LEARNING TO FAIL:

THREE ESSAYS ON RISK ATTITUDES, UNCERTAINTY, AND ENTREPRENEURSHIP EDUCATION

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ABSTRACT

This dissertation examines the impact of Entrepreneurship Education (EE) on first-time entrepreneurs (or nascent entrepreneurs) employing multiple methods in three separate studies. Essay one empirically examines regional differences in risk attitudes among first-time entrepreneurs to test the influence of culture on risk-taking and entrepreneurship. Essay two examines the impact of the Lean Startup Methodology (LSM) (embedded in an experiential learning program and a university startup accelerator) on the risk attitudes of nascent entrepreneurs using longitudinal data. Finally, essay three examines the persistence of nascent entrepreneurs, employing a qualitative methodology, in the early years of building an enterprise, wherein six cases of nascent entrepreneurs are described and compared. These studies contribute to the literature on entrepreneurship education research and provide insights to practice, especially for Entrepreneurship Support Organizations (ESOs), in educating and serving nascent entrepreneurs.

Keywords: Entrepreneurship Education, Nascent Entrepreneurs, Lean Startup Methodology (LSM), Accelerators, Entrepreneurial Cognition, Domain-specific Risk Attitude Scale (DOSPERT), Cushion Theory, Theory of Planned Behavior, Entrepreneurial Intention, Entrepreneurship Support Organizations (ESOs), Locus of Control Risk Attitude, Risk Perception, Uncertainty, Big-Five Personality Types, Startups.

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INTRODUCTION

"The entrepreneurial mystique? It's not magic, it's not mysterious, and it has nothing to do with genes. It's discipline. And, like any discipline, it can be learned."

-Peter Drucker

Genchi Gembutsu ("Go and see for yourself")

-Toyota Production Principle

Entrepreneurship education (EE) has at long last moved beyond the question of whether entrepreneurs are born or made, or whether entrepreneurship can be taught. Entrepreneurs are not born but become, and entrepreneurship can be taught (Rideout & Gray, 2013; von Graevenitz, Harhoff & Weber, 2010; Kuratko, 2005). In the 21st century, as entrepreneurship has become a top global economic driver (Fairlie, 2024; Fairlie, 2022; SBA, 2007), entrepreneurship education curricula at colleges and universities across the globe have grown manifold (Nabi, et al., 2017; Kuratko, 2005; Shane & Venkataraman, 2000). Researchers have attempted to assess the effectiveness of the rapid increase in entrepreneurial pedagogy, both on entrepreneurial intention or the likelihood that an individual will start a firm (Jardim, Bártolo & Pinho, 2021; Bae, et al., 2014; Moriano, et al., 2012; Oosterbeek, Van Praag & Ijsselstein, 2010), and on entrepreneurial action (EA) or the entrepreneur's behavior in response to a judgment or decision about an opportunity (Martínez-Gregorio, Badenes-Ribera & Oliver, 2021; Townsend, Hunt, McMullen & Sarasvathy, 2018; McMullen & Shepherd, 2006).

EE is not only a production line for future entrepreneurs but also promotes critical thinking (Georgescu & Herman, 2020; Sarooghi, Sunny, Hornsby & Fernhaber, 2019) and self-efficacy (Kim, et al., 2020; Hebles, et al., 2019). Nevertheless, if an underlying goal of EE is to make more entrepreneurs rather than to simply teach students about it, the findings are mixed (Jardim, Bártolo & Pinho, 2021; von Graevenitz, Harhoff & Weber, 2010; Carayannis, Evans &

Hanson, 2003). Researchers report little or no association between EE and entrepreneurial intention (Jardim, Bártolo & Pinho, 2021; von Graevenitz, Harhoff & Weber, 2010; Bae et al., 2014). Others find that the strongest correlations between EE and EA appear among those with a prior entrepreneurial orientation (i.e., a family business, prior startup experience) (Martínez-Gregorio, Badenes-Ribera & Oliver, 2021; Georgescu & Herman, 2020; Bae et al., 2014).

Despite these weak correlations, universities have become important centers of training for the next generation of entrepreneurs. Entrepreneurship Support Organizations (ESOs) (Bergman & McMullen, 2021) like coworking spaces, incubators, and accelerators have emerged at these educational institutions as resources for nascent student entrepreneurs (Metcalf, Katona & York, 2021; Hausberg & Korreck, 2018; Hallen, et al., 2014; Cohen & Hochberg, 2014;), with the strong expectation that these resources will increase local economic activity (Cohen, Fehder, Hochberg & Murray, 2019). The root causes of the ineffectiveness of EE in increasing entrepreneurial intention (EI, the intention to start a business) or EA are poorly studied (Ratten & Usmanij, 2021). One possible source of the poor conversion of students to entrepreneurs may lie in how EE is taught, which leans heavily on the notion that entrepreneurs are risk-takers (Furr, 2022; Neck, Neck & Murray, 2019).

EE often begins with two ideas: 1) entrepreneurship is hard, and 2) risky (see Figure 1 below, California Entrepreneurship Educators Conference, 2021). While the first idea is undoubtedly correct, the early positioning of the entrepreneur as a risk taker 1) may discourage students who do not define themselves in this way from entering the field, 2) may encourage risk-taking over critical thinking counter-productively, and 3) taken together, explain the above-mentioned low effectiveness of the link between EE and EI. Entrepreneurship is not a linear, binary path to success or failure. However, most education pedagogies do a poor job of

explaining the actual role of risk-taking in entrepreneurship efforts, and do not teach how successful entrepreneurs can benefit from reducing uncertainty at the early stages of the venture by taking small, calculated risks in iterative experiments.

Most current EE texts and curricula incorporate risk-taking as a central trait of entrepreneurs (Furr, 2022; Neck, Neck & Murray, 2019; Baron & Hmieleski, 2018; Spinelli, Ensign, & Adams, 2014; Timmons & Spinelli, 2003). Entrepreneurship educators in turn perpetuate the idea of entrepreneurs as risk takers, wherein most educators responding to an online survey described entrepreneurs as risk takers. In a recent conference of entrepreneurship educators (8th Annual California Entrepreneurship Educators Conference, 2021), an online poll asked participants to describe entrepreneurs by various attributes ("Entrepreneurs are risk-takers," "Entrepreneurs are open to new experiences," "Entrepreneurs are lucky," " Entrepreneurs are extroverts," "They have all of the above differences," "They have none of the above differences," "They have some of the above differences"). 55% of respondents answered "Entrepreneurs are risk-takers" and 21% answered "They have all of the above differences." And yet, there is no consensus in the literature that risk-taking is a desirable or even effective trait for successful entrepreneurs. In this research, the role of risk attitudes in entrepreneurship will be examined, and the extent to which risk propensity is a reliable construct for EE will be assessed.

This dissertation includes three research studies. In the first essay (Chapter 2), differences in the risk attitudes of entrepreneurs in two regions are examined. Regional difference is used as a proxy for cultural differences. The second essay (Chapter 3) is a longitudinal empirical study of a quasi-experimental design that tests the impact of experiential education (specifically, LSM) on the risk attitudes of nascent entrepreneurs across regions. In the third essay (Chapter 4), the impact of LSM on persistence in entrepreneurship is examined by employing a case study

design. The entrepreneurship journey of six entrepreneurs from the samples of entrepreneurs from essays one and two is analyzed over several years. Chapter 5 includes a general discussion of findings from all three essays as well as suggestions for future research.

1 LITERATURE REVIEW

The following section is a review of the relevant literature on risk-taking, the risk and uncertainty constructs, personality and entrepreneurship, and experiential education as they relate to EE. This review reveals gaps in the recent literature regarding the role of risk attitudes in EE. Specifically, there is a dearth of research on the stability of risk attitudes in EE (Brachert & Hyll, 2014) and virtually no research on the way risk attitudes might change under experiential education. Also, there are no longitudinal studies of how risk attitudes vary among nascent entrepreneurs. Finally, the impact of approaches like the Lean Startup Methodology (LSM) on the risk attitudes of first-time entrepreneurs has not been examined and this research fills that gap.

1.1 Experiential Learning and Entrepreneurship Education

EE research has primarily emphasized its association with entrepreneurial intention (EI), a construct representing the extent to which individuals are committed to act on their new venture (Bae, Qian, Miao & Fiet, 2014). EE has expanded in the 21st Century to include experiential learning (Kolb, 1984) in the form of the Lean Startup Methodology (LSM), among others (Ries, 2011; Blank, 2013; Müller & Thoring, 2012). While still a largely fragmented field of research (see review of meta-analyses of EE in González-López, et al., 2019), much attention has been placed on the counterintuitive lack of significant findings regarding EE and the likelihood to continue with entrepreneurship (Fayolle & Gailly, 2015). Little to no research has been focused on the extent to which experiential programs such as the LSM might improve these outcomes; that is, increase the association between EE and EI or EE and EA.

1.2 Lean Startup Methodology (LSM)

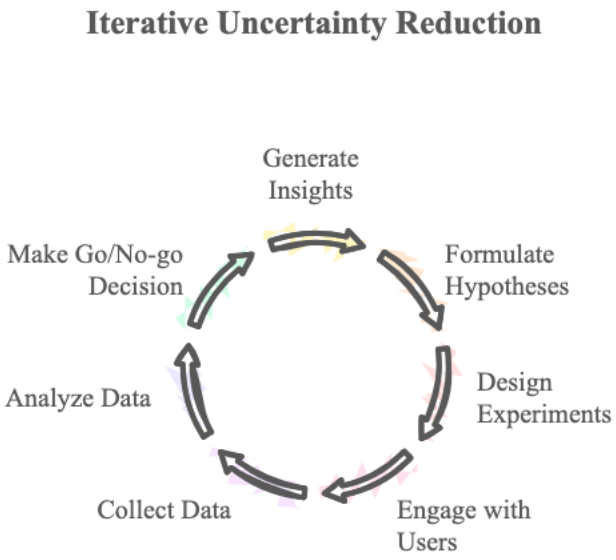
Unlike traditional classroom instruction, which tends to be passive in nature, Experiential Learning Theory (Kolb, 1984) places a premium on active learning by doing. Experiential learning has been adopted heavily in the practice of entrepreneurship, where there has long been a bias for action and failure is considered a learning asset rather than a liability (Politis & Gabrielson, 2009). Since the publication of *The Lean Startup* (Ries, 2011), documenting a methodology for launching new businesses through lean experimentation and customer validation at the expense of detailed business planning and up-front investment, LSM has been readily adopted across universities and entrepreneurship ecosystems as an effective way to launch new businesses. Unlike the historically linear method for teaching entrepreneurship (ideation, market research, product development, and implementation), LSM flips the business development paradigm by encouraging startup founders to seek immediate feedback from customers regardless of product or solution readiness, then to iterate and improve upon their solution based on that feedback. These iterative loops, called pivots, require entrepreneurial agility and cognitive flexibility, but can result in improved market outcomes with less resources put at risk. In essence, the goal is to "fail early and fail fast," or to validate one's hypotheses about the opportunity and its business model without a substantial investment of resources (Blank, 2018).

Alternatively, LSM has been described as a methodological attempt to bring the scientific method (Campbell, 1969) to the creation of startups (Zellweger & Zenger, 2022), exposing entrepreneurs to trial-and-error dynamics as a means to test their beliefs about their new ventures. This programming exposes participants to decision points where they decide to go forward or not to go forward with the project. In the traditional EE approach, such decision points often do not appear until much later in the business life cycle. This tests the willingness of

those individuals to experience failure, be open to change, and to tolerate a risk laden environment. LSM and other similar EE methods are founded on experiential learning to launch and build startup companies (Ries, 2011; Blank, 2013). Within the LSM framework, entrepreneurs design low risk, low-cost customer experiments, gather data from the market, and iterate their business models based on incoming data. This constant flow of incoming new information forces a perpetual revising of entrepreneur's core beliefs about the venture, its risk parameters, and its likelihood of success (see Figure 1 below).

This environment provides an opportunity to study how entrepreneurs deal with risk. Whether experiential entrepreneurship programs like the LSM produces better results needs to be examined empirically. A major design characteristic of LSM in EE programs is forcing nascent entrepreneurs to conduct extensive and in-depth interviews with potential customers. This activity accomplishes two things that have a bearing on risk attitudes. First, facts gathered "outside the building" (Blank, 2013) can reduce the inherent uncertainty of the venture and allow entrepreneurs to better assess financial risks. Second, the process of forcing interactions with "customers" through this discovery process enhances communication and collaboration skills to potentially increase the willingness to take social risks to generate customer feedback. Taken together, LSM becomes a methodology not to reduce risk, but rather to reduce uncertainty.

Figure 1: Uncertainty Reduction within LSM



Little crossover has been uncovered between the domains of EE and risk perception research. Fairlie and Holleran (2010) found that more risk tolerant individuals may benefit more from entrepreneurship training than less risk tolerant ones. They found that higher levels of risk tolerance were associated with a higher likelihood of starting a business (EI). These findings are important in the design of education programs aimed at increasing startup activity within a region. They also bear on the selection process of participants in accelerator programs, assuming that risk tolerance is in fact a stable trait and not manipulable through training interventions. In an empirical study conducted among 99 graduate students in a LSM course, Ladd and Kendall (2017) found that participants became more risk averse after being exposed to LSM. They reasoned that participants learned to convert uncertainties (unknown unknowns) about their new ventures into calculated risks (known unknowns) and take measures to hedge against those risks.

1.3 Start-up Accelerators & Entrepreneurship Education

Experiential entrepreneur education programs (accelerators, incubators, venture competitions, etc.) that aid new entrepreneurs during the early stage in the business life cycle and

serve as filtering mechanisms for durable ventures are growing (Cohen, 2013). Accelerator programs like EE programs are cohort-based, time delimited experiential learning programs. Successful graduates of these programs often continue with their new venture, seek additional venture funding, bringing their products to market, and occasionally obtain substantial success in the marketplace. Researchers are still assessing what are the most important factors that shape successful entrepreneurship following participation in accelerators and other similar startup programs (Hallen, Bingham & Cohen, 2014). Considerations include prior startup experience, regional factors, team dynamics, program characteristics, and individual characteristics such as personality traits and risk attitudes. Variation among these factors appears to matter with respect to the survival of startups, their growth prospects and possibly even their chances of successful exit (Cohen, 2013). However, the extent to which these programs affect participants' attitudes toward the riskiness of the venture, or their overall risk propensity is largely unknown.

Accelerator programs are designed to teach entrepreneurs and their teams' strategies and tactics to overcome uncertainties, to drive growth and value into the business, and to de-risk certain aspects of the venture as it relates to future prospects. Accelerators are shown to have impact on the survival of new ventures (Hallen, Bingham & Cohen, 2014). The effectiveness of accelerators has also been shown to be important to the long-term economic prospects of regional economies (Fehder & Hochberg, 2014). Generally, it has been found that entrepreneurs with prior startup experience perform better in accelerators than first time entrepreneurs (Colombo, Rossi-Lamastra & Wright, 2018).

Shwetzer, Maritz, & Nguyen (2019) explored entrepreneurial ecosystems generally, along with their role in supporting startup activities in a region. They noted that university accelerators play a significant role in shaping entrepreneurial ecosystems by providing

knowledge, research, and talent. Crișan et al. (2021) provided a comprehensive overview of the scholarly research on startup accelerators over the past 15 years (2005-2020), pointing to a lack of understanding of the outcomes of accelerators given their diverse objectives and contexts. In studying accelerators in the university context through a survey of accelerator directors and staff, Metcalf, Katona, and York (2021) found that accelerators primarily serve as platforms for entrepreneurial education, rather than launchpads for new businesses. Aldrich & Ruef (2018) note that first-time entrepreneurs participating in an accelerator program are well-suited for a risk attitudes study as they are less susceptible to survivorship or selection biases.

1.4 Risk Attitudes and Entrepreneurship Education

Indeed, there are many reasons why individuals choose to become entrepreneurs. Personality traits and attitudes may be among them. Views from psychology hold that high risk tolerance favors entrepreneurship (Rauch & Frese, 2000). Most introductory textbooks begin the teaching of entrepreneurship with the introduction either of standard bearers of risk-taking (i.e. Richard Branson, Donald Trump, Elon Musk, and so forth) or personality tests by which students may quickly assess their qualities relative to the entrepreneurial mindset (Baron, & Hmieleski, 2018; Spinelli, Ensign, & Adams, 2014; Timmons & Spinelli, 2003). In a review article, Hisrich, Langan-Fox, and Grant (2007) concluded that a causal relationship between risk and entrepreneurship could not be established conclusively. However, researchers continue to emphasize risk tolerance as an important entrepreneurial trait (Guiso, Sapienza & Zingales, 2018; Ladd & Kendall, 2017; Buckley, et al., 2016; Block, et al., 2015; Baum, et al., 2014; Fairlie & Holleran, 2012; Macko, & Tyszka, 2009). Subsequently, the topic of risk tolerance as an entrepreneurial trait remains a mainstay of EE research (Arpiainen & Kurczewska, 2017; Bandera, Collins & Passerini, 2018; Fayolle & Gailly, 2015; Hameed & Irfan, 2019; Gurol & Atsan, 2006; Jones & English, 2004). For improved outcomes in EE, the field needs a better

understanding of the relationship between risk attitudes of nascent entrepreneurs and entrepreneurial intention, which includes theory building around the cultural and regional antecedents to risk attitudes as they relate to entrepreneurial intention, as well as understanding that entrepreneurship educators may be conflating risk and uncertainty to cause further confusion.

1.5 Attitudes and Entrepreneurial Intention

Research on entrepreneurial intention (EI) has focused on personality traits, attitudes toward risk, locus of control, self-efficacy, and other individual characteristics (see, for example, Salmony & Kanbach, 2021; Kerr, Kerr & Xu, 2017; Miller, 2015; Rauch, 2014). This work has primarily sought to 1) differentiate entrepreneurs from other types of workers (Busenitz & Barney, 1997; Salmony & Kanbach, 2021); 2) predict which type of people are more likely to become entrepreneurs (Segal, Borgia & Schoenfeld, 2005; Arenius & Minitti, 2005); or 3) identify the characteristics conducive to successful entrepreneurial outcomes (Ciavarella et al., 2004). Entrepreneurship researchers have examined whether the Big-Five Personality Traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism) have mixed results as far as the predictive power of these traits as they relate to success in entrepreneurship (Kerr, Kerr & Xu, 2017). The findings have been mixed, and Zimmer (1986) concluded that the personality theory of entrepreneurship is weak because entrepreneurship happens necessarily within the context of social networks and cannot, therefore, be reduced to individual characteristics.

In addition to the Big-Five, other instruments have been applied to entrepreneurship research. Rotter's Locus of Control (LoC) Scale (1966) has been used to evaluate the extent to which entrepreneurs are disposed to view themselves as subject to their efforts and actions (internal locus of control) or subject to the actions of inevitable outside forces (external locus of

control). Rotter (1996) found that individuals with an external LoC believe circumstances beyond their immediate control, such as luck, fate, and other people, affect their outcomes. Individuals with an internal LoC believe they control events and outcomes in their lives. Entrepreneurs are thought to possess relatively higher internal LoC. Kroeck, Bullough, & Reynolds (2010) found that individuals with an internal LoC are more likely to engage in entrepreneurial activity (see Salmony & Kanbach, 2021). Numerous studies on LoC have replicated these results (Mueller and Thomas, 2000; Utsch and Rauch, 2000).

1.6 Risk and Uncertainty

The primary job of entrepreneurs and managers, regardless of the size or stage of a business, is to make strategic decisions in the presence of uncertainty and risk (Simon, 1979). However, uncertainty and risk are different (Magnani & Zucchella, 2023; Alvarez & Barney, 2005; Keynes, 1921; Knight, 1921). The misunderstanding of the difference between uncertainty and risk may be responsible for major market failures (Taleb, 2007) and the high failure rate of businesses, including new ventures. Entrepreneurship research has investigated the difference between risk and uncertainty (see Koudstaal, Sloof, & Van Praag, 2016; Gifford, 2010; Tversky and Fox, 1995; Toma, Chiriţă, & Şarpe, 2012; Knight, 1921). Under conditions of risk, all possible outcomes are known, and the probabilities of those outcomes are known, but the exact outcome is unknown and subject to those known probabilities. Under conditions of risk, decision making can be enabled probabilistically and with expected utility theory (see Knight, 1921). A roll of the dice is an appropriate metaphor for risk, where all outcomes and probabilities are known.

Under uncertainty, however, neither the outcomes nor the probabilities of those outcomes are known. Tannenbaum, Fox, and Ülkümen (2017) demonstrate that the nature of uncertainty—

whether it stems from a lack of knowledge (epistemic) or from inherent randomness (which they refer to as aleatory)—has a meaningful impact on how people assess probabilities. When faced with epistemic uncertainty, individuals tend to provide more extreme and confident judgments, though these are often poorly calibrated and less accurate. In contrast, decisions made under aleatory uncertainty are generally more moderate and better reflect actual probabilities. This research underscores how uncertainty is framed or understood can significantly influence the confidence and accuracy of people's predictions, which carries important consequences for domains like forecasting and risk assessment. This may also affect how entrepreneur educators train the next generation of entrepreneurs. Tannenbaum and colleagues have found support for experiments (see Ellsberg, 1961; Tversky & Kahneman, 1974), where participants prefer choices (in this case, Ellsberg urns) with known probabilities (risk) over urns with no precise probabilities (ambiguity). This is interesting in that it may help explain the tendency to focus on risk rather than uncertainty in EE; that is, people may prefer to assume that probabilities can be known in entrepreneurship (i.e., the odds of being successful) over the more likely ambiguity/uncertainty of those outcomes.)

Early-stage ventures are associated with conditions of uncertainty due to the lack of a proven track record, unproven demand, and a myriad of unknown factors, whereas established companies, it is argued, operate under conditions of risk (Gifford, 2010; Alvarez & Barney, 2005). Nevertheless, EE consistently uses risk terminology to describe entrepreneurship in practice (Bandera, Collins, & Passerini, 2018; Sirelkhatim & Gangi, 2015; Morris, Webb, Fu & Singhal, 2013; Pittaway & Cope, 2007). Entrepreneurs have been described as more risk-tolerant than managers, although these findings are often conflicting (de Blasio, De Paola, Poy, & Scoppa, 2021; Palich & Bagby, 1995; McGrath, MacMillan, & Scheinberg, 1992). One possible

effect of this description is that the myth of the risk-taking entrepreneur may increase early attrition by discouraging those who self-select as less risk tolerant. Moreover, risk-taking is domain-specific (Weber, Blais & Betz, 2002), and some domains of risk-taking may be undesirable in the nascent stages of entrepreneurship (DeNisi & Alexander, 2017). The mythologizing of startup founders attracts the wrong mindset. Additionally, the pedagogical approach to teaching entrepreneurship relies heavily on linear planning processes consistent with large firms rife with resources, where risk mitigation and management make sense. In a startup environment, where uncertainty predominates, these practices are ill-timed and overwrought. Surprisingly, these ideas (risk-taking, risk aversion, risk propensity) are still covered in entrepreneurship courses.

The risk and uncertainty constructs are confounded in both the practice of entrepreneurship, particularly at the critical earliest stage of the nascent entrepreneur in an education program, and in the research on entrepreneurship, where we replace risk perception with risk propensity (Simon, Houghton & Aquino, 2000) and yet still fall back to the notion of entrepreneurs as great risk takers. In a lab experiment, Koudstaal, Sloof, & Van Praag (2016) found that although entrepreneurs perceive themselves as more risk-tolerant than managers, they do not reveal this difference in choice experiments. Instead, entrepreneurs display lower levels of loss aversion. There is a need for entrepreneurship educators to further distinguish between uncertainty and risk and discuss how risk is domain-specific (Weber, Blais & Betz, 2002).

1.7 Entrepreneur Risk Perception

The extent to which entrepreneurs perceive something as risky has also been widely studied, although with conflicting results. Some researchers found significant differences in risk tolerance between entrepreneurs and non-entrepreneurs (Ahmed, 1985; Brockhaus, 1980). Others found that risk aversion mediated the effect of certain personality traits on entrepreneurial

intention (Ahmed, Khattak & Anwar, 2020). Astebro and colleagues (2014) interpret the reasons for entry into entrepreneurship as partly due to differences in levels of risk aversion. It is also found that risk aversion has a significant negative impact on the likelihood of entering entrepreneurship (de Blasio et al., 2021). Miner and Raju (2004) discovered that entrepreneurs are highly risk-avoidant compared to non-entrepreneurs, further confounding the decision-making research. In a meta-analysis, Stewart and Roth (2021) found evidence that entrepreneurs showed higher risk propensity than others. Past research on risk perception and entrepreneurial intention is conflicting. A mixed methods approach, which delves deeply into the hands-on aspects of the accelerator as an entrepreneur support organization (ESO) (Bergman & McMullen, 2021), may clarify this puzzle. Kerr, Kerr & Xu (2017), in an exhaustive review of the literature since 2000 on personality and risk attitudes in entrepreneurship, point to several gaps in our understanding of the links between performance and why entrepreneurs abandon their ventures. They identify the state-of-the-art study as one that utilizes longitudinal data, measures personality data before market entry is decided, and takes observations, including traits like risk attitude, all of which are characteristic of the current studies.

1.8 Domain-specific Risk-taking, Cushion Theory, & Entrepreneurship

Entrepreneurship researchers have found associations between risk attitudes and startup success (Stewart & Roth, 2001). One group (see Miner & Raju, 2004, for example) holds that entrepreneurs are, in fact, more risk-avoidant, particularly in the financial domain. Risk-taking has been chiefly studied independently in two main areas: in psychology as a personality trait, as in how likely is one to engage in a risky activity (Weber, Blais & Betz, 2002) and business, mainly finance, wherein risk preferences are assessed within the context of an economic theory (Hanna, Gutter, & Fan, 2001) as expected values of rational decisions. This division has been incorporated into the EE field in a way that confuses risk attitude (how likely one is to take a

specific risk) with risk perception (how risky something is perceived). On the one hand, risks need to be assessed and mitigated. Known risks that exist for businesses with extensive operating history and market knowledge can often be insured against (Masci, 2011).

Historically, entrepreneurs have been labeled as heroic risk takers and disrupters since the time of Schumpeter (1934). Knight (1921), for whom profit was the reward for the risk entrepreneurs take, did more to marry risk and entrepreneurship than any other economic theorist (Townsend, Hunt & Rady, 2024). Risk has then become inseparable in the literature and in practice from the entrepreneur, which needs to be scrutinized. Risk attitudes are found to be domain-specific (Weber, Blais & Betz, 2002). Weber and colleagues note that individuals reveal different attitudes toward risk depending on the classification of that risk (for example, financial risk versus social risk). Their Domain-specific Risk-Taking Scale (DOSPERT) has been widely used to measure risk attitudes by domain and found to be a reliable measure of domain-specific risk attitude (see Shou & Olney, 2020, meta-analysis of the reliability of the DOSPERT scale). De Groot and Thurik (2018) contend that a conflation of uncertainty attitudes with risk attitudes is related to the well-studied DOSPERT scale (Weber, Blais & Betz, 2002). The conflating of risk-taking as a business activity and an individual characteristic of the entrepreneur has been a source of confusion in the field (Macko & Tyszka, 2009; Mullins & Forlani, 2005). The afore-mentioned DOSPERT scale (Weber, Blais & Betz, 2002) has also been utilized on a minimal basis to examine correlations between risk attitudes and engagement in entrepreneurial activity (Highhouse, Wang & Zhang, 2022; Joseph & Zhang, 2021). Joseph & Zhang (2021) point to the need to examine how domain-specific risk-taking behaviors among entrepreneurs relate to long-term outcomes such as success or failure.

A substantial body of cross-cultural research around risk-taking relates to the "cushion" hypothesis, first proposed by Hsee and Weber (1999), which contends that individuals within a collective society (i.e. Asia) may be less risk averse in the financial domain because they may rely on support from their community (government, family, friends). The cushion theory posits that Western individualist cultures provide weaker social safety nets for risk takers, and consequently, individuals should display greater risk aversion in their financial decision-making. While cushion theory can arguably explain differences in risk-taking among cultural groups, the theory conflicts with the prevailing idea in the *zeitgeist* that people in individualist societies (like the United States) are prone to risk-taking, whereas people in collectivist countries (like China) are prone to avoid uncertainty or risk (Gelfand, Bhawuk, Nishii, & Bechtold, 2004; Bhawuk & Udas, 1996; Singelis, Triandis, Bhawuk, & Gelfand, 1995).

Nobre, Grable, Da Silva & Da Veiga (2016) noted the dearth of studies documenting variations in financial risk attitude based on country of origin. They further stated that much of this research (Fan & Xiao, 2006; Hsee & Weber, 1999) compares U.S. cohorts to those of other countries. There is little research on comparisons across different domains of risk perception. Moreover, no known studies compare domain-specific risk attitudes between various groups in one country, where cultural and/or regional nuances may be at work. Grable (2008) points to best practices in also considering other factors when comparing risk attitudes, including socioeconomic and demographic factors (such as education, gender, experience, field of study), pointing to the need to also consider location (and all the geographic distinctions that may bear on entrepreneurial intention).

The above literature review reveals several important gaps. Firstly, terminological confusion (risk-taking, risk-perception, uncertainty) has propagated into EE significantly and

needs to be resolved through further research into the empirical link between risk attitudes, EE, and EI. Furthermore, there have been no recent studies on whether educational methods such as LSM influence entrepreneur risk attitudes, and very few studies have examined the correlation between risk attitudes and entrepreneurial outcomes at the individual level. In Essay One of this research, by measuring the domain-specific risk attitudes of nascent entrepreneurs by using the DOSPERT scale, cushion theory is tested in a more fine-grained differentiation of risk than previously studied. This is further accomplished by comparing within-country differences in entrepreneurial risk attitudes across two regions. Essay Two examines the stability of domain-specific risk attitudes in a longitudinal study in a university accelerator program. Finally, Essay Three examines the impact of LSM on the persistence of entrepreneurs in the field, an area for which there is no empirical research. This research may contribute to filling these gaps.

ESSAY 1: Startup Paradise or Paradise for Startups: A Cross-Cultural Comparison Study

"Without risks, there cannot be breakthroughs."

-Peter Diamandis

2 Introduction

This field study explores differences in the domain-specific risk attitudes of similar groups of nascent entrepreneurs in two different US regions in existing entrepreneurship programs. Data was collected anonymously through an online survey employing scales to measure risk attitudes, personality, and locus of control. The description of the programs, samples, and the methodology for data collection and analysis are described below.

Risk-taking plays an outsized role in the myth of the successful entrepreneur, so much so that risk-taking is nearly synonymous with entrepreneurship. As the United States has continued to promote entrepreneurship and innovation as the foundation for economic growth (USEDA, 2023), programs of education and training on the subject of entrepreneurship have witnessed substantial increases (Rideout & Gray, 2013; von Graevenitz, Harhoff & Weber, 2010; Kuratko, 2005). According to AACSB, the demand for entrepreneurship education (EE) in 2020 rose by 66% over the previous year. This parallel growth of new venture creation and entrepreneurship education in the US has produced poor results, at least as measured by the high failure rate of nascent firms (see US Bureau of Labor Statistics, 2016).

While EE has been a growth area for the past several decades with university-led accelerators, incubators, and new degree-granting programs, its effectiveness is not well studied (Osterbeek & van Praag, 2010). EE programs introduce first-time entrepreneurs, many of whom are students, to the entrepreneur mindset (risk-taking, experimentation, critical thinking) and the strategies of early-stage startup ventures (business planning, team formation, resource acquisition, etc.). Increasingly, these take the form of experiential learning programs wherein

participants learn by doing and launch startup ventures. At this point, the failure rate of ventures is exceptionally high, with less than one in one hundred successfully receiving necessary outside capital (Aldrich & Ruef, 2018). The US Bureau of Labor Statistics estimates that more than 50% of new businesses will fail within the first five years of their inception (USBLS, 2016). New entrepreneurs often decide that the risks are too great and abandon the venture at this nascent stage.

The most surprising finding (and disappointing one for entrepreneurship educators) is the near nonexistent correlation between Entrepreneurship Education (EE) (despite the great enthusiasm for it) and Entrepreneurial Intentions (EI). In a 2014 meta-analysis of 73 studies (37,285 individuals), Bae et al. (2014) found a small but significant correlation between EE and EI, which disappeared when controlling for entrepreneurial intentions that preexisted the coursework. Indeed, with no track record of producing active entrepreneurs, entrepreneurship educators would be hard pressed to claim more than anecdotal credit for positive entrepreneurial outcomes, let alone myriad success stories. Herein, we explore the possibility that regional cultural differences in risk attitudes may be at the heart of poor entrepreneurial intention-action conversion rates, and that entrepreneurship education needs to better account for these differences with more refined programs in support of emerging regional entrepreneurship.

2.1 Gaps in the Literature

There are numerous reasons why students pursue entrepreneurship education. It may be compulsory, as part of a major, minor, or certificate program (Hahn et al., 2020). They may already be interested in entrepreneurship as a career choice (Sieger et al., 2011). Many universities have actively sought to become more "entrepreneurial," carving their place in their local, regional, and national startup ecosystems (Bergmann, Hundt, & Sternberg, 2016). Despite a dramatic increase in entrepreneurship-related courses and coursework (Hoppe, 2015; Kuratko,

2005), the impact of EE is not clearly documented in research. Numerous studies have found limited or no association between coursework and becoming an entrepreneur (Bae et al., 2014; Entrialgo & Iglesias, 2016; Duong, 2022). Others noticed only a correlation between EE and EI among elective courses (Hahn et al., 2020), presumably where a higher percentage of students are found predisposed to become entrepreneurs compared with the students in the required courses. This effect, interestingly, was not found among students who were "embedded" in a family entrepreneurship condition (Hahn et al., 2020). Background and attitudes are substantially considered antecedents to EI (Ajzen, 1991). Thus, the research stream on EE and its linkage to EI and EA is incomplete and requires further examination.

The current study compares the risk attitudes of first-time entrepreneurs in two distinctive US geographies (Hawai'i and Washington) along with specific perceived behavioral controls (i.e., Locus of Control, Rotter, 1966) and personality traits (Big Five Personality Locator, Goldberg, 1992) as possible confounding variables. Specifically, the extent to which culture may influence risk attitudes is examined. Building on the Theory of Planned Behavior (TPB) (Ajzen, 1991), risk attitudes reflect attitudes toward behavior, and locus of control reflects perceived behavioral control. Certain personality traits may provide a foundational context on which these attitudes and perceived controls moderate entrepreneurial intentions. Van Gelderen et al. (2008) used TPB to investigate the EI of business schools. They found entrepreneurial alertness (see Kirzner, 1973 on the extent to which individuals are alert to entrepreneurial opportunities), among four perceived behavioral control variables, and financial security (or the extent to which a person attaches importance to financial security) among five attitudinal variables, to be the most important in predicting EI. Finally, place (regional geography) may be a critical factor

related to entrepreneurial intention that educators should consider if our goal is to train the next generation of regional business leaders.

The literature reveals several gaps. Firstly, terminological confusion (risk-taking, risk-perception, risk or uncertainty) has propagated into EE to a significant extent and needs to be resolved through further research into the empirical link between risk attitudes, EE, and EI. Furthermore, there have been no recent studies on whether educational methods such as LSM influence entrepreneur risk attitudes, and very few studies have examined the correlation between risk attitudes and entrepreneurship outcomes at the individual level. In this research, by measuring the domain-specific risk attitudes of nascent entrepreneurs by using the DOSPERT scale, cushion theory is tested in a more fine-grained differentiation of risk than previously studied. This is further accomplished by comparing within-country differences in entrepreneur risk attitudes across two regions.

2.2 Objective

This study examines the extent to which domain-specific risk perceptions differ between a sample of Hawai‘i-based entrepreneurs and a sample of Washington-based entrepreneurs. Entrepreneur Intention (EI), the declared intention to become an entrepreneur (Fayolle & Liñán, 2014), may be significantly influenced by the nascent entrepreneur’s perception of the risk associated with turning that intention into action. This study examines risk attitudes of two groups of nascent entrepreneurs, where the primary differences are regional culture and geography. Convention in entrepreneurship research maintains that more risk-averse individuals are less likely to become entrepreneurs (Caliendo, Fossen, & Kritikos, 2009). It is argued here that risk attitudes are considerably more nuanced for nascent entrepreneurs and require that other factors, including but not limited to domain-specific risk attitudes (Weber, Blais & Betz, 2002), regional, cultural, and economic differences, be considered.

2.3 Research Question

Despite a deep canon of risk attitude research related to entrepreneurship, there are no within-country studies of variations in risk attitudes. This invites the research question: *Are there regional differences in risk attitudes of nascent entrepreneurs that bear on entrepreneurial intention?* Numerous opportunities exist to deepen our understanding of how risk attitudes vary among entrepreneurs regionally, culturally, and economically. This study begins to fill that gap. Arpiainen and Kurczewska (2017) noted that our understanding of how risk perception changes in entrepreneurship education programs is absent from research. Conclusive results regarding risk tolerance and the entrepreneur remain elusive, and theory building is at a standstill (Hisrich & Peters, 2002; Miner & Raju, 2004; Stewart & Roth, 2001; Salmony & Kanbach, 2021). Nevertheless, risk as an individual trait persists in the literature as an entrepreneurial skillset (Baron & Shane, 2004; Kuratko, 2005). Rationalizing the definitions of risk and uncertainty related to entrepreneurship teaching may go a long way to improve the practice.

2.4 Theoretical Framework and Hypotheses

In this research, Ajzen's Theory of Planned Behavior (Ajzen, 1991) is employed, which has been applied by other researchers in the entrepreneurship education and general entrepreneurship research domain (Lortie & Castogiovanni, 2015; Gelderen et al., 2008). TPB explains actions based on attitudes, subjective norms, and perceived behavioral control. Within TPB, starting a business is an intentional, planned behavior. In a review paper, Lortie and Castogiovanni (2015) highlight TPB as a dominant framework that is employed to predict the intention to start a business. They note, however, a gap between EI and entrepreneurial action (EA); the so-called intention-behavior gap. TPB in the entrepreneurial context may involve the above antecedents in shaping entrepreneurs 'attitudes (entrepreneurial intention) and

subsequently their decision to create, abandon, or continue a new business venture (entrepreneurial action). To the extent that this model accurately describes the actions of a nascent entrepreneur, we should expect differences in attitudes and perceived behavioral control to ultimately result in different entrepreneurial intentions.

The standard TPB model may be updated in the entrepreneurial context, where intention becomes EI and behavior becomes EA. (see Figure 3 below). Further (in Figure 4 below), attitudinal variables (risk perception and Big Five personality traits), subjective norms (culture), and a perceived behavioral control variable (locus of control) are incorporated into the TPM model.

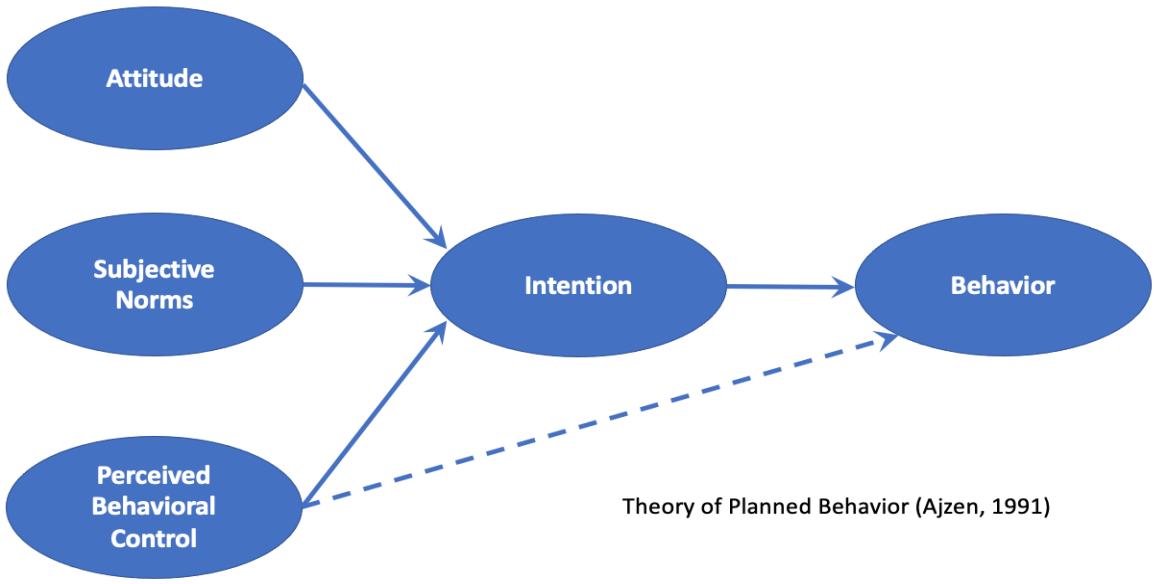


Figure 2: Theory of Planned Behavior

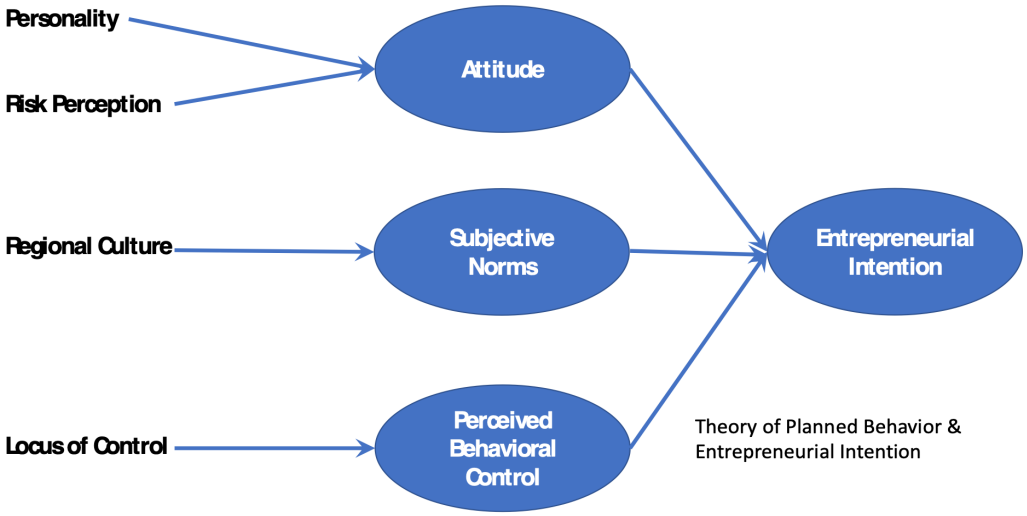


Figure 3: A Model of the Theory of Planned Behavior and Entrepreneurial Intention

The literature relies on TPB to explain EI and ultimately EA. Still, gaps described above oblige researchers to develop a more precise understanding of the impact of attitudes and perceived behavioral controls on EI and EA, in response to the question of whether regional and cultural variation exists among entrepreneurs in these antecedents. Previous analyses of collectivism and individualism within the United States have ranked these constructs by state (Vandello & Cohen, 1995), placing Hawai‘i at the highest rank for collectivism and Washington State at forty-three (out of fifty states) on the same scale. Given the cushion theory discussed above, one would expect entrepreneurs in Hawai‘i (more collectivist) to display greater tolerance toward risk, particularly within specific risk domains, than their counterparts in Washington.

Hypothesis 1-7. Nascent entrepreneurs in Hawai‘i will display higher risk tolerance by domain than similar entrepreneurs in Washington.

This analysis (and corresponding hypotheses) may be further broken down into domains of risk (Blais, Weber & Betz, 2002), building on the cushion theory wherein the more collectivist orientation of Hawai‘i residents will result in 1) lower risk-taking in the ethical domain due to

community pressures to conform to ethical standards, but 2) higher risk-taking in the health, recreational, social and investment domains due to the relative collective safety net provided in the regional culture.

Table 1: Hypotheses

Hypothesis	Risk Variable	Description
H1	Risk Overall	Nascent entrepreneurs in Hawai'i will display **higher** risk tolerance by domain than similar entrepreneurs in Washington
H2	Ethical	Nascent entrepreneurs in Hawai'i will display **lower** tolerance for ethical risk taking than similar entrepreneurs in Washington
H3	Health/Safety	Nascent entrepreneurs in Hawai'i will display **higher** tolerance for health/safety risk taking than similar entrepreneurs in Washington
H4	Recreational	Nascent entrepreneurs in Hawai'i will display **higher** tolerance for recreational risk taking than similar entrepreneurs in Washington
H5	Social	Nascent entrepreneurs in Hawai'i will display **higher** tolerance for social risk taking than similar entrepreneurs in Washington
H6	Investment	Nascent entrepreneurs in Hawai'i will display **higher** tolerance for investment risk taking than similar entrepreneurs in Washington
H7	Gambling	There will be **no significant differences** in HI and WA groups in the gambling domain
H8	Locus of Control	Nascent entrepreneurs in Hawai'i will display **greater** internal locus of control than similar entrepreneurs in Washington
H9	Personality	Differences in risk attitudes among regional entrepreneurs will be **reduced** when controlling for personality traits

In a cross-cultural study, Hsee and Weber (1999) found differences in risk tolerances between Chinese and Americans, which was attributed to cultural dissimilarities; Chinese were collectivists, whereas participants from the US were individualists (see Fan & Xiao, 2006). Perceived behavioral control (Ajzen, 1991) may be necessary in explaining sources of variation in EI among groups within a country with visible cultural dissimilarities. Mueller and Thomas (2001) found correlations between internal locus of control and individualism, and at the same time found support for higher entrepreneurial orientation among individualist cultures.

Hypothesis 8. Nascent entrepreneurs in Washington State will display a greater internal locus of control than those in Hawai'i.

Some personality researchers attribute the difference in risk attitudes among individuals to be a function of personality traits (Zhao, Seibert, & Lumpkin, 2010). Entrepreneurship researchers have attempted to correlate personality traits like the Big Five (Goldberg, 1992) with entrepreneurial outcomes, but with mixed results (Arenius & Minitti, 2005). Nicholson, Soane, Fenton-O'Creevy, and Willman (2005) found that overall risk propensity was directly correlated to the Big Five factors of extraversion and openness, and negatively correlated to neuroticism, agreeableness, and conscientiousness. It is expected that entrepreneurs from different regions would display different traits with respect to personality based on regional and cultural factors. However, since personality traits vary widely at the individual level, these differences in risk attitudes should be minimized when controlling for personality traits.

Hypothesis 9. Differences in risk attitudes among the two regional groups of entrepreneurs will be reduced when controlling for personality traits.

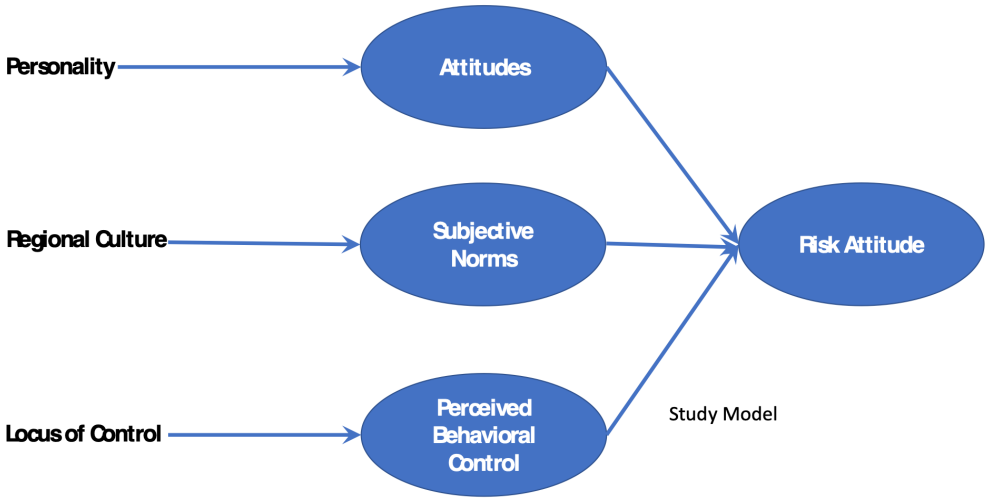


Figure 4: Study Model: Antecedents to Entrepreneur Intention

2.5 Methodology

This field study explored differences in domain-specific risk attitudes of similar groups of nascent entrepreneurs in two regions of the US. In addition to collecting data on risk attitudes, personality trait data (attitudes) and perceived behavioral control (locus of control) data were collected anonymously through an online survey applied at various times over six years (2019-2023). The two samples and the data collection and analysis methodology are described below.

2.5.1 Program Descriptions

Participants were selected from two similar EE programs: 1) a six-week summer university startup accelerator program (each cohort with about ten teams of two to four members) in Hawai‘i and 2) an experiential entrepreneurship course in Washington. Both programs employ LSM in their curricula.

Hawai‘i Program. The goal of the Hawai‘i program is to encourage student entrepreneurs who may have participated in other entrepreneur programs during their time at the university or started a business while pursuing their studies simultaneously to continue the pursuit of their ventures. The accelerator is designed to help them determine whether the venture is worth pursuing by utilizing LSM’s customer discovery processes to validate “problem-solution” fit (Blank, 2013; Ries, 2011). This entails extensive interaction outside of the classroom with real potential customers to validate and co-create solutions that solve real problems. This approach reduces uncertainty about new ventures and increases the likelihood of success for nascent entrepreneurs. The program is open to all local entrepreneurs, and the requirement is that at least one team member must be a registered student at the time of application to the program. Typically, program applicants are student entrepreneurs engaged in first-time entrepreneurship, having started their business just before or very recently with respect to the program's start.

Occasionally, applicants have already launched some early aspect of the business and seek assistance in expanding or growing the venture, though it is still nascent.

The program has been running for eight years and has produced several new businesses that continue to survive and grow after completing the LSM program. Data collection for this study was conducted over five years from 2018 to 2022. During this period, the program accepted 52 teams of between two and five team members from among 455 applications (n=146/455 = 32% individuals total). Teams comprised students (graduate, undergraduate, and alums) and some faculty team members, nearly all of whom were engaged in entrepreneurship for the first time as they entered the accelerator program. The application process requires a detailed application including demographic, biographical, and descriptive information about the venture and its stage and an in-person interview between program staff and the cofounding team. Acceptance into the program requires that the team abide by the intensive commitment requirement of time and effort; voluntary or involuntary attrition rates trend approximately 10% each year (people who completed the program, n = 131).

Washington Program. The Washington program is an experiential entrepreneurship course utilizing LSM as the primary methodology for ideation, market validation, and business model development. In the case of the Washington sample, most students pursue either a graduate certificate or an undergraduate minor in entrepreneurship and enroll in this specific course to satisfy a requirement of either the graduate certificate or the minor in entrepreneurship. Each year, up to 60 students are enrolled in the program, which constitutes a 10-week, experiential curriculum wherein student teams seek active feedback from outside the classroom to validate the core aspects of their proposed new business venture. Students were invited to complete the same online survey before the start of the course, which the Hawai‘i sample

completed. Like the Hawai‘i counterpart, the Washington program is entirely experiential in that students (mostly first-time entrepreneurs) work together in teams to ideate, validate, and develop a new venture during a 10-week program. Teams completing this initial course usually continue in a second course, which focuses on business model development and results in a formal entry into the university’s business plan competition in the Spring. Like the Hawai‘i program, nearly all these participants are first-time entrepreneurs, developing nascent ventures in the earliest stage of development. Like the Hawai‘i program, many of these teams will continue to develop their businesses after completing the LSM program.

The two programs are different only in length and location, incorporating similar methodology throughout, and each was led by the same instructor during the research period. The methodology of the Washington for-credit course, while containing nuances that vary from the Hawai‘i extra-curricular accelerator, is structured on the same basic organizing principles, requiring teams to utilize LSM to validate (or invalidate) every aspect of their nascent ventures, often revising both their beliefs about the business model and business plans as they accumulate external data from the marketplace. The participants of this research are motivated entrepreneurs who provide a sample that may be representative of the population of real-world nascent entrepreneurs

2.5.2 Samples

To ensure comparability, only pre-program survey responses from both samples were included in the analysis. This helped remove the programmatic influence. Participation in the research was voluntary. The personality scale was introduced in year three of the study period, which is the reason for the smaller sample sizes for this scale. Sample sizes for the three instruments for the two locations were: risk perception, n=119 (Hawai‘i =76; Washington=43),

locus of control, n=119 (Hawai‘i=76; Washington=43), Big Five personality, n=101 (Hawai‘i=58; Washington=43). Missing data, along with test responses, was removed.

Table 2: Sampling Frame/Final Samples

	Sampling Frame		Sample
Hawai'i	Applicants	Participants	Respondents
Risk			76
Locus of Control			76
Personality*			58
Total	455	146	76
Washington	Applicants	Participants	Respondents
Risk			43
Locus of Control			43
Personality			43
Total	n/a	95	43

** Personality scale added in year 3*

2.5.3 Methods

Several methods were utilized to compare the two field samples. Historically, risk perception studies chose a one-shot design where risk was either the independent variable (antecedent to entrepreneurship outcomes) or the dependent variable (entrepreneur characteristics, a predictor of risk attitude) (for example, see Block, Sandner, & Spiegel, 2015). Given the two regional samples, an independent sample *t*-test was performed, including reliability tests within each risk sub-domain. Finally, a multivariate regression analysis was performed to test whether regional differences exist in attitude, personality, and perceived behavioral controls between the two samples.

2.5.4 Variables and Instruments

The primary instruments for data collection are the Domain-specific Risk Attitude Scale (DOSPERT; Weber, Blais & Betz, 2002), Rotter's Locus of Control Scale (Rotter, 1966), and the

Big Five Personality Locator (Goldberg, 1992). Instruments are presented in Appendix C. These three scales constituted the factors making up attitudes and perceived behavioral control in the modified TPB model noted above (see Figure 3 above).

DOSPERT (Weber, Blais & Betz, 2002). The Domain-specific Risk Attitude Scale consists of 30 items in a Likert-type scale from 1 (extremely unlikely) to 5 (extremely likely). Respondents are presented with statements, such as "Admitting that your tastes are different from a friend," and asked to respond on a range of extremely unlikely (1) to extremely likely (5). There are six items within each represented risk domain (ethical, recreational, social, health/safety, and financial). The financial domain is further divided (3 items each) into investment (i.e., "Investing 5% of your annual income in a very speculative stock" - investment risk attitude) and gambling (i.e., "Betting a day's income at the horse races" - gambling risk attitude). Each item grouping is added to obtain a domain score. Higher scores are indicative of higher risk propensity; that is, a greater likelihood for risk-taking behaviors. A lower DOSPERT score indicates a greater aversion to risk and risk-taking. The DOSPERT scale has been widely used to measure risk attitudes by domain, less often among entrepreneurs, and found to be a reliable measure of domain-specific risk attitude (see Shou & Olney, 2020, meta-analysis of the reliability of the DOSPERT scale). Breuer, Kollath, Salzmann & Nitzsch (2017) describe risk attitude as "the chosen state of mind towards risk," and can range from risk-avoiding to risk-seeking. They recommend observing risk attitude separately from a specific risky decision situation.

Locus of Control Scale (Rotter, 1966). The LoC scale is a 29-item questionnaire in which respondents are asked whether they agree more with one of the two statements. Tabulation of the items results in a relative score for internal/external locus of control, wherein higher scores

indicate greater external locus of control and lower scores indicate relatively greater internal locus of control. Rotter (1996) found that individuals with an external LoC believe circumstances beyond their immediate control, such as luck, fate, and other people, affect their personal outcomes. Individuals with an internal LoC believe they personally control events and outcomes in their lives. Entrepreneurs are thought to possess a relatively higher internal locus of control. Numerous studies on LoC have replicated these results (Mueller and Thomas, 2000; Utsch & Rauch, 2000).

Big Five Personality Locator (Goldberg, 1992). The Big Five Personality Locator is a 41-item scale wherein respondents are asked to select how accurately each statement describes themselves on a 5-point Likert-type scale ranging from 1 ("Very Inaccurate") to 5 ("Very Accurate"). Tabulated results obtain scores across five domains of personality: openness (to experience), conscientiousness, extraversion/introversion, agreeableness, and neuroticism. Higher scores indicate a stronger individual personality trait. While the Big Five personality traits have produced mixed results with respect to correlations with entrepreneur characteristics, entrepreneurs have consistently been found to be higher on the openness dimension (Kerr, Kerr & Xu, 2018).

The measured risk attitude variables, and several covariates, are described below:

1. Ethical Risk Attitude ($Risk_e$). This variable represents the DOSPERT score only for the ethical risk items.
2. Health/Safety Risk Attitude ($Risk_{h/s}$). This variable represents the DOSPERT score only for the health and safety risk items.
3. Recreational Risk Attitude ($Risk_r$). This variable represents the DOSPERT score only for recreational risk items.

4. Social Risk Attitude ($Risk_s$). This variable represents the DOSPERT score only for the social risk items.
5. Financial Risk Attitude ($Risk_j$). This variable represents the DOSPERT score only for the investment risk items.
6. Financial Risk Attitude ($Risk_g$). This variable represents the DOSPERT score only for the gambling risk items.
7. Personality is a set of variables drawn from the Big Five Personality Locator (Goldberg, 1992), which include Openness, Conscientiousness, Extraversion/Introversion, Agreeableness, and Neuroticism.
8. Locus of Control (LoC). LoC is a numerical variable that constitutes the extent to which a participant perceives their own control over the main events in their life. A higher relative score indicates a higher external locus of control (see Appendices). The scale used is based on Rotter (1966).
9. Location. A dummy variable with the value 0 for Hawai‘i and 1 for Washington State.

2.5.6 Analyses

First, the internal consistency of the scale components was analyzed by calculating Cronbach's Alpha for each. Next, the two convenience samples were compared using an independent sample t-test. Finally, a predictive multiple regression model was developed to test how well the independent variables might predict Location as the dependent variable (Location, Hawai‘i =1, Washington = 0). These approaches follow the recommendations from past studies on risk attitudes (Weber, Blais, & Betz, 2002/2006; Bandera, Collins, & Passerini, 2018).

2.6 Results

Results of the analysis are presented below. Significant differences in risk attitudes by domain between Hawai‘i-based and Washington-based entrepreneurs were found. Five

hypotheses were supported, whereas four were not. Of note, the study found higher risk tolerance among Hawai‘i entrepreneurs in the recreational, social, and investment domains, which supports the cushion theory (Hsee & Weber, 1999) as an explanation. Additionally, the study found that Washington-state-based entrepreneurs displayed higher risk tolerance in the ethical, health/safety, and gambling domains, supporting H2 but undermining hypotheses H3 and H7. Lastly, the study found no support for the differences in locus of control measures for Hawai‘i and Washington participants, and mixed support for the influence of personality measures in controlling the above dependent variables.

Means and Standard Deviations. The means and standard deviations for each dependent variable are presented in Table 3 below, grouped by location sample (Hawai‘i and Washington). For the risk domains, the Hawai‘i sample (N=76) was larger than the Washington sample (N=43). The Hawai‘i sample displayed lower mean scores in the ethical (M=12.99, SD=4.99), health/safety (M=19.55, SD=6.26), and gambling (M=6.29, SD=3.3) risk domains than its Washington counterpart (M=20.35, SD=4.19; M=23.23, SD=4.19; M=8.02, SD=1.97, respectively). Hawai‘i entrepreneurs reported higher scores in the recreational (M=23.05, SD=6.9), social (M=28.2, SD=4.22), and investment (M=12.92, SD=3.89) risk domains compared to the Washington sample (M=17.47, SD=4.33; M=25.3, SD=4.3; M=9.02, SD=2.79, respectively). Hawai‘i entrepreneurs also reported lower means scores for Locus of control (M=9.96, SD=3.9), Openness (M=22.7, SD=64.2). Conscientiousness (M=22.34. SD=3.64), Agreeableness (M=22.34, SD=3.39), and Neuroticism (M=17.74, SD=5.75), compared to the Washington sample (M=11.6, SD=2.84; M=26.58, SD=5.37; M=27.84, SD=5.1; M=29.81, SD=5.3; M=21, SD=7.5, respectively) but a higher mean score for Extraversion (M=21.62, SD=3.3) than the Washington sample (M=20.74, SD=7).

Table 3: Means and Standard Deviations

Location		N	Mean	Std. Deviation	Std. Error Mean
Ethical	Hawai'i	76	12.99	4.995	0.573
	Washington	43	20.35	4.185	0.638
Health	Hawai'i	76	19.55	6.264	0.719
	Washington	43	23.23	4.191	0.639
Recreational	Hawai'i	76	23.05	6.897	0.791
	Washington	43	17.47	4.333	0.661
Social	Hawai'i	76	28.20	4.112	0.472
	Washington	43	25.30	4.296	0.655
Investment	Hawai'i	76	12.92	3.888	0.446
	Washington	43	9.02	2.790	0.425
Gambling	Hawai'i	76	6.29	3.302	0.379
	Washington	43	8.02	1.970	0.300
Locus of Control	Hawai'i	76	9.96	3.697	0.424
	Washington	43	11.60	2.838	0.433
Opennes	Hawai'i	58	22.74	4.020	0.528
	Washington	43	26.58	5.373	0.819
Conscientiousness	Hawai'i	58	22.24	3.643	0.478
	Washington	43	27.84	5.085	0.775
Extroversion	Hawai'i	58	21.62	3.302	0.434
	Washington	43	20.74	7.011	1.069
Agreeableness	Hawai'i	58	22.34	3.390	0.445
	Washington	43	29.81	5.261	0.802
Neuroticism	Hawai'i	58	17.74	5.745	0.754
	Washington	43	21.00	7.480	1.141

Test for Reliability. Cronbach's Alpha was computed for all risk variables to assess the internal reliability of the primary scales (see Table 4 below). Cronbach's alpha was ascertained by carrying out an Analysis of Variance (ANOVA: Two Factor without Replication) for each dependent risk variable (n=148) to acquire the elements to calculate the alpha [1-(error/mean

squared)]. Cronbach's calculations are included in Table 4 below. All Hawai'i sample risk attitude factors were acceptable for internal reliability (Cronbach's $\alpha > .7$). For the Hawai'i sample, all personality variables were above the acceptable range for reliability except for the Conscientiousness variable (Cronbach's $\alpha = .65$), which increased to $\alpha = .74$ if one item ("Leave my belongings around") was removed. All Washington risk factors were also above the acceptable limit, except for the ethical and health/safety factors. Shou and Olney (2020), in their meta-analysis of the reliability of the DOSPERT scale, found that the ethical and social domains showed lower than acceptable Cronbach's Alpha across 64 empirical studies, suggesting that those specific subdomain items may not capture ethical risk-taking attitude as consistently as other domains. The reliability of the health/safety factor increased to $\alpha = .71$ when an item ("Regularly eating high cholesterol foods") was removed. The Conscientiousness and Extraversion variables in the Washington sample also fell below the acceptable limit for Cronbach's Alpha, although increased to .76 in both cases if one item was removed ("Leave my belongings around" – Conscientiousness; "Don't like drawing attention to myself" – Extraversion).

Table 4: Cronbach's Alpha

	Cronbach's Alpha		
Risk Domains	All Cases (N=148)	Hawai'i Sample (N=90)	Washington Sample (N=86)
Ethical	.83	.87	.67
Health/Safety	.76	.79	.69*
Recreational	.83	.85	.79
Social	.79	.76	.82
Gambling	.87	.91	.72
Investment	.82	.86	.70
Control Variables	All Cases	Hawai'i Sample	Washington Sample
Locus of Control	.97	.98	.98
Openness	.75	.74	.74
Conscientiousness	.65**	.65**	.68***
Extraversion	.75	.77	.69****
Agreeableness	.70	.70	.71

Neuroticism	.85	.86	.84

*increases to.71 if item 40 (Regularly eating high cholesterol foods) is removed
**increases to .74 if item 8 (Leave my belongings around) is removed
***increases to .76 if item 8 is removed
****increases to .76 if item 36 (Don't like to draw attention to myself) is removed

Variable Correlations. Correlations between the variables are presented in Table 5 below. For the risk variables, strong correlations were found between ethical and health risks (r=.66, p=.001). For the personality variables, strong correlations were found for Conscientiousness and Agreeableness (r=.51, p=.001), and Extraversion and Agreeableness (r=.51, p=.001).

Table 5: Pearson Correlations

Pearson Correlations

	Ethical Risk	Health Risk	Recreational Risk	Social Risk	Investment Risk	Gambling Risk	Locus of Control	Openness	Conscientiousness	Extroversion	Agreeableness	Neuroticism
Ethical Risk												
Health Risk	.655**											
Recreational Risk	-0.083	.260**										
Social Risk	-0.003	.297**	.313**									
Investment Risk	-0.179	0.024	.328**	.381**								
Gambling Risk	.439**	.469**	.190*	0.133	-0.003							
Locus of Control	0.179	0.082	-0.165	-.183*	-.229*	0.161						
Openness	.381**	.257**	-0.031	0.136	0.043	.229*	0.191					
Conscientiousness	.380**	.201*	-0.049	-0.153	-.246*	.260**	0.103	.349**				
Extroversion	0.034	0.080	0.150	0.158	0.061	0.140	0.024	0.183	0.126			
Agreeableness	.380**	.242*	-.262**	-.287**	-.340**	0.155	0.179	.396**	.508**	0.063		
Neuroticism	.337**	.263**	-0.108	0.022	-0.151	0.178	-0.063	0.133	.220*	.224*	.332**	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Independent Samples *t*-Test. Data for the six risk domains was examined using SPSS, and significant differences were found for all variables at the p <.001 level. The assumption of homogeneity of variance between the samples using Levene's Test (see Table 6) was evaluated. The test for equality of means found all variables significant at the p <.001 level. The tests for homogeneity of variance allow us to assume homogeneity of variance for the Ethical, Social, and Investment variables (p=.13, p=.56, p=.15, respectively). For the three remaining variables (Health, Recreational, and Gambling), significance was reached only when the assumption of equal variances was relaxed (p<.001). Effect sizes were also calculated (see Table 7 below) and found to be large for all variables. The negative coefficients for effect sizes for ethical, health, and gambling risk attitude indicate lower average attitudes toward risk-taking in these domains.

The coefficients for the *t*-tests were negative in the case of ethical risk, health risk, and gambling risk, indicating that the Hawai‘i sample, on average, was more risk-averse in these three domains than the Washington State sample.

Table 6: Tests for Homogeneity of Variance

		Test for Equality of		t-test for Equality of Means							
						Significance		Mean	Std. Error	Confidence Interval	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Difference	Difference	Lower	Upper
Ethical	**Equal variances assumed**	2.307	0.131	-8.173	117	0.000	**0.000**	-7.362	0.901	-9.146	-5.578
	Equal variances not assumed			-8.583	100.433	0.000	0.000	-7.362	0.858	-9.064	-5.660
Health	Equal variances assumed	8.864	0.004	-3.438	117	0.000	0.001	-3.680	1.070	-5.800	-1.560
	Equal variances not assumed			-3.827	114	0.000	**0.000**	-3.680	0.962	-5.585	-1.775
Recreational	Equal variances assumed	12.375	0.001	4.799	117	0.000	0.000	5.588	1.164	3.281	7.894
	Equal variances not assumed			5.420	116	0.000	**0.000**	5.588	1.031	3.546	7.629
Social	**Equal variances assumed**	0.341	0.561	3.631	117	0.000	**0.000**	2.895	0.797	1.316	4.474
	Equal variances not assumed			3.586	84.164	0.000	0.001	2.895	0.807	1.290	4.500
Investment	**Equal variances assumed**	2.049	0.155	5.781	117	0.000	**0.000**	3.898	0.674	2.563	5.233
	Equal variances not assumed			6.324	110.369	0.000	0.000	3.898	0.616	2.676	5.119
Gambling	Equal variances assumed	11.281	0.001	-3.138	117	0.001	0.002	-1.734	0.552	-2.828	-0.640
	Equal variances not assumed			-3.587	117	0.000	**0.000**	-1.734	0.483	-2.691	-0.776
Locus of Control	**Equal variances assumed**	3.809	0.053	-2.524	117	0.006	**0.013**	-1.644	0.651	-2.934	-0.354
	Equal variances not assumed			-2.714	106.421	0.004	0.008	-1.644	0.606	-2.845	-0.443
Openness	**Equal variances assumed**	2.710	0.103	-4.110	99	0.000	**0.000**	-3.840	0.934	-5.694	-1.986
	Equal variances not assumed			-3.940	74.624	0.000	0.000	-3.840	0.975	-5.782	-1.898
Conscientiousness	Equal variances assumed	6.040	0.016	-6.446	99	0.000	0.000	-5.596	0.868	-7.318	-3.873
	Equal variances not assumed			-6.142	72	0.000	**0.000**	-5.596	0.911	-7.412	-3.780
Extraversion	Equal variances assumed	21.329	0.000	0.836	99	0.203	0.405	0.877	1.048	-1.203	2.956
	Equal variances not assumed			0.760	56	0.225	**0.451**	0.877	1.154	-1.435	3.188
Agreeableness	Equal variances assumed	13.215	0.000	-8.662	99	0.000	0.000	-7.469	0.862	-9.180	-5.758
	Equal variances not assumed			-8.141	67.150	0.000	**0.000**	-7.469	0.918	-9.300	-5.638
Neuroticism	Equal variances assumed	6.390	0.013	-2.477	99	0.007	0.015	-3.259	1.316	-5.869	-0.648
	Equal variances not assumed			-2.383	76.048	0.010	**0.020**	-3.259	1.368	-5.982	-0.535

Similar *t*-tests were conducted on the Locus of Control variable and the five personality variables for the two regional samples, finding significant differences between the sample means for all variables except for Extraversion. Levene's Test allowed for the assumption of equal variances for Locus of Control (p=.053 and Openness (p=.103). Equal variances were not assumed for Conscientiousness (p=.02), Extraversion (p=.00), Agreeableness (p=.00), or Neuroticism (p=.01). Effect sizes were also calculated (see Table 7 below) and found to be large for all significant personality variables (excluding Extraversion). The negative coefficient for effect sizes for Locus of Control, Openness, Conscientiousness, Agreeableness, and Neuroticism indicates lower mean scores in these areas. The coefficients for the *t*-tests were negative in the

case of Locus of Control, Openness, Conscientiousness, Agreeableness, and Neuroticism, indicating that the Hawai‘i sample, on average, displayed greater internal Locus of Control, lower Openness, lower levels of Conscientiousness, lesser Agreeableness and less Neuroticism compared to the Washington State sample.

Hypothesis 1: (Supported). Nascent entrepreneurs in Hawai‘i revealed a higher propensity for risk-taking than their Washington counterparts in several domains, providing mixed support for Hypothesis 1. Specifically, Hawai‘i entrepreneurs displayed lower risk propensity in the ethical ($p<.001$) and gambling ($p<.001$) risk domains, but higher mean risk propensity in the health/safety ($p<.001$), recreational ($p<.001$), social ($p<.001$) and investment ($p<.001$) domains. These results are described below.

Hypothesis 2: (Supported) ethical risk attitude. Using the cushion theory, Hawai‘i entrepreneurs were expected to display a lower tolerance for ethical risk-taking given the influence of collectivist culture in the region. Support for this hypothesis was found in the significantly ($p<.001$) lower mean scores for the ethical risk attitude domain compared to the Washington sample (M=12.99 vs 20.35).

Hypothesis 3: (Not Supported) health/safety risk attitude. Again, based on cushion theory reasoning, it was hypothesized that Hawai‘i entrepreneurs would display higher mean scores on the health/safety risk-taking domain. The analysis did not support this. The mean scores for health/safety risk-taking for the Hawai‘i sample (M=19.55) were significantly ($p<.001$) higher than the Washington sample (M=23.23).

Hypothesis 4: (Supported) recreational risk attitude. Hawai‘i entrepreneurs in our sample displayed greater tolerance (M=32.05) for recreational risk-taking than their Washington counterparts (M=17.07), which supports this hypothesis ($p<.001$).

Hypothesis 5: *(Supported)* social risk attitude. Hawai‘i entrepreneurs displayed greater tolerance (M=28.2) for social risk-taking than their Washington counterparts (M=25.3), which supports this hypothesis ($p<.001$) derived from cushion theory.

Hypothesis 6: *(Supported)* investment risk attitude. It was hypothesized that Hawai‘i entrepreneurs would be more willing to take risks in the investment domain under the theorized cultural “cushion.” The analysis found support for this hypothesis with mean investment risk domain scores for the Hawai‘i sample (M=12.92) above that of Washington (M=9.02) at a statistical significance of $p<.001$.

Hypothesis 7: *(Not Supported)* gambling risk attitude. It was theorized that no significant difference between the two regional samples in the gambling risk domain. This hypothesis was not supported. The Washington sample revealed a statistically significant ($p<.002$) higher mean score for gambling risk attitude (M=8.02 vs. M=6.29).

Hypothesis 8: *(Not Supported)* locus of control. Cross-cultural theory regarding higher reported levels of collectivism among Asian-influenced culture (Hawai‘i sample) led to the hypothesis that Hawai‘i entrepreneurs would display greater external locus of control than their Washington counterparts. This hypothesis was not supported, as the Hawai‘i mean score (M=9.96) for locus of control was significantly ($p=.01$) lower than the Washington sample (M=11.6).

Hypothesis 9: *(Not supported)* personality controls. See Regression Modelling below.

A summary of the calculated effect sizes for each risk variable is shown in Table 7 below. A large negative effect (Cohen’s d = -1.56) was found for the ethical risk domain. A moderate negative effect (Cohen’s d=-66) was also found in the health/safety risk attitude domain. Together, these indicate a lower tendency for taking risks in these domains for the

Hawai‘i group than their respective Washington comparison group. Moderately large to substantial positive effects for the recreational (Cohen's d =.91), social (Cohen's d =.69), and investment (Cohen's d =1.1) domains, but a moderate negative effect in the gambling domain (Cohen's d =-6) was also found. The remaining variables also produced moderate to large effect sizes (Locus of Control =-.48, Openness =-.83, Conscientiousness=-1.3, Agreeableness=-1.74, Neuroticism=-5) except for Extraversion (.17).

Table 7: Calculated Effect Sizes (t-Test)

Variable		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
Ethical	Cohen's d	4.720	-1.560	-1.981	-1.133
Health	Cohen's d	5.609	-0.656	-1.038	-0.271
Recreational	Cohen's d	6.102	0.916	0.522	1.306
Social	Cohen's d	4.179	0.693	0.307	1.076
Investment	Cohen's d	3.533	1.103	0.701	1.501
Gambling	Cohen's d	2.895	-0.599	-0.979	-0.216
Locus of Control	Cohen's d	3.413	-0.482	-0.860	-0.102
Openness	Cohen's d	4.642	-0.827	-1.236	-0.414
Conscientiousness	Cohen's d	4.314	-1.297	-1.728	-0.861
Extroversion	Cohen's d	5.209	0.168	-0.227	0.563
Agreeableness	Cohen's d	4.285	-1.743	-2.203	-1.277
Neuroticism	Cohen's d	6.537	-0.498	-0.898	-0.097

Multiple Regression Models. A regression model using the Location variable as the dependent variable was tested using the following equation:

$$Y = ex + hx + rx + sx + ix + gx$$

where *e* is the score for ethical risk attitude, *h* is the score for health/safety risk attitude, *r* is the score for recreational risk attitude, *s* is the score for social risk attitude, *i* is the score for investment risk attitude, and *g* is the score for gambling risk attitude. A hierarchical regression model was tested by adding in sequence the variables for Locus of Control and each respective

personality variable (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). Subsequently, three hierarchical models were tested to analyze the effects of covariates on risk attitude (see Table 8).

Table 8: Regression Model

DV: Location	Model 1	Model 2 + Locus of Control	Model 3 + Personality Variables
IVs:			
(1) Ethical Risk	*R(f)*	*R(f)*	*R(f)*
(2) Health/Safety Risk	*R(h)*	*R(h)*	*R(h)*
(3) Recreational Risk	*R(r)*	*R(r)*	*R(r)*
(4) Social Risk	*R(s)*	*R(s)*	*R(s)*
(5) Investment Risk	*R(i)*	*R(i)*	*R(i)*
(6) Gambling Risk	*R(g)*	*R(g)*	*R(g)*
Locus of Control		*LoC*	*LoC*
Openness			*O*
Conscientiousness			*C*
Extroversion/Introversion			*E*
Agreeableness			*A*
Neuroticism			*N*

Introducing covariates hierarchically allowed for the assessment of the impact of each factor on the predictive power of the location prediction model. Summary results are shown below in Table 9.

The results for model 1 (Risk Variables only) suggest a strong fit to the location prediction model with an F ratio of 28.314 (p <.001). Only the ethical, recreational, social, and investment risk variables were significant (p <.001, p <.001, p <.008, p <.001). Table 9 below summarizes these results.

Table 9: Model 1 (Risk Domains Only)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	.833	.202		4.116	<.001	.432	1.235
	Ethical	.033	.007	.406	4.574	<.001	.019	.048
	Health	.009	.008	.114	1.234	.220	-.006	.024
	Recreational	-.021	.005	-.290	-4.179	<.001	-.031	-.011
	Social	-.021	.008	-.188	-2.702	.008	-.036	-.005
	Investment	-.028	.008	-.235	-3.479	<.001	-.045	-.012
	Gambling	.020	.011	.127	1.816	.072	-.002	.043

a. Dependent Variable: Location

In Model 2, the perceived behavioral control variable (Locus of Control) was added. The summary results of this analysis are presented in Table 10. The F-Ratio (24.1, p =.001) suggests a strong fit to the prediction, with significance for the ethical (p <.001), recreational (p <.001), social (p =.008), and investment (p <.001) variables. The introduced LoC variable did not change the model prediction.

Table 10: Model 2 (Risk Domains + Locus of Control)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	.857	.237		3.623	<.001	.388	1.326
	Ethical	.033	.007	.407	4.558	<.001	.019	.048
	Health	.009	.008	.115	1.235	.219	-.006	.025
	Recreational	-.021	.005	-.292	-4.157	<.001	-.031	-.011
	Social	-.021	.008	-.189	-2.694	.008	-.036	-.006
	Investment	-.029	.008	-.236	-3.462	<.001	-.045	-.012
	Gambling	.021	.011	.129	1.817	.072	-.002	.043
	LOC	-.002	.009	-.012	-.195	.845	-.019	.016

a. Dependent Variable: Location

In Model 3, the five personality variables are included in the regression, and the results are shown in Table 11. The summary results of this analysis are presented in Table 12. The F-Ratio (20.37, p=.001) suggests a stronger fit to the prediction of location based on the selected variable, with significance for the ethical (p =.002), recreational (p =.002), investment (p <.001),

and gambling (p =.035) variables. A summary of the regression results for the three models is presented in Table 12.

Table 11: Model 3 (Risk Domains + Locus of Control + Personality)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-.167	.296		-.564	.574	-.756	.422
	Ethical	.023	.007	.278	3.177	.002	.009	.038
	Health	.003	.007	.037	.421	.674	-.011	.018
	Recreational	-.017	.005	-.217	-3.265	.002	-.028	-.007
	Social	-.010	.008	-.088	-1.259	.211	-.025	.006
	Investment	-.030	.009	-.241	-3.528	<.001	-.048	-.013
	Gambling	.024	.011	.140	2.143	.035	.002	.046
	LOC	-.005	.009	-.032	-.551	.583	-.022	.013
	Openness	.012	.007	.123	1.791	.077	-.001	.026
	Conscientiousness	.016	.007	.168	2.458	.016	.003	.030
	Extroversion	-.010	.006	-.100	-1.690	.095	-.021	.002
	Agreeableness	.022	.007	.255	3.326	.001	.009	.036
	Neuroticism	-.005	.005	-.063	-.986	.327	-.014	.005

a. Dependent Variable: Location

Hypothesis 3 predicted that controlling for personality variables would reduce differences in risk attitudes among the two groups. This analysis produced mixed support for this hypothesis. Only Conscientiousness (p=.016) and Agreeableness (p=.001) were statistically significant in their contribution to the hierarchical regression model. A summary of all three models and their coefficients is presented in Table 12 below.

Table 12: Summary of Hierarchical Regression Models

	Model 1 Risk Atitudes Only	Model 2 Risk + LOC	Model 3 Risk, LOC, Personality
Ethical	0.406**	0.407**	0.278**
Health	0.114	0.115	0.037
Recreational	-0.29**	-0.292**	-0.217**
Social	-0.188**	-0.189**	-0.088
Investment	-0.235**	-0.236**	-0.241**
Gambling	0.127	0.129	0.14*
Locus of Control		-0.012	-0.032
Openness			0.123
Conscientiousness			0.168*
Extroversion			-0.1
Agreeableness			0.255**
Neuroticism			-0.063
R Squared	0.603	0.603	0.735
Adjusted R Squared	0.581	0.578	0.699
Observations	119	101	101

1. Dependent Variable: Location

2. *, ** indicates significance at the 95%, and 99% level, respectively

2.7 Discussion

Mean risk attitudes of Hawai‘i and Washington State entrepreneurs are significantly different and, in part, lend further support for the cushion theory. However, this support for the theory depends on the specific domain of risk, which is a key finding of this study. A summary of the findings relative to the study hypotheses is presented in the Table (Table 13 below).

Table 13: Support for Study Hypotheses

Hypothesis	Hypothesis	Findings
H1	Nascent entrepreneurs in Hawai‘i will display higher risk tolerance by domain those in Washington.	**Supported**
H2	Nascent entrepreneurs in Hawai‘i will display lower tolerance for ethical risk-taking those in Washington.	**Supported**
H3	Nascent entrepreneurs in Hawai‘i will display higher tolerance for health/safety risk-taking than those in Washington.	**Not Supported**

H4	Nascent entrepreneurs in Hawai‘i will display higher tolerance for recreational risk-taking than those in Washington.	**Supported**
H5	Nascent entrepreneurs in Hawai‘i will display higher tolerance for social risk-taking those in Washington.	**Supported**
H6	Nascent entrepreneurs in Hawai‘i will display higher tolerance for investment risk-taking than those in Washington.	**Supported**
H7	There will be no significant difference between Nascent entrepreneurs in Hawai‘i and Washington in the gambling domain	**Not Supported**
H8	Nascent entrepreneurs in Washington will display higher internal locus of control than those in Hawai'i	**Not Supported**
H9	Differences in risk attitudes among two regional groups of entrepreneurs will be reduced when controlling for personality traits	**Mixed Support (by domain)**

2.7.1 Paired Sample *t*-Test Discussion

The independent samples *t*-test found that Hawai‘i entrepreneurs are, on average, significantly more risk tolerant (i.e., they have higher risk attitude scores) in the Recreational, Social, and Investment Risk domains (*p<.001)*, respectively. This supports the cushion theory in that these regional entrepreneurs may feel a perceived benefit of their community, reflecting their risk attitudes in these domains. The same group appeared less risk tolerant in the Ethical, Health/Safety, and Gambling Domains ($p<.001$, $p<.001$, $p<.002$, respectively). Lower risk attitudes within the Ethical and Health/Safety Domains may also support the cushion theory in that collectivist-oriented communities may put relative pressure on their members to take fewer community-oriented risks (i.e., straying from ethical or health norms). However, the finding concerning Gambling risk is curious and requires further study. One possible explanation may be

the availability of legalized gambling outlets in Washington State (absent from Hawai‘i), thereby destigmatizing risk-taking in the gambling domain somewhat.

2.7.2 Discussion of Hierarchical Regression Results

Three models were tested to examine the role of risk attitudes, perceived behavioral controls, and personality traits in shaping the characteristics of entrepreneurs across regions.

Model 1. The first model (Risk Domains only) found support (Adjusted R^2=.581) for differences in Ethical, Recreational, Social, and Investment risk attitudes (ß=.406, p <.001, ß=-.290, p <.001; ß=-.188, p =.01; ß=.-235, p <.001, respectively) between the two regional groups. Entrepreneurs in Hawai‘i have higher risk tolerance in the Recreational, Social, and Investment domains, thus the negative signs for their coefficients, but lower risk tolerance within the Ethical domain, which is consistent with the findings of the *t*-test. Neither the Health/Safety nor the Gambling Domain scores were significant regional predictors in this model.

Model 2. Model 2 (Risk Domains while controlling for differences in Locus of Control; Adjusted R^2=.578) was not materially different from Model 1 (see Summary of results for all three models above). The same variables were significant (Ethical, Recreational, Social, and Investment) with only minor changes to their coefficients (ß=.407, p <.001, ß=-.292, p <.001; ß=.-189, p =.01; ß=.-236, p <.001, respectively). The locus of control variable (LoC) was not significant. For further verification of this apparent lack of support for Hypothesis 2, a separate independent samples *t*-test was performed with only the Locus of Control data, using Location as the grouping variable (see Table 14) finding in fact that Washington State entrepreneurs appear to display a statistically significant average external locus of control (opposite of our theorized prediction). We theorized from past research that internal locus of control is prevalent in individualist cultures (Mueller & Thomas, 2001). This finding warrants further study.

Table 14: Locus of Control t-Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance		Mean	Std. Error	95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Difference	Difference	Lower	Upper
LOC	Equal variances assumed	3.809	.053	-2.524	117	.006	.013	-1.644	.651	-2.934	-.354
	Equal variances not assumed			-2.714	106.421	.004	.008	-1.644	.606	-2.845	-.443

Model 3. The final model (Risk Domains while controlling for differences in Locus of Control and the five personality variables) strengthened the prediction (Adjusted R^2=.699). Here, the Health/Safety domain remained insignificant, and the Social domain became insignificant when controlling for personality variably. Ethical, Recreational, and Investment variables remained significant predictors, and their coefficients were unchanged (ß=.278, *p*=.002, ß=-.217, *p*=.002; ß=-.241, *p* <.001, respectively). Interestingly, the coefficient for the Investment risk domain, wherein Hawai‘i entrepreneurs appear statistically more risk tolerant, increased when controlling for personality variables and may account in part for the improved fit of the model (Adjusted R^2=.578 in Model 2 to Adjusted R^2=.699 in Model 3; F sig change <.001). Also of interest, the Gambling risk domain (ß=.14, *p*=.035) became significant in this model when adding the personality variables, with Hawai‘i entrepreneurs displaying lower tolerance for gambling risk, consistent with our original Hypothesis 2 above.

The locus of control remained an insignificant factor in these models. Of the five personality variables, only Conscientiousness (ß=.168, *p* =.016) and Agreeableness ß=.255, *p* =.001) were significant and added to the regression model's explanatory power.

2.8 Limitations

The study has numerous limitations, some of which may be alleviated through the experiment’s design. To reduce both selection and survivor bias, the sampling frame has been broadened widely to first-time entrepreneurs, with the participation selection criteria for

inclusion only limited by one team member's registration status and successful application to the program.

Self-reported Data. All data is self-reported. Personality preferences, including risk perceptions, may be subject to self-report bias. Participants may be inclined to provide answers in line with how they wish to be seen rather than how they actually perceive themselves or the world.

Internal Threats. The DOSPERT scale measures individual risk attitude, not entrepreneurship risk-taking specifically. Whether an individual sees risk in bungee jumping may not relate to whether they see risk in launching a startup. The social and financial risk domains, including gambling and investment risk propensity, may be the most parsimonious explanatory variables relative to entrepreneurship. This may be a threat to the internal validity of the study. The small sample size from the two university samples may limit the generalizability of the findings.

External Threats. Geographic locations are unique to the entrepreneurship education programs. The programs have some unique aspects, including but not limited to the instructors, guest speakers, program staff, and other cohort-specific features. These may not generalize beyond the individual cohort, the specific accelerator, regions, or the entrepreneurship field.

Response Rates. Response rates being different from the sampling frame may influence the results in material ways.

2.9 Conclusions

2.9.1 Research Significance (Theory & Practice)

Entrepreneurship education, while a rapidly growing field of research like its larger surrounding domain of entrepreneurship research, remains gapful (see Kerr, Kerr & Xu, 2017), particularly in the study of how risk attitudes vary by culture, region and domain, and further

how those differences may warrant different approaches to teaching the next generation of entrepreneurs. Of note are lacunae regarding links to performance and why entrepreneurs abandon their ventures. Kerr, Kerr & Xu (2017) identify the state-of-the-art study today as one that utilizes longitudinal data, measures personality data before entrepreneurial action, and takes observations including traits like risk aversion. Our findings that risk attitudes are materially different among otherwise similar groups only differentiated by region and culture are important in that they argue for 1) differentiated practices in entrepreneurship education, 2) more refined policy making and policy implementation with respect regional innovation investment in entrepreneurial ecosystem components (such as universities), and 3) further research in linkages between risk attitudes and entrepreneurial intention.

For practice, understanding the regional differences in the risk preferences of first-time entrepreneurs may have implications for regional innovation and entrepreneurship ecosystems and entrepreneurs as they make decisions about the uncertainties of their ventures. Given the distinctions revealed in this study, programs such as the National Science Foundation's highly distributed i-Corps Program, which deploys lean start-up practices nearly uniformly across many regions, may need to be rethought.

2.9.2 Future Research

The findings of this study could be extended to other regions to attempt replication of the within-country risk attitude variances. Hawai‘i is a remarkable and distinct community in many ways, not the least of which is its risk-tolerant next generation of entrepreneurs. Additional regional cross-cultural comparison studies may reveal just how unique it is.

2.9.3 Conclusions

The significant regional differences in risk attitudes uncovered in this within-country study warrant further exploration. As national & international programs (such as the National Science Foundation's *i*-Corps program, the international Techstars franchise, and others) of support for emerging entrepreneurs proliferate, avoiding a one-size-fits-all application of experiential techniques is essential. Because cultural, economic, and geographic differences impact the underlying attitude toward engaging in entrepreneurship, generic approaches to entrepreneurship development are unlikely to be impactful. Instead, a more nuanced approach to entrepreneurship education is required, one that considers these differences in origin and provides a platform for entrepreneurs to thrive despite these differences.

ESSAY 2: Learning to Fail: the impact of experiential education on the risk attitudes of nascent entrepreneurs

"I have not failed. I have just found 10,000 ways that won't work."

-Thomas Edison

3 Introduction

First-time entrepreneurs participating in a university accelerator program are well suited as participants for a longitudinal study of changing risk perception because they are less susceptible to problems of both selection and survivorship bias (Aldrich & Ruef, 2018). Longitudinal designs have successfully been implemented to study EE's impact on entrepreneur outcomes (Bandera, Collins & Passerini, 2018). The latter researchers found that experiential education curricula could increase tolerance toward non-domain-specific risk-taking. Otache, Umar, and Audu (2019) utilized a similar two-time period, pre- and post-survey design to test the impact of EE on the likelihood of student entrepreneurs to start a business. They found that EE increases EI among 250 Nigerian university students participating in the longitudinal study. Block, Sandner, and Spiegel (2015) surveyed German entrepreneurs (n=2,330), categorized them through their responses into opportunity or necessity entrepreneurs, and found that necessity entrepreneurs are less willing to take risks than opportunity entrepreneurs.

In the second essay, I conducted an empirical field study using a novel dataset collected over 5 years of nascent entrepreneurs participating in a university accelerator. This research aimed to assess the stability (or variance) of the domain-specific risk attitudes of nascent entrepreneurs before and after an LSM program. The Hawai'i University accelerator program described above was used. Ladd & Kendall (2017) generalized risk attitude without domain-specificity. They found that participation in a lean startup (LSM) course increased the correlation of the risk-taking dimension of the entrepreneurial orientation construct (Hughes & Morgan,

2007). This proposed research builds on Ladd and Kendall's work by unpacking the possible variability of risk attitudes into six risk domains employing the DOSPERT scale.

3.1 Theory

The theoretical basis for the predictions in the current study lies with the entrepreneur cognition literature (Mitchell et al., 2002), personality and risk perception (Kerr, Kerr & Xu, 2017), and entrepreneurship education (Kuratko, 2005). Experiential Learning Theory (Kolb, 2014, 1984) provides the foundation for LSM (Ries, 2011) in its emphasis on hands-on, real-world experience as a key source of learning. Kolb highlighted the importance of experimentation and hypothesis testing in developing solutions in real-world contexts. This hypothesis-testing approach is at the core of LSM (Blank, 2014).

Nascent entrepreneurs are individuals involved in creating a new business venture but who have yet to achieve stable operations in that business (Wagner, 2006). They are important actors in entrepreneurship as they operate at the nexus of entrepreneurial intention (EI) and entrepreneurial action (EA). Nascent entrepreneurs face many challenges at this early stage, among them a lack of resources in support of their ventures and substantial uncertainty about the acceptance of their solution by the market (Davidsson, 2006). The support these entrepreneurs receive during this early period may have a considerable bearing on the survival of their venture, but also on the attitudes and perceptions they will carry forward into future endeavors.

Fairlie and Holleran (2010) found little connection between personality traits or risk attitudes and EI. However, risk attitudes are domain-specific (Weber, Blais & Betz, 2002, 2006), that is, they are expressed differently within the same individual depending on the risk domain. An individual, including an entrepreneur, will exhibit different risk preferences ranging from risk-averse to risk-tolerant depending on the specific domain. Weber, Blais, and Betz (2002) posit that they fall into five distinct areas (ethical, financial, health & safety, recreational, and

social). One size does not fit all for entrepreneurs, in that loving the autonomy of being your own boss or the thrill of creating a new market is not necessarily in the same domain as jumping out of an airplane or cheating on an exam. Weber and colleagues have designed the DOSPERT scale to tease out the domain-specificity of risk attitudes to distinguish these fine-grained differences between, for example, market risk-taking decisions and health risk-taking decisions. This allows us to examine entrepreneurs' attitudes at a finer-grained scale. The literature review above and subsequent gaps reveal several interesting research questions:

RQ1: Are entrepreneurship education programs, like the Lean Startup Methodology, associated with a change in risk attitudes among nascent entrepreneurs?

Entrepreneurship education programs (like university accelerators) that incorporate the LSM are excellent venues for experimental research into this research question in that they are often cohort and time-based; that is, they accept a limited number of startup teams who participate in the developmental program together over a specific time delimited program, usually ranging from six weeks to six months (see Cohen, 2013). Moreover, most often, the participants in university accelerators are nascent entrepreneurs, operating at the nexus of intention and action. The above research question should also consider that risk attitudes are domain-specific (Weber, Blais, & Betz, 2002) and may vary over time based on revised beliefs (Crocker, Fiske, & Tayler, 1984) about perceived risk.

RQ2: Is there variability within domain-specific risk attitudes of entrepreneurs, and which domains are more susceptible to variation?

Here, the research question seeks a more focused understanding of risk attitude and variance. A cohort-based university accelerator offers a well-suited "lab" for evaluating domain-

specific changes in risk attitude that may be due directly or indirectly to the experimental manipulation (in this case, LSM). Unlike past findings that suggest risk attitudes vary over more extended periods (Schildberg-Hörisch, 2018), this research question is concerned with shorter periods to better isolate the correlates of that change.

RQ3: Do risk attitude changes covary with other factors, including personality traits and demographic characteristics?

Indeed, other factors influence attitudinal change, including personality traits, the influence of external stakeholders, and the skills and experience of the individual entrepreneur entering the accelerator. While previous findings have been conflicting regarding many of these traits and demographic characteristics related to entrepreneurship (de Blasio et al., 2021; Miner & Raju, 2004; Stewart & Roth, 2001), they may be significant sources of covariance.

Other interesting questions related to this area concern how attitudinal changes might affect other entrepreneurial constructs, including entrepreneur orientation (EO) (Lumpkin & Dess, 1996) and entrepreneurial intention (EI), the latter of which is derived from the theory of planned action (Ajzen, 1991). This investigation might be extended into studies of how these changes affect not only entrepreneurial action and/or intention but also the probability of success, the link between risk attitudes and new venture starts, survival rates, exits, and finally, the causes of new venture abandonment, for which there is essentially no research.

3.2 Gaps and Hypotheses

While traits and attitudes of entrepreneurs are well researched, there remain gaps, several of which are addressed by the current study. Generally, the effectiveness of EE programs has not been studied. The extent to which LSM programs produce meaningful variation in entrepreneur disposition may be necessary for research and practice. There has also been significantly less

research on entrepreneurs and domain-specific risk (Weber, Blais & Betz, 2006; Xu & Ruef, 2004). More specifically, personality traits and risk attitudes are thought to be relatively stable over time (de Blasio et al., 2021), with little research testing manipulated instability. If they evolve, they are supposed to do so slowly – for example, over a lifetime or as the result of a sudden exogenous shock (Schildberg-Hörisch, 2018). This study addresses this gap by exploring the variability of risk attitudes among entrepreneurs. Finally, no research to date has tested the impact of EE on domain-specific risk attitudes. To the extent that new entrepreneurs can learn to revise their perceptions regarding the risks of entrepreneurship, entrepreneurship educators, leaders of accelerators, investors, and other stakeholders in the entrepreneur ecosystem may find new ways to improve startup outcomes and reduce failure rates among nascent entrepreneurs.

From entrepreneurship research and practice, it is clear that entrepreneurs are not a homogenous body (Block et al., 2015) and that the path into entrepreneurship, survival within it, and possibly even the successful emergence from it may rely on learning how to cope with and adapt to risk and uncertainty. These gaps in our understanding of entrepreneurial risk attitudes warrant further research.

Several hypotheses were tested to investigate these research questions and gaps in the literature. The theoretical framework described above suggests the possibility that differences will emerge between the pre- and post-surveys after the LSM intervention. LSM forces entrepreneurs to gather real-world data about their new venture and revise their beliefs about their new business model, forcing iterations and adaptations. Attitudinal changes are expected. Entrepreneurship Education (EE) teaches students how to acquire resources, a form of resource acquisition for students. From the resource-based view (Barney, 1996), entrepreneurs should

exhibit reduced risk aversion after attending an LSM program (greater risk propensity). Based on these conditions, the following hypotheses are proposed:

Hypothesis 1. Nascent entrepreneurs will display increased overall risk propensity after attending a lean startup methodology (LSM) program compared with the pre-program survey.

Hypothesis 1 predicts that participants will display an overall reduced perception of risk concerning activities introduced across various domains. One possibility is that changes in risk attitudes over time are domain-specific. The influence of experiential programs like LSM is more significant in one domain than another. If this is the case, we expect to see variance within one or more of the above domains after program intervention, more significantly than with other domains. Given the economic consequences of choosing entrepreneurship as a vocation, one might expect the financial risk domain to be more critical to the entrepreneurial context. As students learn to think critically about the many factors influencing their entrepreneurship journey and gather real-world data to validate their venture hypotheses, the economic risk should be perceived to be reduced. This would be reflected in an increased willingness to take risks in the financial domain. Therefore, the following hypothesis is proposed:

Hypothesis2. Nascent entrepreneurs will display increased risk propensity within the financial risk domain after attending an LSM program compared with the pre-program survey.

The theory undergirding this study proposes that experiential entrepreneurship education will enable the conversion of chance-taking (real risk) into critical thinking (calculated decision-making under uncertainty; Tversky & Kahneman, 1974). That is, nascent entrepreneurs subjected to experiential education (i.e., LSM) should develop, on average, critical thinking skills that will reveal themselves in the variance of chance-taking risk propensity, such as gambling. Therefore, we propose the following hypothesis:

Hypothesis3. Nascent entrepreneurs will display reduced risk propensity within the gambling risk subdomain after attending an LSM program compared with the pre-program survey.

Past research (Weber, Blaise & Betz, 2002) subdivides the financial risk domain into gambling and investment risks. Gambling risk represents undesirable chance-taking with entrepreneurial pursuits, whereas investment risk represents calculated risk-taking based on Bayesian probabilities (Bayes, 1763) and/or critical thinking. Experiential entrepreneurship education programs offer the opportunity for new entrepreneurs to better understand the business's actual risks and favor calculated risk-taking over chance-taking. For this reason, the following hypothesis is proposed:

Hypothesis4. Nascent entrepreneurs will display increased risk propensity within the investment risk domain after attending an LSM program compared with the pre-program survey.

Hypotheses 2, 3, and 4 imply that nascent entrepreneurs, after learning the lean startup methodology, will be more likely to take risks in the financial domain, or somewhat more likely to take calculated risks in the financial arena. This may not be the case in other domains. Entrepreneurship is hard, but above all, it requires strong social skills. Effectuation theory (Sarasvathy, 2001) holds that successful entrepreneurs make their future with the resources they have rather than implement plans in a causative manner. This requires convincing others that your version of the future makes sense, requiring strong social, communication, and collaboration skills. LSM programs force entrepreneurs to practice strong communication and collaboration skills as they co-create their proposed new ventures with all stakeholders, including potential customers, partners, cofounders, investors, and so forth. These entrepreneurs would fall on the risk-taking end of the social risk domain. Thus, the following hypothesis is proposed:

Hypothesis5. Nascent entrepreneurs will display increased risk propensity within the social risk domain after attending an LSM program compared with the pre-program survey.

Hypothesis 5 predicts that after attending an LSM program, a core aspect of which requires participants to "get out of the building" and get direct feedback on their venture from customers (Blank, 2014), entrepreneurs will perceive less risk within the social domain. Learning to take social risk in an educational setting, where the stakes are lower, may be a critical aspect of the methodology, and support for this hypothesis would provide pedagogical support for the approach.

The methodology for the research is presented in what follows, including the procedure, samples, research design, key variables, control variables, the data screening methods employed, and the analyses.

3.3 Procedure

Participants were asked to complete three pre- and post-program surveys to assess the impact of EE and certain demographic variables on risk attitudes. The Locus of Control (Rotter, 1966), Risk Attitude (Weber, Blais & Betz, 2002), and Big-Five Personality Locator (Goldberg, 1992) instruments were employed, and data were collected from 76 participants over five cohorts.

3.3.1 Sample

Data was collected from the accelerator program from 2018 to 2022. At the onset of each cohort, accelerator participants were invited to participate in the pre-program survey, informed of their consent, and that participation was not mandatory. At the end of the program, participants were similarly invited to participate. Thus, the inclusion criteria for the research sample are that participants must have 1) been accepted into the accelerator program and 2) voluntarily chosen to participate in both the pre- and post-surveys. These criteria resulted in a small matched-pairs sample size (n=16). However, one case was removed after the analysis revealed response bias in

the post-test survey. Power analysis in SPSS indicated that to obtain a desired power level of 0.8 and an effect size (Cohen's D) of 0.8, the required sample size was 15.

3.3.2 Variables & Measures

Since this study aims to determine the stability of domain-specific risk attitudes among entrepreneurs, the following variables and measures were used (see Table 1 below).

Table 15: Variables

Experimental Manipulation	**Independent Variables**	**Dependent Variables**
Lean Startup Methodology	Startup Experience[1] Openness[2] Conscientiousness[2] Extraversion/Introversion[2] Agreeableness[2] Neuroticism[2] Locus of Control[3] Age Gender Education Cohort	Risk Attitudes[4]: Ethical Financial Investment Gambling Health/Safety Recreational Social

[1]Ramayah, et al., 2012; Hallen, Bingham, Cohen, 2017; Delmar & Shane, 2006; Oosterbeek, Van Praag & Ijsselstein, 2010
[2]Big-Five Personality Locator (Goldberg, 1992)
[3]Locus of Control Scale (Rotter, 1966)
[4]DOSPERT (Weber, Blais & Betz, 2002)

Age, Gender, Education, Startup Experience, Cohort. These were control variables drawn from demographic data gathered with each program application and were included in the hierarchical modelling. Age is an ordinal variable. Gender is a nominal variable (0 = male, 1= female). Education is a nominal variable with 0=undergraduate and 1=graduate. Startup Experience is an ordinal variable (0=no, 1=yes).

Personality. Personality is a set of control variables drawn from the Big Five personality scale (Goldberg, 1992). These include Openness, Conscientiousness, Extraversion/Introversion,

Agreeableness, and Neuroticism. Each variable was measured twice at the pre-test and post-test. However, the substantive analysis is conducted only on the post-test results.

Locus of Control (LoC). LoC is a numerical variable that constitutes the extent to which people perceive having control over the main events in their lives. A higher relative score indicates a higher external locus of control (see Appendices). The scale used is based on Rotter (1966).

Risk Perception ($Risk_{1/2}$). This dependent variable represents the combined risk score across all five domains, measured at time 1 and time 2 based on the pre- and post-survey responses.

Financial Risk Perception ($Risk_{f1/2).}$ This dependent variable represents the score only for the financial risk items from the DOSPERT scale, including items for the investment and gambling subdomains, measured at times 1 and 2 based on the pre- and post-survey responses.

Gambling Risk Perception ($Risk_{g1/2}$). This dependent variable represents the score only for the financial gambling risk items, measured at time 1 and time 2 based on the pre- and post-survey responses.

Investment Risk Perception ($Risk_{i1/2}$). This dependent variable represents the score only for the financial investment risk items, measured at time 1 and time 2 based on the pre- and post-survey responses.

Ethical Risk Perception ($Risk_{e1/2}$). This dependent variable represents the score only for the ethical risk items, measured at time 1 and time 2 based on the pre- and post-survey responses.

Recreational Risk Perception ($Risk_{r1/2}$). This dependent variable represents the score only for the recreational risk items, measured at time 1 and time 2 based on the pre- and post-survey responses.

Health/Safety Risk Perception ($Risk_{h/s1/2}$). This dependent variable represents the score only for the health/safety risk items, measured at time 1 and time 2 based on the pre- and post-survey responses.

Social Risk Perception ($Risk_{s1/2}$). This dependent variable represents the score only for the social risk items, measured at time 1 and time 2 based on the pre- and post-survey responses.

3.3.3 Instruments

The proposed instruments used in Essay One, namely, DOSPERT, LoC, and Big-Five Personality Locator, were also employed in Essay Two.

3.3.4 Analysis

A paired sample *t*-test and a hierarchical linear regression were conducted. First, the reliability of the scales was computed by calculating Cronbach's alpha. Given the pre- and post-matched pairs, a paired sample *t*-test was performed. A Shapiro-Wilk test for normality was initially conducted with findings that the assumption of normality required for a robust paired sample *t*-test was not met for several of the tested domain-specific risk variables. Therefore, a Wilcoxon signed-rank test was subsequently conducted on all measured risk variables. Control variables, including gender, age, cohort, education, and experience, were collected in the sample and are included to analyze possible covariation (see Figure 6 and Table 16 below). Subsequently, a hierarchical linear regression was conducted using SPSS. In this analysis, each of the three significant variables from the paired samples *t*-test and the covariates (personality

and demographics) were added in each subsequent model. This resulted in twelve discrete models (four for each domain-specific risk variable from the paired sample *t*-test). Each of these models is depicted in Table 16 below. This approach allowed for the inclusion of covariates (or controls), the comparison of any cohort differences, and the analysis of multiple waves of observations (the pre- and post-surveys in this case).

Figure 5: Proposed Study Model

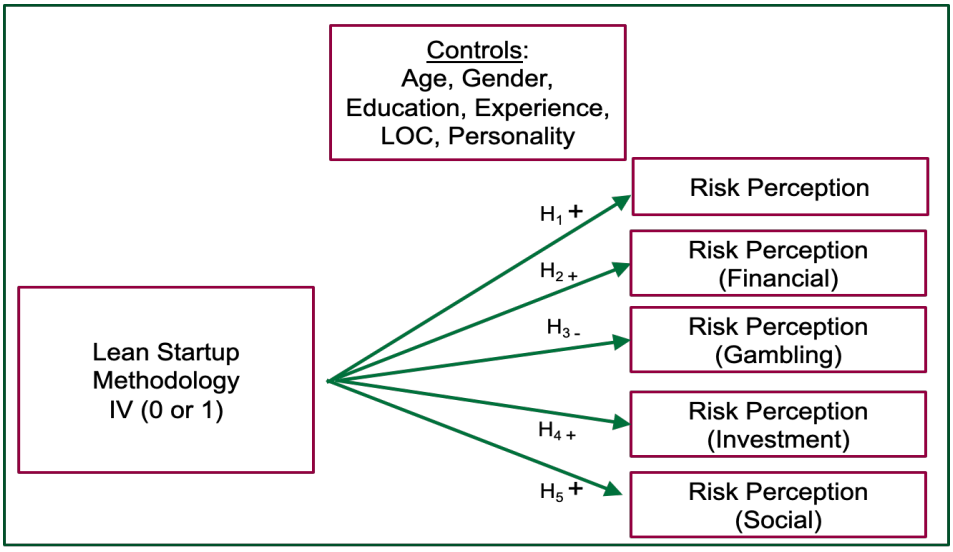


Table 16: Hierarchical Regression Models

M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
$Risk_{f2}$	$Risk_{f2}$	$Risk_{f2}$	$Risk_{f2}$	$Risk_{g2}$	$Risk_{g2}$	$Risk_{g2}$	$Risk_{g2}$	$Risk_{s2}$	$Risk_{s2}$	$Risk_{s2}$	$Risk_{s2}$
$Risk_{f1}$	$Risk_{f1}$	$Risk_{f1}$	$Risk_{f1}$	$Risk_{g1}$	$Risk_{g1}$	$Risk_{g1}$	$Risk_{g1}$	$Risk_{s1}$	$Risk_{s1}$	$Risk_{s1}$	$Risk_{s1}$
	LoC	LoC	LoC		LoC	LoC	LoC		LoC	LoC	LoC
		O	O			O	O			O	O
		C	C			C	C			C	C
		E	E			E	E			E	E
		A	A			A	A			A	A
		N	N			N	N			N	N
			m/f				m/f				m/f

			Age				Age				Age
			Educ				Educ				Educ
			Exp				Exp				Exp

First, each risk perception variable was analyzed alone (i.e., Model 1). Then, the LoC variable was included along with the risk variables (i.e., Model 2). Subsequently, Big-Five personality control variables were added to the model (i.e., Model 3). And finally, all the above measured variables were included (i.e., Model 4). This procedure was repeated for each domain of risk that was significant in the paired sample *t*-test. Support (or lack thereof) for the four hypotheses was analyzed, and findings are presented below.

The analytical methods utilized are shown in Table 17 below. These approaches are modified recommendations from past studies on risk attitudes (Weber, Blais, & Betz, 2002/2006), particularly those incorporating longitudinal data (Bandera, Collins, & Passerini, 2018).

Table 17: Statistical Analysis of Data

Research Question	**Variables Measured**	**Statistical Analyses Performed**
1	Risk Attitude	Internal Reliability; Correlations; Paired Sample *t*-test; Shapiro-Wilk Test; Wilcoxon Signed Rank Test
2	Domain-specific Risk Attitude	Internal Reliability; Correlations; Paired Sample *t*-test; Shapiro-Wilk Test; Wilcoxon Signed Rank Test
3	Risk Attitude, Big Five, LoC; Demographic Controls	Hierarchical Linear Regression

3.4 Results

The following section reports the findings of the analysis. First, the internal reliability of each domain measure was measured by calculating Cronbach's Alpha. Subsequently, paired

sample *t*-tests were conducted on all risk variables using SPSS. Descriptive Statistics, pre- and post-test variable Correlations, *t*-test results, and Cronbach's Alpha for each risk domain variable are presented in the tables below, as well as the results of the Shapiro-Wilk Test for assumption of normality of the sample differences, and the subsequent Wilcoxon signed-rank Test that resulted. Next, a hierarchical linear regression model was built with the post-test risk results as the dependent variables and the pre-test risk results as the independent variables, along with personality and demographic data as covariates. This allows the prediction of the influence of the covariates on the change in the risk scores between the pre- and post-test, separating the effect of the experimental manipulation (the Lean Startup Methodology).

3.4.1 Sample and Sample Size Adjustments

Risk attitude survey responses were collected from 123 participants, of which four were determined to be incomplete and were removed. Of the 119 remaining, 79 were determined to be related to the pre-test and 40 to the post-test. Further, 16 matched pairs of pre- and post-surveys were obtained, including demographic controls and the six personality variables (Locus of Control, Openness, Conscientiousness, Extraversion/Introversion, Agreeableness, and Neuroticism). However, one case was removed after the analysis revealed response bias in the post-test survey. All analyses for this study were conducted on these matched cases.

3.4.2 Test for Internal Reliability

To confirm the internal reliability of the collected measures, Cronbach's Alpha was calculated for each risk domain, including the two subdomains for financial risk (investment and gambling). Cronbach's alpha was ascertained by carrying out an Analysis of Variance (ANOVA: Two Factor without Replication) for each dependent risk variable (n=127) to acquire the elements to calculate the Alpha (1-(error/mean squared)). Cronbach's alphas are presented in

Table 18 below. Internal consistency of all factors was acceptable, although Cronbach's Alpha for the Social risk-taking domain was borderline low. Of the three variables with significant mean differences (Financial, Social, and Gambling risk) in the paired sample *t*-test, Cronbach's Alpha was .81, .63, and .92, respectively.

Table 18: Results of Tests for Internal Reliability

	Cronhbach's Alpha		
	Pre Test Responses	**Post Test Responses**	**All Responses**
Risk Overall	0.7	0.94	0.9
Ethical	0.74	0.95	0.95
Financial	0.64	0.85	0.81
Health	0.60	0.83	0.75
Recreational	0.78	0.85	0.82
Social	0.58	0.56	0.63
Investment	0.81	0.84	0.83
Gambling	0.65	0.94	0.92

3.4.3 Descriptive Statistics & Correlations

The following table shows the descriptive statistics for the 16 cases. The difference in the sample (N) refers to the matched pair without demographic data. The only demographic control variable that produced significant results in the following analysis was previous startup experience, which was significantly predictive of social risk-taking in the hierarchical regression (see analysis below). Though data was collected regarding the status of the individuals (Still Entrepreneur), it was deemed inappropriate for our analysis. Nevertheless, this may be relevant in future research.

Table 19: Demographic Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Gender	15	0	1	0.27	0.458
Age	15	20	45	25.47	7.160
Education	15	1	2	1.27	0.458
Startup Experience	15	0	1	0.47	0.516
Cohort	16	1	5	2.38	1.310
Still Entrepreneur	15	0	1	0.33	0.488
Valid N (listwise)	15				

The correlation matrix calculated in SPSS for the model variables is presented in Table 20 (pre-test) and Table 21 (post-test). For the pre-test variables, statistically significant correlations were found between the overall Risk propensity and the health (Pearson Correlation $r = .697$, $p = .00$) and recreational risk sub domain (Pearson Correlation $r = .80$, $p < .005$) and the pre-test Neuroticism score ($r = .798$, $p < .005$), respectively. Recreational risk was strongly correlated with the Overall risk variable ($r = .80$, $p < .005$) and moderately with the Neuroticism variable ($r = .614$, $p = .04$). Unsurprisingly, Investment risk was strongly correlated with the overall Financial risk variable ($r = .923$, $p < .005$). However, its counterpart gambling risk did not correlate with its higher-level financial risk domain. Social risk was moderately correlated with the personality variable Conscientiousness ($r = .672$, $p = .02$). Risk propensity in the social ($r = .614$, $p = .04$) and recreational ($r = .699$, $p = .02$) domains was moderately correlated with Neuroticism. Within the personality variables in the pre-test sample, Conscientiousness was highly correlated with Neuroticism ($r = .816$, $p < .005$). Among the remaining demographic variables, Startup Experience was moderately correlated with Investment risk-taking ($r = .527$, $p = .04$), Age was moderately negatively correlated with Conscientiousness ($r = -.654$, $p = .04$) and Neuroticism $r = -.669$, $.p = .04$), while positively correlated with Education ($r = .679$, $.p < .005$).

Table 20: Correlations between variables (pre-test)

Pearson Correlations

	Pretest Risk	Risk1e	Risk1f	Risk1h	Risk1r	Risk1s	Riskfi1	Riskfg1	LOC1	Open1	Cons1	Extr1	Agree1	Neur1	Age	Educ	StrtpExp	Cohort	StillEnt
Pretest Risk																			
Risk1e	0.291																		
Risk1f	0.256	-0.495																	
Risk1h	.697**	0.331	-0.117																
Risk1r	.800**	-0.169	0.320	0.399															
Risk1s	0.364	0.476	-0.217	0.043	0.041														
Riskfi1	0.330	-0.443	.923**	-0.047	0.387	-0.190													
Riskfg1	-0.163	-0.171	0.274	-0.183	-0.140	-0.085	-0.118												
LOC1	-0.072	-0.084	-0.172	0.162	-0.073	-0.097	-0.195	0.044											
Openness1	0.246	-0.042	-0.408	0.101	0.331	0.507	-0.348	-0.405	0.001										
Conscientiousness1	0.595	0.020	0.189	-0.066	0.534	.672*	0.191	0.013	-0.546	0.467									
Extraversion1	0.035	-0.135	0.225	-0.223	0.021	0.284	0.193	0.217	0.282	0.055	0.193								
Agreeableness1	0.060	0.080	-0.083	0.085	0.002	0.080	-0.074	-0.063	0.260	0.459	-0.004	0.536							
Neuroticism1	.798**	0.338	0.063	0.123	.614*	.699*	0.012	0.311	-0.407	0.298	.816**	0.251	0.017						
Age	-0.269	-0.270	-0.228	0.181	-0.128	-0.401	-0.229	-0.016	0.271	-0.167	-.654*	-0.488	-0.473	-.658*					
Education	-0.353	-0.208	-0.182	0.029	-0.253	-0.406	-0.136	-0.129	0.212	-0.370	-0.439	-0.060	-0.381	-.669*	.679**				
Startup Experience	0.244	-0.117	0.425	0.045	0.274	-0.195	.527*	-0.222	-0.141	-0.241	-0.162	-0.279	-0.065	-0.085	-0.218	-0.262			
Cohort	-0.220	0.261	-0.233	-0.400	-0.215	0.187	-0.132	-0.270	0.100	-0.264	-0.345	0.149	-0.165	-0.152	-0.151	0.163	0.434		
Still Entrepreneur	-0.147	-0.264	0.280	-0.203	-0.102	-0.113	0.151	0.350	-0.462	0.015	0.112	-0.613	-0.421	-0.109	-0.068	-0.107	0.472	0.000	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

For the post-test variables, correlations appeared more frequently (Table 21). Among the post-test responses, all risk domain variables except Investment risk showed moderate to high correlations with the overall Post Test Risk variable (Ethical r=.956, p<.005; Financial risk r=.749, p<.005; Health risk r=.837, p<.005; Recreational risk r=.807, p<.005; Social risk r=.666, p=.01; Gambling risk r=.734, p<.005). The overall financial risk domain was found to correlate moderately with Ethical risk-taking (r=.71, p<.005), and both financial risk subdomains correlated moderately in the case of Investment risk (r=.72, p<.005) and highly in the case of Gambling risk (r=.853, p=.00) with overall Financial risk variable. The Health risk variable correlated with the Ethical risk propensity (r=.837, p<.005) and Gambling risk (r=.545, p=.03), while the Recreational risk domain correlated moderately with Ethical risk-taking (r=.674, p<.005). A correlation between Social risk and Conscientiousness appeared in the post-test sample (r=.725, p=.01). Social risk was also correlated moderately with Ethical risk-taking in the post test sample (r=.601, p=.01). Gambling risk correlated highly with Ethical risk (r=.796, p<.005) and Financial risk (r=.853, p<.005), and moderately with Health risk (r=.545, p=.03) and

the Extraversion variable (r=-.641, *p*=.03). Within the other personality variables, Extraversion negatively correlated with Neuroticism (r=-.603, *p*=.05), and Agreeableness correlated with Openness (*r*=.727*, p*=.01). Significant correlations with the remaining control variables, which were not significant in the pre-test sample, appeared. Gender emerges negatively correlated with Investment risk-taking (r=.539, *p*=.04) and positively correlated with Age (r=.679, *p* <.005). Similarly, Age was found to be moderately negatively correlated with Investment risk-taking (r=.528, *p*=.04) and positively correlated with Education (r=.679, *p*<.005). Education was also moderately negatively correlated with Investment risk-taking (r=.539, *p*=.04). No other demographic variables displayed correlations.

Table 21: Correlations between variables (post-test)

Pearson Correlations

	Post Test Risk	Riske2	Riskf2	Riskh2	Riskr2	Risks2	Riskfi2	Riskfg2	LOC2	Open2	Consc2	Extr2	Agree2	Neur2	Gender	Age	Educ	StrtpExp	Cohort	StillEnt
Post Test Risk																				
Riske2	.956**																			
Riskf2	.749**	.710**																		
Riskh2	.837**	.835**	0.437																	
Riskr2	.807**	.674**	0.484	.568*																
Risks2	.666**	.601*	0.324	0.490	0.476															
Riskfi2	0.412	0.257	.720**	0.086	0.324	0.306														
Riskfg2	.734**	.796**	.853**	.545*	0.431	0.222	0.253													
LOC2	-0.142	-0.125	-0.022	-0.062	-0.071	-0.414	0.050	-0.068												
Openness2	-0.276	-0.339	-0.216	-0.315	-0.189	0.527	0.101	-0.424	-0.237											
Conscientiousness2	0.177	-0.024	-0.251	0.172	0.084	.725*	-0.126	-0.121	-0.124	0.523										
Extraversion2	-0.342	-0.581	0.092	-0.376	-0.131	0.167	0.496	-.641*	0.328	-0.028	-0.218									
Agreeableness2	-0.224	-0.148	-0.328	-0.083	-0.304	0.485	-0.288	0.030	-0.340	.727*	0.508	0.019								
Neuroticism2	0.300	0.330	-0.258	-0.092	0.483	0.202	-0.465	0.387	-0.127	-0.084	0.385	-.603*	-0.076							
Gender	-0.285	-0.227	-0.400	0.080	-0.351	-0.286	-.539*	-0.147	-0.214	-0.512	-0.447	-0.053	-0.129	-0.206						
Age	-0.176	-0.124	-0.364	0.139	-0.092	-0.382	-.528*	-0.106	-0.036	-0.311	-0.453	-0.331	-0.186	0.060	.679**					
Education	-0.285	-0.227	-0.400	0.080	-0.351	-0.286	-.539*	-0.147	-0.214	-0.512	-0.447	-0.053	-0.129	-0.206	1.000**	.679**				
Startup Experience	0.222	0.140	0.127	0.039	0.261	0.443	0.368	-0.102	0.239	0.278	-0.212	0.393	-0.028	-0.056	-0.262	-0.218	-0.262			
Cohort	-0.309	-0.237	-0.418	-0.347	-0.282	0.183	-0.281	-0.371	0.062	-0.251	-0.192	0.357	-0.031	0.205	0.163	-0.151	0.163	0.434		
Still Entrepreneur	-0.221	-0.326	0.078	-0.348	-0.153	-0.124	0.195	-0.039	0.111	0.598	0.150	0.098	0.454	-0.085	-0.107	-0.068	-0.107	0.472	0.000	
	0.429	0.236	0.783	0.204	0.586	0.660	0.487	0.889	0.693	0.068	0.679	0.787	0.188	0.816	0.705	0.809	0.705	0.075	1.000	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

3.4.4 Test for Normality

Before conducting a paired sample *t*-test on the pre- and post-test matched pairs, a Shapiro-Wilk test for normality was performed on the differences between the pre-test and post-test samples for each domain-specific risk variable, with the following results (see Table 22). All variables satisfied the test for normality except for the differences between the gambling

measures. As a robustness check, a nonparametric Wilcoxon signed-rank test was performed on all variables (see section 3.4.6 below).

Table 22: Test for Normality

		Shapiro-Wilk	
Statistic	df	Sig.	Sig.
Risk_Diff	0.971	15	0.878
Ethical_Diff	0.928	15	0.257
Financial_Diff	0.897	15	0.085
Health_Diff	0.963	15	0.751
Recreational_Diff	0.899	15	0.09
Social_Diff	0.934	15	0.318
Invest_Diff	0.964	15	0.769
Gambling_Diff	0.808	15	0.005

3.4.5 Paired Sample *t*-Tests

Paired sample *t*-tests were performed on all risk and personality variables for which data were collected before and after the experimental manipulation (LSM). No significant differences in the mean scores for Locus of Control or Big Five personality variables were found. The results of the paired sample *t*-tests for the risk domain variables are presented in the tables below, where some significant differences were found. Mean scores and standard deviations for the risk attitude variables are reported in Table 23 below. Mean risk attitude scores increased after the LSM treatment for all risk domains except for the Recreational risk domain, which declined but not significantly. Since mean variances in risk attitudes are bidirectional, two-tailed significance tests were employed. Significant differences were found between the pre- and post-test means in the Financial and Social risk domains, lending support for Hypotheses 2 and 5 and the Gambling risk subdomain. Pre- and post-survey risk means were not significantly different for Risk overall or for the Ethical, Recreational, Health/Safety domains, or the Investment subdomain, the latter showing no support for hypothesis 2.

Table 23: Risk Domains - Paired Samples Statistics

Risk Domains		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Risk Pretest	96.27	15	9.721	2.51
	Risk Post-test	98.87	15	10.309	2.662
Pair 2	Ethical Pre	10.73	15	3.693	0.954
	Ethical Post	12	15	3.625	0.936
Pair 3	Financial Pre	18.27	15	3.731	0.963
	Financial Post	21.13	15	5.083	1.312
Pair 4	Health Pre	17.53	15	4.224	1.091
	Health Post	18	15	4.359	1.125
Pair 5	Recreational Pre	21.53	15	5.792	1.496
	Recreational	19.53	15	5.514	1.424
Pair 6	Social Pre	23.8	15	3.234	0.835
	Social Post	28.2	15	3.189	0.823
Pair 7	Investment Pre	13.2	15	3.468	0.895
	Investment Post	14.53	15	3.523	0.91
Pair 8	Gambling Pre	5.07	15	1.534	0.396
	Gambling Post	6.6	15	3.68	0.95

Results for the Paired Samples *t*-test (Table 24) confirmed significant differences only for the Financial and Social risk domains, as well as for the Gambling risk subdomain (p=.037, p <.001, and p=.049, respectively). The Investment risk domain was not significant at the p<.05 level but was significant at the p<.10 (p=.088). A negative mean for each paired sample indicated a higher mean score for risk-taking after the LSM treatment.

Table 24: Paired Samples t-Tests

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	Confidence Interval of the Lower	Upper			One-Sided p	Two-Sided p
Pair 1	Pretest Risk - Post Test Risk	-2.6	8.407	2.171	-7.256	2.056	-1.2	14	0.125	0.251
Pair 2	Risk1e - Riske2	-1.267	3.432	0.886	-3.167	0.634	-1.43	14	0.087	0.175
Pair 3	Risk1f - Riskf2	-2.867	4.809	1.242	-5.53	-0.2	-2.31	14	0.018	0.037
Pair 4	Risk1h - Riskh2	-0.467	3.27	0.844	-2.278	1.344	-0.55	14	0.295	0.589
Pair 5	Risk1r - Riskr2	2	4.209	1.087	-0.331	4.331	1.84	14	0.044	0.087
Pair 6	Risk1s - Risks2	-4.4	2.444	0.631	-5.753	-3.05	-6.97	14	<.001	<.001
Pair 7	Riskfi1 - Riskfi2	-1.333	2.82	0.728	-2.895	0.228	-1.83	14	0.044	0.088
Pair 8	Riskfg1 - Riskfg2	-1.533	2.748	0.71	-3.055	-0.01	-2.16	14	0.024	0.049

Effect size was computed using SPSS (Table 25) for the three significant paired sample variables (Financial risk, Social risk, and Gambling risk) and found substantial negative effect sizes for all three (d=-.596, d=-1.801, and d=-.558, respectively), with Gambling risk showing a moderate effect. The negative sign on the effect indicates that the post-test mean was significantly higher than that of the pre-test.

Table 25: Paired Samples Effect Sizes for Supported Hypotheses

					95% Confidence Interval	
			Standardizer[a]	Point Estimate	Lower	Upper
Pair 3	Risk1f - Riskf2	Cohen's d	4.809	-0.596	-1.139	-0.036
		Hedges' correction	5.087	-0.564	-1.076	-0.034
Pair 6	Risk1s - Risks2	Cohen's d	2.444	-1.801	-2.62	-0.957
		Hedges' correction	2.585	-1.702	-2.477	-0.905
Pair 8	Riskfg1 - Riskfg2	Cohen's d	2.748	-0.558	-1.095	-0.004
		Hedges' correction	2.907	-0.527	-1.035	-0.003

a. The denominator used in estimating the effect sizes.
Cohen's d uses the square root of the average variance of measures.
Hedges' correction uses the square root of the average variance of measures, plus a correction factor.

3.4.6 Nonparametric Tests (Wilcoxon Signed Rank Test)

Since the mean differences for one of the variables in the paired samples violated the assumption of normality, a Wilcoxon signed-rank test was conducted to evaluate whether significant differences were found between the pre-test and post-test risk attitude domains. This method is a nonparametric test for mean difference when the normality assumption cannot be made. The null hypothesis in these tests is "the median of differences between pre-test Risk domain and post-test risk domain equals 0." This test, as with the paired t-tests, confirmed significant differences (null was rejected) for the Financial (p=.047), Social (p<.001), and Gambling (p=.042) risk attitude domains, but not for the Investment domain. See Table 26 for a complete summary of the results.

Table 26: Nonparametric test (Wilcoxon Ranked Sign Test) of mean risk scores

Hypothesis Test Summary

	Test Statistic	Sig.[a,b]	Decision
Overall Risk	1.132	0.258	Retain null
Ethical Risk	1.555	0.12	Retain null
Financial Risk	1.985	0.047	**Reject null**
Health Risk	0.601	0.548	Retain null
Recreational Risk	-1.796	0.073	Retain null
Social Risk	3.34	<.001	**Reject null**
Investment Risk	1.696	0.09	Retain null
Gambling Risk	2.037	0.042	**Reject null**

a. The significance level is .050.
b. Asymptotic significance is displayed.

3.4.7 Hierarchical Linear Regression (12 models)

Hierarchical modelling was conducted to incorporate the impact of specific personality and demographic control variables on predicted effects for the financial ($Risk_{f2}$), gambling ($Risk_{g2}$), and social ($Risk_{s2}$) dependents. A linear regression model with the time 2 (post-test) variable as the dependent variable was performed, including the time 1 (pre-test) and various other collected data. This analytical approach (when combined with *t*-tests) is appropriate for analyzing longitudinal data collected at multiple time increments and allows for the inclusion of covariates. See Table 16 above for the detailed components included in each model.

Financial Risk. Results of Model 1 (Post-test financial risk compared to pre-test financial risk) are not found to be significant (p=.10, f=3.096). When the Locus of Control variable is added (Model 2), the model is not significant. In Model 3, Big Five personality variables were added, but no significant effects were found. Finally, in Model 4, all the above variables were included, but with no significant results.

Table 27: Financial Risk Linear Regression Model Summary & ANOVA (Model 1)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.439[a]	0.192	0.130	4.741	0.192	3.096	1	13	0.102

a. Predictors: (Constant), Risk1f

b. Dependent Variable: Riskf2

Table 28: Financial Risk Linear Regression Model Summary & ANOVA (Model 2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
2	.451[a]	0.204	0.071	4.900	0.204	1.533	2	12	0.255

a. Predictors: (Constant), LOC1, Risk1f

b. Dependent Variable: Riskf2

Gambling Risk. In Models 5, 6, 7 and 8, the covariation of the independent variables (pre-test gambling risk, personality variables, and demographic control variables) with the post-test gambling risk dependent variable are analyzed. Model 5 includes only the gambling risk attitude variables, and the regression is significant (p=.002) with 51% of the variance in the model explained by the independent variable (pre-test gambling risk, R^2=.51*)*. When the Locus of Control variable is added as a covariate in the regression model (Model 6), significant results (p=.004) are found and R^2 increases slightly (R^2=.535). Model 7, which considers how well the personality variables explain the changes to the risk attitudes after LSM, is not significant. No significant findings were obtained for Model 8 (personality and demographic variables).

Table 29: Gambling Risk Linear Regression Coefficients (Model 5)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
5	.739[a]	0.546	0.511	2.573	0.546	15.647	1	13	0.002

a. Predictors: (Constant), Riskfg1

b. Dependent Variable: Riskfg2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
5	(Constant)	-2.385	2.366		-1.008	0.332					
	Riskfg1	1.773	0.448	0.739	3.956	0.002	0.739	0.739	0.739	1.000	1.000

a. Dependent Variable: Riskfg2

Table 30:Gambling Risk Linear Regression Coefficients (Model 6)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
6	.776[a]	0.602	0.535	2.509	0.602	9.062	2	12	0.004

a. Predictors: (Constant), LOC1, Riskfg1

b. Dependent Variable: Riskfg2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
6	(Constant)	-4.178	2.693		-1.552	0.147					
	Riskfg1	1.686	0.442	0.703	3.812	0.002	0.739	0.740	0.695	0.977	1.024
	LOC1	0.243	0.188	0.238	1.292	0.221	0.345	0.350	0.235	0.977	1.024

a. Dependent Variable: Riskfg2

Social Risk. In Models 9, 10, 11 and 12, the covariation of the independent variables (pre-test social risk, personality variables, and demographic control variables) with the post-test social risk dependent variable are evaluated. For Model 9 (see Table 31), which included only the risk variables, a significant result was found (p=.003, R^2=.47). When the LoC variable (Table 32) was added, the model predictive power was not improved (p=.01, R^2=.45). It should be noted that when performing a similar regression of the social risk variable with only the demographic variables, including Startup Experience as a covariate (p=.019), a significant result (p=.01, R^2=.626) is found with Startup Experience contributing most significantly to the model. See Table 33 below. None of the additional hierarchical models produced a significant result.

Table 31: Social Risk Regression (Model 9)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
9	.711[a]	0.505	0.467	2.329	0.505	13.260	1	13	0.003

a. Predictors: (Constant), Risk1s

b. Dependent Variable: Risks2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
9	(Constant)	11.520	4.620		2.494	0.027					
	Risk1s	0.701	0.192	0.711	3.641	0.003	0.711	0.711	0.711	1.000	1.000

a. Dependent Variable: Risks2

Table 32: Model 10 (including locus of control)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
10	.726[a]	0.527	0.448	2.369	0.527	6.687	2	12	0.011

a. Predictors: (Constant), LOC1, Risk1s

b. Dependent Variable: Risks2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
10	(Constant)	12.999	5.097		2.550	0.025					
	Risk1s	0.690	0.196	0.699	3.512	0.004	0.711	0.712	0.697	0.994	1.006
	LOC1	-0.132	0.176	-0.149	-0.749	0.468	-0.202	-0.211	-0.149	0.994	1.006

a. Dependent Variable: Risks2

Table 33:Social Risk Linear Regression Model 11 (Demographic Controls)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
11	.877[a]	0.770	0.626	1.912	0.770	5.344	5	8	0.019

a. Predictors: (Constant), Startup Experience, Age, LOC1, Risk1s, Education

b. Dependent Variable: Risks2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
11	(Constant)	8.125	6.210		1.308	0.227					
	Risk1s	0.850	0.202	0.852	4.203	0.003	0.672	0.830	0.713	0.700	1.428
	LOC1	-0.003	0.163	-0.004	-0.018	0.986	-0.265	-0.006	-0.003	0.767	1.305
	Age	-0.092	0.102	-0.216	-0.899	0.395	-0.416	-0.303	-0.153	0.497	2.013
	Education	2.568	1.604	0.385	1.601	0.148	-0.248	0.493	0.272	0.497	2.011
	Startup Experience	3.438	1.177	0.565	2.920	0.019	0.356	0.718	0.496	0.769	1.300

a. Dependent Variable: Risks2

3.5 Discussion

The following section discusses the findings of the analyses, including contributions to theory and method, and their applications to practice in entrepreneurship education and entrepreneur support organizations such as accelerators.

3.5.1 Paired Sample *t*-Test Discussion

Of the four hypotheses explored by means of paired sample *t*-testing, three were statistically supported (Financial risk, Gambling Risk, and Social risk) and two were not supported (Investment risk and Overall risk). Table 29 summarizes these results.

Table 34: Support for Study Hypotheses

Hypothesis	Hypothesis	Findings
H1	LSM increases risk propensity	not supported
H2	LSM increases financial risk propensity	**Supported**
H3	LSM reduces gambling risk propensity	**Supported**
H4	LSM increases investment risk propensity	not supported
H5	LSM increases social risk propensity	**Supported**

This study found mixed results regarding the impact of experiential education on nascent entrepreneurs, specifically those exposed to LSM. Nonetheless, moderate to strong effect sizes warrant further exploration. Here, possible explanations for the differences between the pre- and post-test means are discussed.

The DOSPERT scale (Weber, Blais, & Betz, 2002, 2006) explores risk domains, differentiating between risk-taking propensity in various areas of endeavor. It seems intuitive that individuals would experience the likelihood of taking these risks differently depending on the nature of the risk; that is, it seems unlikely that individuals would maintain the same relative risk propensity across all risk domains. Numerous previous studies have borne this out (for

example, see Dohmen et al., 2011). However, the possibility of manipulating this risk propensity has not been studied. Our findings, particularly with the three risk domains addressed by Hypotheses 2, 3, and 4 (see table above), contribute to theories of entrepreneurial risk-taking.

The Lean Startup Methodology (LSM) as a pedagogical methodology is rooted in experiential education; that is, it forces nascent entrepreneurs to gather real-world data and revise their beliefs about reality based on those findings. This resembles the scientific method (Zellweger & Zenger, 2022; Ries, 2011; Blank, 2013). That said, the scientific method offers the rigor of the lab setting that is not often present in the startup "struggle." Entrepreneurs, particularly first-time founders, must grapple with myriad incoming data and make appropriate decisions about moving forward (or retreating) based on Bayesian Priors (Bayes, 1763). Why do entrepreneurs express variability in their own risk propensity over relatively short periods of time, when risk propensity has been classically stable in individuals (Schildberg-Hörisch, 2018)? In this study, some explanations are offered based on strong longitudinal data.

Financial Risk (Hypothesis 2)

Financial risk exists firmly within business risk-taking (Miles, 2014) since critical thinking and data analysis, combined with slow thinking (Kahneman, 2011), prevail over rash risk-taking. The means in the pre- and post-tests (p=.04) reveal an increased propensity to take financial risk, which is consistent with nascent entrepreneurs (students mostly in this sample) learning to think critically (slowly), analyze the incoming data, and revise their beliefs about reality as it relates to their specific venture. Other studies have reported contrary findings (Ladd & Kendall, 2017) wherein study participants have grown more financially risk-averse after exposure to lean startup methods. This warrants further study, particularly because most of the

difference in financial risk between the pre- and post-test is explained by the Gambling risk subdomain.

Gambling Risk (Hypothesis 3)

LSM encourages early-stage entrepreneurs to take personal chances, that is, to "get out of the building" and gather evidence that the proposed venture merits the resources warranted. As educators, we hope this process involves calculated risk-taking. We encourage student entrepreneurs and first-time entrepreneurs to base their risk-taking on the facts in evidence at the time. Essentially, this is the opposite of gambling risk, wherein the risk outcomes are known, long, and favored toward the "house." Yet, this study found a significant (p=.049) correlation between LSM education and risk-taking akin to gambling risk. The moderate effect size (*d*=.56) is noted. Yet, risk-taking is so prevalent in entrepreneurship education that we may not be surprised by the moderate correlation between gambling and risk-taking for first-time entrepreneurs. This may be a potential area for improvement in the entrepreneurship education curriculum.

Social Risk (Hypothesis 5)

Here, the most substantial effect (*d*=-1.801) and the most significant results ($p < .001$) are seen. The essence of entrepreneurship education is communication, so it may be no surprise that LSM significantly increases the willingness of participants to take risks in the social domain. As previously discussed, LSM at its foundations encourages entrepreneurs not to guess what the market wants but rather to go find out by conducting a formal process of customer discovery (Ries, 2011). This process is daunting for many first-time entrepreneurs, who learn improved communication skills and revise their beliefs about reality. This leads to a refined business model

with improved potential outcomes. The finding that LSM increases social risk-taking is important for both theory and practice.

3.5.2 Discussion of Hierarchical Regression Results

The results of the hierarchical linear regression analysis of the three significant variables from the Paired Sample *t*-Tests (Financial risk, Gambling risk, Social risk) were not significant. However, demographic control variables appear to be significant in predicting a portion of the variation between the pre- and post-test social risk variables. Results are discussed below.

Financial Risk (Hypothesis 2). In Model 1, a regression of the post-test financial risk scores against the pre-test paired sample without any confounds was performed, finding no significant effect. Adding additional variables does not improve the model's explanatory power, requiring further examination by breaking out the six financial scale items into their components of investing risk and gambling risk. While the paired sample *t*-test found significant results, a reliable predictive model from the linear regression was not obtained.

Gambling Risk (Hypothesis 3). In the gambling risk models, extraversion is found to be significantly but negatively correlated with the post-test gambling risk propensity. This is an interesting and potentially significant contribution to the literature on entrepreneurship education. Extraversive behavior is a requirement of LSM in that participants are encouraged to expressively communicate with potential stakeholders regarding their new venture value propositions and co-create that value proposition. Introverted behavior in this study's findings may lead to risk-taking behavior, in that real-world facts from venture stakeholders may be withheld from the introvert.

In contrast, extroverts can obtain facts about the business that reduce the risk of the venture (according to Model 6 results). The results imply that experiential education programs like LSM can impact outcomes favorably by building extroverted behavioral characteristics in nascent entrepreneurs. This has ramifications for theory (requiring further study) and practice, wherein those of us who provide education and training to nascent entrepreneurs may apply LSM methods to improve startup outcomes.

Social Risk (Hypothesis 5). Hierarchical regression results for social risk-taking produced significance regarding the pre-test social risk results of the matched cases, and with the presence of previous startup experience. That is, individuals with higher relative risk-taking propensities in the pre-test produced, on average, higher relative scores on the post-test, and the mean change was significant. Furthermore, individuals with prior startup experience displayed considerable variance between their pre-test and post-test social risk scores. This has implications for both entrepreneurship education and startups in practice. Those individuals with prior startup experience may display a higher propensity for taking social risks, which may affect startup outcomes. This result requires further study.

3.5.3 Limitations

The study has several limitations, some of which may be alleviated by employing an experimental design. To reduce both selection and survivor bias, the sampling frame is broadened to include first-time entrepreneurs. Also, the participation selection criteria for inclusion are limited only by one team member's registration status and successful application to the program.

Self-reported Data. All data is self-reported. Personality preferences, including risk perceptions, may be subject to self-report bias. Participants may be inclined to provide answers in line with how they wish to be seen rather than how they perceive themselves or the world.

Internal Validity Threats. The primary instrument (DOSPERT) measures individual risk perception, not entrepreneurship risk specifically. Whether an individual sees risk in bungee jumping may not relate to whether they see risk in launching a startup. The social and financial risk domains, including gambling and investment risk propensity, may be the most parsimonious explanatory variables relative to entrepreneurship. This may be a threat to the internal validity of the study. The small sample size of the paired samples may also limit the generalizability of the findings.

External Validity Threats. The program's geographic location and some unique aspects, including, but not limited to, the instructors, guest speakers, program staff, and other cohort-specific features, are unique to the program. These may not generalize beyond the individual cohort, the specific accelerator, or the entrepreneurship field.

Time. In this study, it was not possible to control for the influence of time on the individual respondents' post-test surveys. This threat to validity must be considered, as it is not possible to know whether external events (i.e., changes in environmental conditions, competing programs, etc.) may have explanatory power on the pre- and post-test variance. In future studies, adding a control group will alleviate this threat to validity.

Individual-Level Covariates. We can satisfactorily address individual-level confounds since each paired sample represents an individual and, therefore, acts as its own control group.

Response Rates. A noted drop-off in response rates within each annual cohort may impact the validity of the experimental findings. The results will be analyzed as a pool and with

cohort controls to minimize the impact of response rate bias. Our paired samples approach to this study should eliminate most, if not all, of the response rate bias.

No control group. This study did not use a control group. That said, there are methods available, including propensity score matching (PSM) and coarsened exact matching (CSM), that may allow for the creation of a control sample after the fact (Cera et al., 2020). This study used samples of pre- and post-test surveys matched to specific individuals. This allows for a within-subjects design where individuals may be considered their own control group (Charness, Gneezy, & Kuhn, 2012). In future replication studies, it will be possible to construct a control group using the entire sampling frame of accelerator applicants; that is, those accepted into the accelerator become part of the experimental cohort, while unaccepted applicants join the control group.

3.6 Conclusion

3.6.1 Research Significance (Theory & Practice)

Kerr, Kerr & Xu (2017) in their exhaustive review of literature since 2000 on personality and risk attitudes in entrepreneurship point to several gaps. They note gaps in linking entrepreneur attitudes to performance and why entrepreneurs abandon their ventures. They identify the state-of-the-art study today as one that utilizes longitudinal data, measures personality data before market entry is decided, and takes observations, including traits like risk aversion, all of which are characteristic of the present study. Further, little to no research has yet examined the stability of risk preferences among nascent entrepreneurs. No study has yet surfaced that has used experiential education as an experimental manipulation of risk attitudes other than Ladd & Kendall (2017). Our findings that risk attitudes are not stable over time and may be manipulated by intense experiential education serve to 1) validate past and future investment in entrepreneurship education, 2) support further policy making in innovation

investment and education, and 3) spur further research in linkages between risk attitudes and entrepreneurial outcomes.

For practice, understanding the risk preferences of entrepreneurs may have profound implications for several stakeholders in the innovation ecosystem, including investors, educators, government agencies, and entrepreneurs themselves as they make key decisions about the uncertainties of moving ahead in the game of new ventures. Blaise Pascal said, perhaps apocryphally, “It is not certain that everything is uncertain.” Entrepreneurship is rich with uncertainty. Learning how to convert uncertainty into manageable risk is one of the most critical aspects of the entrepreneur’s journey. Understanding their attitude toward risk may be the first step.

3.6.2 Future Research

The present study offers numerous avenues for future research. As the first study to consider experiential entrepreneurship education's impact on nascent entrepreneurs' risk attitudes, there are many avenues for future research. A few are listed below:

- How risk propensity implicates failure rates of startups.
- How risk propensity implicates quitting rates of first-time entrepreneurs.
- How experiential education can improve/impact Entrepreneur Intention (likelihood of starting a new venture) and/or Entrepreneur Action (actual rates of startup formation).
- This study has shown that domain-specific risk propensity is variable; the extent to which entrepreneurship education can be implicated in this variance should be further studied.

- This longitudinal study was conducted in Hawai‘i, on the island of Oahu, a remote, low-population region (~1 million residents) with potentially unique cultural characteristics that impact the generalizability of these results; replication of this approach in accelerator programs in other regions is warranted.
- Risk propensity, variance in risk propensity over time, and the likelihood of persistence as an entrepreneur.

ESSAY 3: Nascent Entrepreneurs & Survival in the Valley of Death

4 Introduction

The startup "valley of death" is a theorized period of high uncertainty for nascent entrepreneurs. In this period, there is a gap between the resources available to the venture and those required to operate the business sustainably from a cash flow perspective (Barron & Amorós, 2020). This "valley of death" is characterized by financial constraints, lack of market validation, and constrained social capital (mentorship, etc.). Programs supporting entrepreneurs during this stage include experiential education, accelerators, incubators, and other support organizations. Improving our understanding of nascent entrepreneurs, their decision making, and how support organizations like university accelerators impact them could be helpful in academic research and entrepreneurship practice. Many regions, including the State of Hawai'i, have explicitly included in their long-term economic development plan the goal of diversifying the economy. In Hawai'i's case, it has been to shift the economy away from an overdependence on the tourism sector. Such a long-term economic development plan often begins with university entrepreneurial education (EE), from which the initial wave of nascent entrepreneurs emerges.

Qualitative research methods can be effectively utilized in entrepreneurship research to create in-depth descriptions of the "lived experience" of entrepreneurs (Hlady-Rispal & Jouison-Laffitte, 2014; Neergaard & Ulhøi, 2007). Hlady-Rispal and Jouison-Laffitte (2014) highlighted the importance of qualitative research in advancing entrepreneurship research. This methodology can address the complexities of entrepreneurship phenomena that do not necessarily emerge from quantitative approaches. The final essay is a case study that captures how nascent entrepreneurs persist during and following participation in a university startup accelerator. Six of the 76 entrepreneurs are included in this research. A case study for each documented their journey from a university accelerator over five to eight years. Analysis of these cases provides a nuanced

understanding of how entrepreneurship support organizations (ESOs), like university accelerators with their experiential education programming, facilitate the nascent entrepreneurs in the field.

4.1 Literature Review

The following section reviews the relevant literature on entrepreneurship education, university accelerator programs, and the lean startup methodology. Several gaps are noted regarding 1) the conversion of student entrepreneurs to active entrepreneurs and 2) the contribution of startup methodologies like LSM to this intention-to-action nexus and beyond.

4.1.1 Experiential Learning and Entrepreneurship Education

As discussed in Chapter One's literature review, EE research emphasizes its association with entrepreneurial intention (EI) (Bae, Qian, Miao & Fiet, 2014). Experiential education methodologies like the Lean Startup Methodology (LSM) (Ries, 2011; Blank, 2013; Müller & Thoring, 2012) have emerged as common approaches to ESO curricula. In their 2019 meta-analysis, González-López et al.(2019) note the research attention placed on the lack of findings linking EE to the likelihood of engaging in entrepreneurship (Fayolle & Gailly, 2015). Virtually no research has focused on the impact of programs such as LSM on nascent entrepreneur outcomes, research that may offer insights on persistence through the valley of death.

4.1.2 Lean Startup Methodology (LSM)

Experiential Learning Theory (Kolb, 1984) emphasizes active, hands-on learning. It has been widely adopted in entrepreneurship education, particularly through the Lean Startup Methodology (LSM), which prioritizes experimentation and customer feedback over traditional, linear business planning (Ries, 2011; Politis & Gabrielson, 2009). LSM encourages entrepreneurs to quickly test hypotheses, adapt based on customer input, and either "fail fast" or validate their ideas before investing significant resources (Blank, 2018). Framed as applying the

scientific method to startups (Campbell, 1969; Zellweger & Zenger, 2022), LSM exposes entrepreneurs to iterative learning cycles—pivots—that challenge them to develop cognitive flexibility and comfort with failure (see Figure 2 on page 7 above). These processes, integral to experiential entrepreneurship education, reduce market uncertainty and foster tolerance of uncertainty by incorporating real-world customer engagement, which sharpens business acumen and cultivates social risk-taking to reduce that uncertainty. As such, LSM offers a valuable framework for studying entrepreneurial risk attitudes, though its effectiveness and impact deserve further research attention.

4.1.3 Start-up Accelerators & Entrepreneurship Education

Experiential entrepreneurship education programs—such as accelerators, incubators, and venture competitions—are increasingly prevalent as mechanisms to support early-stage entrepreneurs and help identify ventures with long-term viability (Metcalf, Katona, & York, 2021; Cohen, 2013). Accelerators, typically cohort-based and time-limited, provide hands-on learning environments that reduce startup uncertainty, foster growth, and increase venture survival rates (Hallen, Bingham & Cohen, 2014). While successful participants often continue developing their ventures or secure additional funding, researchers are still examining which factors, such as prior experience, regional dynamics, team composition, and individual traits like risk tolerance, most influence post-accelerator outcomes (Cohen et al., 2019; Colombo, Rossi-Lamastra & Wright, 2018). Accelerators have broader economic implications, particularly in regional development, and university-based programs play a key role in shaping entrepreneurial ecosystems by contributing knowledge and talent (Shwetzer, Maritz, & Nguyen, 2019; Fehder & Hochberg, 2014). However, despite the growing prominence of accelerators, their effectiveness varies, and scholarly understanding of their long-term outcomes remains limited (Crișan et al.,

2021). Notably, university accelerators often function more as educational platforms than business launchpads. First-time entrepreneurs in these programs can provide valuable insights due to reduced survivorship bias (Aldrich & Ruef, 2018).

4.1.4 Case Method and Nascent Entrepreneurship

Case study methods have been underutilized in entrepreneurship research (Henry & Foss, 2015) but are becoming more prevalent. Volmar and Eisenhardt (2020) highlight how the case study method integrates grounded theory development with comprehensive case analysis to produce well-supported theories based on empirical evidence. The research approach is beneficial when existing frameworks fall short and is ideal for investigating "how" questions through extensive, long-term engagement with participants. LSM, as a relatively new approach to entrepreneurship education, in the context of a university accelerator program, offers an ideal environment to apply the case study approach and, combined with the quantitative approaches in Studies 1 and 2, produce insights for research on nascent entrepreneurs.

The case method, though not widely employed in entrepreneurship research, has been utilized across various contexts, including family businesses (Leppäaho, Plakoyiannaki & Dimitratos, 2016), innovation (Kandel, 2020; Vega et al., 2012; Johnston et al., 2010), and entrepreneurial teams (Iacobucci & Rosa, 2010). Henry and Foss (2015) noted that the method has proven valuable in analyzing complex entrepreneurial environments. In such settings, quantitative approaches may not provide the depth needed to capture the intricate nature of the subject. Case studies serve as a valuable tool for examining topics not explored sufficiently in entrepreneurship (Bagnoli & Megali, 2011; Corner & Ho, 2010). Beyond their exploratory function, case studies advance theory by providing an in-depth understanding of case-specific dynamics (Eisenhardt, 1989). This study employs a multi-case design because it enables both

within-case and cross-case analysis, which is essential to develop theory about how diverse entrepreneurial experiences shape survival outcomes (Yin, 2017; Eisenhardt & Graebner, 2007). This method can contribute to developing novel entrepreneurial theories, particularly concerning experiential education methodologies like LSM.

4.2 Case Studies & Methodology

In this essay, the entrepreneurship journey of six entrepreneurs from the sample of entrepreneurs from essays one and two will be analyzed over several years. This research aims to shed light on themes that may be important in enabling entrepreneurs to survive the period of high uncertainty referred to as the "valley of death."

4.2.1 Background & Context

Entering entrepreneurship from various backgrounds, each founder faces distinct challenges in becoming an entrepreneur. They also face unique obstacles in the pursuit of the growth of their ventures. Entrepreneurs for this multi-case study were selected from diverse industries and backgrounds so that useful themes may emerge to provide insights into the post-LSM phase of nascent entrepreneurship.

4.2.2 Research Objective

The overarching objective of this study is to discover common themes among nascent entrepreneurs as they persevere to keep their enterprise going. Various emergent themes from the case analysis should reveal insights for entrepreneurial education, ESOs, and LSM.

4.2.3 Research Questions

The following research questions will guide the study:

1. How do nascent entrepreneurs carry out their enterprise in the "valley of death" after the LSM intervention?

2. What are the similarities and differences in the survival experience of nascent entrepreneurs after the LSM intervention?
3. How does past experience (including specific industry experience and/or personal experience) shape the survival outcomes of nascent entrepreneurs in the "valley of death?"
4. What are the similarities and differences between entrepreneurs in different business sectors or domains?

4.2.4 Methodology

A multi-case study approach (Duxbury, 2012; Lehmann & Lehmann, 2010) was employed combining 1) rich grounded detail from several rounds of interviews with individual entrepreneurs, 2) longitudinal observations during each of the six-weeks of LSM cohort experience, 3) exit interviews of individuals and teams at the end of the LSM program, and 4) firm survival data collected from the entrepreneurs. The role of demographic variables is also examined. Purposeful sampling (Suri, 2011; Merriam, 2009) was used to select cases representing diverse backgrounds and experiences and shared entrepreneurship educational experience.

Data Collection. Data have been compiled from the accelerator applications, semi-structured interviews (both application interviews and subsequent participant observer interactions), field notes, review of various documents related to the founders' venture plans and progress, and longitudinal observations within a six-week formal program in which all founders participated. Observations of each founder's career in entrepreneurship over five to ten years were made. Entrepreneurs answered questions about their background (work and educational experience) in the accelerator applications. They provided detailed descriptions of their startup

venture and answers to questions about their expectations and needs from the accelerator program. Each applicant participated in a 30–60-minute, semi-structured interview with the researcher (participant observer), answering standardized and open-ended questions about the long-term plans for the venture. Each participant in this study, having been accepted to the accelerator program, was observed weekly throughout the six-week program, subsequently through occasional interactions over several years with the researcher, where venture progress was discussed, as well as remotely through publicly available sources (news, websites, LinkedIn, etc.). The data sources utilized, along with the purpose for the inclusion of each, are shown in Figure 6 below.

Figure 6: Data Sources and Purpose

Data Source	Purpose	Frequency	Example Content
Accelerator Applications	Background, motivations	Once	Education, work history
Semi-structured Interviews	Narrative experience	1–2 per subject	Startup goals, challenges
Longitudinal Observations	Behavioral data	Weekly (6 weeks) + follow-ups	LSM engagement
Exit Surveys/Coach Reports	Third-party reflections	End of program	Coachability, pivots
Public Records (LinkedIn)	Venture trajectory	At least once	Current venture status

4.3 Case Profiles

The following section contains the six case studies, including detailed descriptions, where possible, of each entrepreneur's background, motivation to become an entrepreneur, experience with entrepreneurship education, and entrepreneurship support organizations. The structure of each case description has been standardized into a biographical narrative. Sometimes, less information is available for some participants before and/or following their accelerator experience. Most importantly, the cases describe each participant's experience with LSM. In the cross-case analysis that follows (section 4.4), these experiences are contrasted with implications for the persistence of the entrepreneurs with their ventures.

4.3.1 Case One: Necessity Entrepreneur: Violet (2017-2024)

Introduction

Violet (a pseudonym) began making jewelry in high school to augment her family's income. She is one of thirteen children and grew up in a busy household of fifteen. She continued to develop her business while pursuing an undergraduate degree in business, competing in several university startup competitions, and serving as, first a member, then the President, of the student-run entrepreneurship club. During that time, she led the launch of a student-run retail pop-up location. Violet participated in cohort one (2017) of the university accelerator program as a cofounder of a different venture. She returned to join in cohort two (2018) of the accelerator as the founder of the jewelry business she runs today, which is in operation.

Timeline

First fourteen years (age 5-14).

Violet grew up in a busy household with seven brothers and five sisters. She was homeschooled until fifth grade, but after her parents divorced, she entered public school. Violet reported that her mother was homeless for a period, and this experience moved her to work hard to take care of herself. As a result of a dispute with her stepmother, there was a period during middle school when she was "kicked out" of the house and lived with her friend's family. She never had her own room until she moved out of the house permanently at nineteen to attend university.

High school years (age 14-17).

Her father was an entrepreneur, owning a tour company. While her father's occupational choice was a clear influence, it was not a direct influence because he did not offer his experience

or advice on how she should go about her business. His parenting style was letting each child figure things out independently.

Violet got her first job when she was fifteen years old. She first learned about the jewelry business there. This required her to seek out and obtain a special work permit, signed by an employer and her parents. She describes her first significant accomplishment as the one where, at fifteen, she successfully negotiated with her employer to be paid $2 per wrapped shell rather than the originally offered $1 per wrapped shell. Since her family structure did not provide many economic resources, Violet developed an early commitment to financial savings and goal setting. For example, after many years of using public transportation to get around daily, she set the goal of saving money for a car. Eventually, she could use the money saved from this first job to buy a car. At sixteen, she bought some jewelry-making tools from a local craft store. She began selling her products through the high school social media page. This "side hustle" continued when she decided to attend the University of Hawai'i.

College years (age 17-21).

Her fledgling jewelry business remained a side hustle until college, when she studied business and realized she could employ what she was learning to make it a full-time business. In her first year, she intended to major in psychology and business. However, she quickly saw the business courses as more directly relevant to advancing her business goals. Her high school side hustle became a pathway to full-time entrepreneurship when she started participating in extracurricular entrepreneurship education programs at the university during her second year as an undergraduate. In 2017, she represented the university at the Women's Business Enterprise National Council (WBENC) in the Student Entrepreneur Program (SEP) in Las Vegas, Nevada. This was her first opportunity to participate in a national pitch competition. It went poorly, and

she froze during the presentation. She decided to participate in as many opportunities as possible to hone her public speaking skills. She took on many similar pitch competitions to learn how to overcome this earlier challenge. The entrepreneurship center at the university offers many opportunities to develop communication skills, including several startup competitions, co-founder meetups, and guest speaking events. Violet regularly participated in nearly all of these programs during her third and fourth years in school. She credits this participation in public events as an effective way to build brand awareness for her jewelry business.

At the university, Violet was very active in curricular and extracurricular programs related to entrepreneurship and strived to participate in everything that would help her learn how to be a better businessperson. In her second year, she joined and then, in her third year, became the president of the university's student-run entrepreneurs club. The club met weekly at the entrepreneurship center, during which members shared challenges and opportunities they each faced in building their businesses.

Violet was inspired to help other young entrepreneurs as a method to develop herself as an entrepreneur. Under her leadership, the club opened a student-run retail pop-up location near downtown, where various club members staffed the store and sold an array of products offered by the student businesses. While multiple student entrepreneurs supported this student retail location, Violet was the founder, inspiration, and effective "CEO" of the joint venture, negotiating the original lease, coordinating staffing of the retail area, and managing all financial matters. Violet and her club member colleagues gained valuable experience with this retail experiment. However, the concept was shuttered when the landlord redeveloped the property and did not renew the subtenant leases.

While at the university, Violet participated in two sequential cohorts of the university accelerator as an undergraduate student. In the first cohort in 2017, she cofounded a social media marketing startup intending to improve how consumers learn about and acquire new products and services. The target customer segment was small and medium-sized businesses that may not have the resources or experience to leverage new technology platforms like social media as a marketing channel. She was actively engaged in the summer intensive program, worked closely with her coaches and mentors, and incorporated the feedback from them and potential customers into the business. At the end of the six-week program, during the final presentations, her team recommended not moving forward with the business due to the heavy presence of competition from new and legacy marketing services firms in that space. In her exit interview, she noted the value of receiving active feedback (positive and negative) from coaches and mentors.

The following year, in 2018, Violet founded a new business, positioning itself as the "Warby Parker" of jewelry, intending to build an e-commerce-only jewelry company. She and her student team entered the university's new venture competition and placed second overall. This success encouraged her to apply to the summer accelerator that same year. Violet applied as the cofounder of the new jewelry business, which was related to but independent of her original side hustle, which she continued to develop in parallel. This business received strong feedback from customers and coaches. Violet and her team were actively engaged in the weekly work of the accelerator and recommended moving forward upon completion of the program. In her exit interview, she noted that the experience of receiving feedback from coaches and mentors gave her the confidence to turn her side hustle into a full-time business.

In the Valley of Death

2017-2024 (age 21-29). Following participation in the accelerator, she combined her two businesses into one brand, continuing with the original brand from her first business, which resonated most effectively with her customer base. She also decided that a brick-and-mortar business was more effective at reaching customers with its unique custom jewelry bar approach and shifted emphasis away from the online distribution model. She learned during the accelerator that building brand awareness and product differentiation in the online channel was difficult. Still, her jewelry workshop and showroom approach was highly effective at building a customer base among visiting tourists and residents. Further, the positive experience of her customers for the hands-on jewelry making workshops leads to lasting brand relationships that support future online sales.

Violet opened her first brick-and-mortar location in 2018, her second in 2020, and her third was in the planning stage in 2024. This expansion has come despite the significant obstacle of a global pandemic, a massive downturn in tourism during COVID, and stiff competition from a host of well-known Hawai‘i-based jewelry businesses. Violet became the youngest owner (21 years old) of a retail location in Waikiki when she opened her first location in 2018. In 2020, despite the retail downturn resulting from the pandemic, she opened a second location. She believes she is strong in opportunity recognition, both in terms of new business opportunities and people, having built a strong team of like-minded employees who share her passion and persistence. Currently, the business has plans to open its third location and expand into new jewelry categories. It employs 10 employees, one sibling, and maintains a headquarters in downtown Honolulu. In 2024, Violet was recognized by Pacific Business News as one of the Inno Under 25, a list recognizing exceptional young business leaders.

Achievements

Violet's entrepreneurial development is marked by overcoming obstacles and achieving milestones. Starting with buying her first car and attending university, she acquired steadily the resources necessary to turn her side hustle into a full-time business. Her early career is also notable for numerous recognitions by the community for entrepreneurial accomplishments and business leadership. Several well-known professional magazines have recognized her, including Hawai‘i Business Magazine and Pacific Business News. She won second place in the university's 2018 New Venture Competition. That same year, she won the Champion Certificate for participating in the Hawai‘i chapter of the global Entrepreneurs Organization's global business competition. In 2019, she was recognized by the Hawai‘i Venture Capital Association as the Student Entrepreneur of the Year. In 2020, her business was featured on a popular local TV program highlighting hot new products in the region. Finally, in 2024, Pacific Business News recognized her as one of the Inno Under 25.

Discussion

The "valley of death" for entrepreneurs is notable for its absence of resources, mainly due to the lack of credibility of the entrepreneurs and their ventures from an external stakeholder perspective. Violet's strategy for surviving this period is rooted in self-study; whenever she faced an obstacle or experienced failure, she viewed it as a learning experience, seeking out additional training or the wisdom of mentors to persist in the development of her business. This willingness to fail is a core premise of LSM, but Violet may have already embraced this tactic in her entrepreneurial efforts before formal LSM training. However, her active participation in entrepreneurship education opportunities may have reinforced her lifelong persistence in the face of adversity. Specifically, Violet appears to have incorporated the "lean" startup methodology (LSM) in her entrepreneurial practice, which encourages iterative growth of a new venture

through experimentation and feedback from stakeholders (customers, advisors, partners, etc.). A feature of the university accelerator, LSM may have influenced her strategies for surviving the valley of death, although she demonstrated the inclination to approach her life in that way from a very early age.

Violet's story is one of "passion, poise and persistence," which has been incorporated as a mantra for her company. Intrafamily struggles taught her to fend for herself. At an early age, she understood that nothing would be handed to her. She stated in an interview that she inherited her work ethic as a 'stubborn entrepreneur' from her father. In that interview, she related how she had been angry at her parents for a lack of guidance on her life but grew to appreciate and even feel grateful for that lack of guidance because it forced her to figure things out for herself. Violet's inspiration comes from a combination of family influences (her father's entrepreneurship was a major influence) and the strong role that other jewelry industry mentors played in developing her business. She credits strong mentors and role models from both the jewelry industry, as well as other women-owned businesses**,** who inspired her to never give up regardless of the obstacles. She has noted that businesswomen in Hawai'i even within the jewelry business, do not compete, but rather collaborate and cooperate.

Violet has maintained a pragmatic attitude toward entrepreneurship and risk-taking. All her experiences are marked by proactive acquisition of resources. She leveraged mentors and incorporated feedback, both positive (shifted from online to brick-and-mortar company) and negative (closed the first social media marketing), to develop her business. She maintains that she chose to take risks in the business when she was young because she felt she had less to lose than she might later in life. In a recent interview, she described "life as a bunch of failures that you need to recognize and face up to."

Summary

The most notable lessons from the experiences of Violet as an entrepreneur reside in her business's continuing tagline of **"**passion, poise, and persistence." While she iterated toward a successful business model, she never wavered from her core passion of building a jewelry brand. Additionally, she maintained the highest standard for elegance and professionalism in an industry that highly values poise. The last word, "persistence," personifies Violet in her entrepreneurial journey. She faced many personal and professional obstacles, yet persisted through each, learned from all, and thrived in the early part of her likely long entrepreneurial journey. Her "secret" strategy for surviving the "valley of death" was to embrace obstacles as learning experiences, place high value on mentor feedback, and never give up.

4.3.2 Case Two: Hardware Technology Entrepreneur: Arthur (2017-2024)

Introduction

Arthur began his entrepreneurial career while pursuing a PhD in Electrical Engineering. As a doctoral student, he developed several mechanical innovations with commercial applications in the life sciences and sustainable energy production. He also participated in two summer accelerator cohorts (2017 and 2018) as co-founder of a venture developing a solution to improve the viability of in-vitro fertilization through spectroscopy. Subsequently, he joined forces with another mechanical engineer from cohort three (2019) to create an innovation research company to develop and spin out various scientific innovations based on their collective research. Together, the two cofounders participated in a separate advanced accelerator program and received equity funding of $25,000. Subsequently, Arthur participated in the National Science Foundation's (NSF) iCorps program to commercialize an innovation around solar panels, based on the research owned by the company founded in 2018. Subsequently, Arthur has

gone on to become a full-time university faculty member. He continues to run his innovation lab, having secured several federal research grants.

Timeline

Early years (before 2014).

Arthur was born and raised in Bangladesh. His early professional career was as a member of the Bangladeshi Navy. While in the Navy, he worked as a senior electrical engineer focused on missile systems for frigates and destroyers. He served in the Navy for thirteen years and retired in 2013 as a Lieutenant Commander. His involvement with innovative military technology fostered an interest in electrical engineering. After leaving the Navy, Arthur worked for one year as a senior project manager for a luxury resort and spa project in Bangladesh, where he was responsible for the site expansion construction from a 5-star hotel to a luxury resort and spa.

Graduate school (2014-2017)

In 2014, Arthur moved to Hawai‘i to pursue a PhD in electrical engineering, which he received in 2018. His research was in microdevices and microfluidics, and his efforts led to 17 scientific papers in this area and five pending patents. After completing his PhD, he was employed as a post-doctoral research fellow in several different university labs, including a one-year assignment as a postdoctoral fellow at Cornell Tech in New York City in 2022. He returned to Hawai‘i in 2023 as a full-time faculty member in the engineering department of a local university.

Becoming an entrepreneur (2017-2020)

While a PhD student and a post-doctoral researcher, Arthur developed several innovations with commercialization potential. The first was a non-invasive process for assessing

the viability of bovine embryos using spectroscopy. He thought this technology might benefit the cattle industry, where in-vitro fertilization is an approach to cattle rearing, but its efficiency could be improved. Along with a colleague, Arthur applied to and was accepted by the university accelerator in its second cohort (2017) to pursue this commercialization opportunity. During the accelerator program, he contacted and interviewed numerous stakeholders in the bovine breeding industry, learning that the in-vitro fertilization approach to cattle breeding was a relatively minor part of the market compared to traditional methods and artificial insemination. This market investigation led Arthur and his team to evaluate the market opportunity for human embryo assessment.

In 2018, Arthur and a colleague from the research lab applied to and were accepted into the 3rd accelerator cohort. This time, the team was focused on the market for human embryo health assessment, utilizing the same underlying technology from the previous effort, but concentrating on the human in vitro fertilization market. As two research scientists entering entrepreneurship, they learned the lean startup methodology (LSM), which required them to map out their proposed stakeholder ecosystem (the universe within which their future business would exist) and proactively contact and interview these stakeholders to gain knowledge about their market opportunity. The team made substantial progress in developing their concept. Still, their graduate studies demanded that they set aside temporarily their startup work in favor of their graduate research and degree pursuit.

Arthur developed an understanding for the value of the mentorship and resource acquisition offered by the university. In 2019, although his dissertation prevented him from directly participating in the new accelerator cohort, he supported his co-founder of the innovation lab in a new application focused on developing a reflective coating for solar concentrators. This

innovation came out of his lab research when, nearly by accident, he and his colleagues discovered that glass painted with a gallium coating created a highly reflective and flexible coating.

In 2020, Arthur and his co-founder were accepted into an advisory program for startup ventures run by the university that provided highly specialized coaching and mentoring throughout six months. They continued to pursue their innovation lab concept, which was intended to be a clearinghouse for developing and licensing applied innovations developed in their lab. For the advisory program, they met monthly with a team of highly experienced advisors from various industries, many with directly relevant experience in the markets they intended to enter. The structure and business model for the innovation lab were finalized during this program with regular feedback from their advisors. Upon completing the program, their startup received $10,000 in non-dilutive funding to continue to build their new venture. After this program, Arthur and his co-founder applied for and were accepted to a growth-focused technology commercialization accelerator, also run by the university. This twelve-week program offered intensive programming to push startup ventures to achieve investor readiness. After completing the program, Arthur's venture received their first $25,000 equity investment from the university. This investment allowed Arthur and his partner to establish the innovation lab as an ongoing concern formally.

In the summer of 2020, Arthur was accepted into the highly prestigious NSF's iCorps Program, which, like the accelerator, incorporates the lean startup methodology to enhance the commercialization of university innovations. This highly disciplined twelve-week program was designed to validate market opportunities for basic university research. Inspired and created by using the same methodology first proposed by Eric Ries (*The Lean Startup*, 2011) and Steve

Blank (*Why the Lean Startup Changes Everything,* 2013), the program is cohort-based, bringing together teams from top research universities across the countries to collaborate and learn from each other on the commercialization potential of each scientific innovation. While both programs (the summer accelerator and iCorps) rely heavily on LSM, the iCorps operates in a more rigorous manner wherein participating teams risk being expelled from the program if they do not provide concrete evidence of customer discovery and development. Every team must present findings weekly from a set number of customer interactions (15). Falling behind in one week requires making up the difference in the following week or being ejected from the cohort. In the 2020 cohort, 25 ventures participated, each eligible for up to $100,000. Arthur's successful completion of iCorp added to the cumulative capital resources of his innovation lab venture, which, by this point, amounted to approximately $150,000.

In the valley of death (2020-present)

The Innovation Lab continued to build its asset base after Arthur completed his graduate and post-doctoral studies. Arthur faced unique constraints because he held a student visa, which presented certain constraints to his status in the country. Upon completing his PhD, his post-doctoral studies extended his stay in the United States. However, his right to remain in the U.S. was entirely contingent upon his student status. Upon completing his studies, he was required to either return home or acquire a work visa sponsored by a U.S.-based organization (an H1b visa). This international work visa program allowed recipients to be funded by their own companies; a legitimate startup with sufficient resources to provide for its employees can hire its founders under this H-1b visa program. Arthur successfully obtained numerous local and federal grants that provided the seed capital for the innovation lab, which was the ultimate sponsor for his work visa.

Achievements

Arthur's efforts in innovation research and entrepreneurship have been recognized. He has been a productive winner of numerous research grants, many directly supporting his startup venture. He was awarded a two-year, $120,000 postdoctoral fellowship by the National Space Biomedical Research Institute in 2020. In 2023, he was awarded a $50,000 grant from NASA to develop the liquid metal technology further. Finally, in 20204, he was awarded a $350,000 innovation capacity building grant from the NSF. In 2025, Arthur was awarded an initial $5,000 EnergyTech Prize, sponsored by the U.S. Department of Energy, with eligibility for an additional $60,000 based on a competitive evaluation of his proposal for a new energy commercialization program and curriculum.

Discussion

Arthur's entrepreneurial spirit is a defining aspect. He learned this spirit after a sequence of educational opportunities in entrepreneurship that paired his intense research and innovation skills with a program to commercialize those innovations. This led him to found two Hawai‘i-based startups, secure multiple patents, and build an innovation company that thrives despite numerous adversities. Arthur participated directly and indirectly in five accelerators, utilizing LSM for 42 weeks of formal LSM training. He embedded that approach in his practice as a technology entrepreneur. Arthur learned how to incorporate LSM into his entrepreneurial approach and continues to deploy the methodology in his innovation lab, mentoring student interns and partners on how to engage in innovation commercialization with this method in mind.

Arthur's progress as an entrepreneur was a methodical process of acquiring resources, at first on a relatively small scale. His initial exposure to LSM in the 2017 accelerator cohort

allowed him to transition from research scientist to entrepreneurial leader. Yet, he never set aside his academic career but used it as a "side gig" to support his family and remain in the U.S. until his company could provide that support.

Summary

Arthur learned these entrepreneurial skills and practiced them through several iterations of his business. Trained as a scientist with the training discipline of a retired naval officer, Arthur learned and applied LSM rigorously and effectively. This iterative application of LSM became his primary tool for resource acquisition in the early days of his new venture. Arthur became a skilled proponent of LSM and was highly successful in applying it to acquiring non-dilutive funding through various federal grantmaking agencies, including the NSF, DOE, and NASA. These iterations started with a single innovation, then led to multiple innovations with commercial potential, and finally, a fully developed "innovation lab" platform for commercializing basic research. Arthur's strategy for surviving the "valley of death" was intimately tied to his entrepreneurship education and his application of the lean startup methodology.

4.3.3 Case Three: Software Entrepreneur: Martin (2018-2024)

Introduction

Martin participated in the accelerator's third cohort (2018) shortly after having founded his startup with two other cofounders, all of whom were graduate students in computer science. He first participated in an entrepreneur fellows program run by the entrepreneurship center, which selectively advises individual students or faculty on commercial innovation practices. After being accepted into the accelerator, he and his team rapidly validated market demand and built a working prototype of their remote workplace collaboration platform. Upon successfully

completing the accelerator program, they entered a phase 2 accelerator program and secured seed funding of $50,000. After two years of effort, while completing his PhD in computer science, he and his team could not raise the funding required to grow the business. The venture was placed on hold when Martin secured a full-time research position at a different university. This decision was made in connection with work visa requirements for international students.

Timeline

Early career years (before 2014)

Martin was born in Spain and received a Bachelor of Science in Electrical Engineering in 2008. He then worked for six years on developing and deploying air traffic control systems in that country. This established his interest in automation and control systems and, as a result, in 2012, he began a Master of Science in Automation and Robotics from a leading polytechnic university in Madrid, graduating in 2013. Intent on a career in computer science research, Martin applied and was accepted to a graduate program in the United States in 2014 and moved to Honolulu, Hawai‘i.

Graduate school in Hawai‘i (2014-2020)

In 2014, Martin enrolled in the Master of Science in Computer Science at the University of Hawai‘i, which he completed in 2015. During this time, he worked part-time in a prestigious data visualization lab at the university on a team that, among other activities, designed data science tools for the National Security Agency. One project he was engaged in was designing and deploying large-scale data visualization solutions. As part of this team, he developed systems to manage data walls or large digital screen installations, which could be used in real time to share high volumes of information between multiple teams in disparate locations. Under a federal grant, his lab coordinated the deployment of these systems at approximately 100

locations worldwide, contributing to his strong interest in remote collaboration tools. Upon completing his MS in 2015, he enrolled in a PhD program in Computer Science at UH, completing his dissertation in data visualization and machine learning in 2020.

Becoming an entrepreneur (2017-2018)

While working toward his PhD and employed as a researcher at the data visualization lab, Martin became interested in the possibilities of commercializing the data wall project. Given his technical background, he sought out resources at the university that could provide him with support for this commercialization concept.

In the Fall of 2017, he applied to participate in the Entrepreneurship Practicum, a program run by the entrepreneurship center director in which select university students or faculty could participate in a guided course wherein they would develop their startup ideas from the very early idea stage. This was a for-credit graduate-level course offered once per year. The course curriculum was built primarily around LSM and encouraged participants to iterate their ideas in collaboration with key players in their target stakeholder ecosystem; that is, to involve potential customers, partners, suppliers, and others in co-creating the business model. Martin aimed to ideate around applications to turn the data wall project into a stand-alone commercial venture. One primary source of insights for this concept came from an annual conference attended by data scientists during the course, at which nearly all personnel utilizing a data wall were present. He used this opportunity to validate a variety of possibilities for large-scale data visualization solutions. He returned from the conference discouraged. Feedback suggested that these capital-intensive projects had limited application for workforce collaboration outside of major government initiatives (i.e., air traffic control, defense, etc.) or a limited number of private sector applications.

While discouraged from his data wall commercialization project, he was encouraged by the growth of remote work solutions. Many companies, mostly early-stage tech companies, were going "officeless" or one hundred percent remote. In these cases, remote workers spent most of their time at home or out of coworking spaces, only getting together in person for important company events and conferences. To be productive in this remote structure, companies were developing new collaboration tools that allowed remote workers to interact as if in the same room. Martin's next iteration of the data wall was a virtual workspace where all manner of media files, data, and other documents could be shared and worked on collaboratively in real-time.

In 2018, Martin recruited two colleagues from the data visualization lab as co-founders of a new company that would develop this virtual remote collaboration platform. The three computer scientists developed a working prototype. They entered the university's new venture competition in the Spring of 2018, winning first place, which included a $10,000 prize and in-kind services (legal, marketing, accounting) of equivalent value. As a result of winning the competition, they were invited to join a prestigious local software accelerator, which would have invested up to $150,000 in equity in exchange for participating in its upcoming cohort. This accelerator was founded by a well-known entrepreneur in the online gaming space and has significantly influenced the state's startup ecosystem. Despite the honor of this invitation, the founders decided that they were not ready to commit to the rigors of this accelerator and chose instead to focus equally on developing their prototype into a product and on their graduate studies. Notwithstanding, winning this competition provided Martin and his cofounders modest seed capital for the new business and gave them access to a wide range of advisors and mentors. It also allowed them to enter the summer accelerator's next cohort automatically.

The team participated in the summer accelerator's third (2018) cohort. As with the earlier practicum, the program intensively utilized LSM. Martin and his team initially targeted professional design firms (architects, engineers, etc.) who often engaged cross-functional teams to collaborate on complex projects. Since these teams were usually geographically dispersed, their proposed product would allow a large team to work together as if in the same room. The metaphor they often described was of a team working together in a conference room, sharing various documents, and utilizing whiteboards and computer displays as tools to complete a project. In the physical world, the team could stop working, leaving all materials and work in progress in the room, then return the next day and start where they left off again. Martin's startup planned to develop a virtual version of this conference room workspace.

During the accelerator program, Martin and his team made substantial progress. As experienced computer scientists, they quickly developed a prototype product and began demonstrating it to potential users in professional services organizations, particularly engineering design firms. They primarily wanted feedback on the core functionality necessary to make the product valuable and marketable. They actively engaged in more than 100 separate customer interviews, mentor engagements, and detailed discussions with subject matter experts. Their dedicated coach during the accelerator, himself an executive in a design firm, opened many doors for Martin's team. Not only did they receive critical feedback on the product functionality, but they also obtained non-binding commitments in the form of letters of intent to become a pilot customer of the new company once the product was developed. Excited about this progress, they formally established the company as a Delaware C-Corporation, set up an equity incentive program for founders and new employees, and began developing a plan to fund the company through external investment. After completing the accelerator in the late summer of 2018, they

had positive meetings with several early-stage professional investors. They gave them valuable feedback and recommended that they aggressively pursue pilot contracts to prepare themselves for outside investment.

In the valley of death (2018-2022)

In the fall of 2018, with the company formally established using the initial capital acquired through the competition, Martin and his team set about turning their prototype into a minimum viable product (MVP), which would deliver on the collaboration value proposition such that customers would pay for it despite it not being a fully featured solution. They established a formal contract with their previous accelerator coach to become a business advisor, helping them recruit early customers to the platform. This was a significant step in expanding their core team beyond experienced computer scientists.

One important issue that emerged at this time related to Martin's long-term status as a resident of the U.S. His student visa allowed him to remain in the country as long as he remained enrolled in his studies. Once he completed those studies, he would be granted a "grace" period of Optional Practical Training or OPT, whereby he could remain in the country to gain practical work experience in his field for up to one year. Martin began thinking about his long-term options for remaining in the U.S. A work visa (H1b) sponsored by a U.S. firm was an option if the company could demonstrate that they were unable to hire a permanent resident with similar qualifications. An esoteric aspect of the visa program was that a startup could sponsor its founder with a work visa. Martin planned to establish his startup so that it could sponsor his work visa in the long run.

The company continued to leverage its established close relationships with the university resources devoted to supporting innovation and entrepreneurship. In Fall 2018, the company

sponsored another MBA team that developed a detailed business plan and market assessment. In the winter of 2019, the company applied and was accepted to that year's cohort of the university's innovation commercialization accelerator, which provided $25,000 in investment in exchange for six percent of the equity capital. This six-month-long, cohort-based accelerator was established in 2014 as a public-private partnership between the university and a local venture firm. The accelerator was a nationally recognized top accelerator with a growing portfolio of mostly technology-based ventures, all of which had been spun out of the university. The program itself was run entirely outside of the university by the venture firm team, who maintained an interest in each portfolio company and managed the portfolio on behalf of the university.

The innovation accelerator offered two tracks: a phase 1 track for emerging startups and a phase 2 track for advanced startups. While the phase 1 track provided a $25,000 investment, the phase 2 track offered an additional $50,000 to accepted companies with a strong promise of sustainability and growth. Several things occurred during this time that benefited Martin and his startup. Firstly, the university decided to take over the operation of the innovation accelerator from the venture firm. Reestablishing the accelerator within the university operations was a complex implementation. Since Martin had strong relationships with the entrepreneurship and innovation personnel at the university, his venture was offered a place in the first new cohort (Winter/Spring 2020) of the renamed University Venture Accelerator, now under new university management. This allowed them an additional $50,000 in funding, in exchange for six percent equity, for completing another six-month program.

During this accelerator cohort, which was the fourth LSM program in which Martin participated, his company faced several challenges. At the start of the cohort, both of his cofounders decided to quit the venture in favor of focusing on their graduate studies. Since the

accelerator program required a minimum team size of two people, Martin recruited a partner from the MBA team who had worked with him the previous fall. Additionally, the period of the cohort straddled the onset of the COVID-19 pandemic, so a substantial portion of the cohort experience was moved online. Exit surveys from cohort participants during this period clearly indicate a loss of cohort cohesiveness and collaboration due to the sudden shift to an online format. Finally, Martin defended his dissertation in April 2020, which coincided with and somewhat distracted him from the final completion milestones of UH Ventures.

The program similarly promoted iteration of the business model and milestone progression based on direct marketplace feedback. While in the earlier programs, Martin had been eager to apply this technique, during this latest cohort, he became frustrated with the pressure to revise his business model based on external feedback. As a computer scientist, he felt confident that his product fit the market. A competitor had emerged with an inferior product and succeeded in raising $50 million in venture capital funding with only marginally more customer traction. Martin was confident that the timing was right to take the company to investors once he could stabilize the executive team.

Nearly immediately after completing the University Venture Accelerator, the company applied to and was accepted into the 12th cohort of the nationally recognized software accelerator founded by the well-known gaming entrepreneur. The managing directors were intrigued by the rapid progress of Martin's company, particularly in product development. In August of 2020, they entered this accelerator, which was a 12-week, cohort-based program that recruited startups from all over the world to participate. It is considered a highly competitive program and a signal of significant quality for startup potential to be admitted. One aspect of this accelerator is its strong investor network. Many startup graduates from this global accelerator receive follow-on

investment after completion, given the broad exposure to angel and institutional investors offered by the accelerator network.

Upon completing the software accelerator, Martin and his newly recruited co-founder, Steven, became focused on fundraising. A similar company had raised substantial capital, validating its market potential, and the pandemic had generated a sudden and widespread embrace of remote work. Notwithstanding the global crisis, their timing was perfect for equipping remote teams with an effective collaboration tool. Martin and his new cofounder engaged with dozens of early-stage investors over six months while their dwindling capital resources became problematic. Additionally, Martin successfully defended his PhD dissertation and graduated in December of 2020, an accomplishment and a residency status milestone in that the one-year period of eligible OPT began at that point.

Throughout the first half of 2021, the company met with dozens of seed-stage investors, including prospective angel investors (individuals) and early-stage venture capital funds. Martin's partner had relocated to Portland and was actively networking among the notable software startup ecosystem in the Pacific Northwest. During this time, Martin was the primary developer of the platform and continued to add features and capabilities based on feedback from a growing number of pilot users. The company struggled to convert its pilot customers to paid customers. While the platform was easy to use and highly collaborative, the tools available from the major software companies (Microsoft, Google, etc.) had become increasingly effective for supporting remote collaboration. In parallel, their intense efforts to raise seed funding during this period did not bear fruit.

In the summer of 2021, looking ahead to the prospect of outlasting his work visa and being unable to secure sufficient funding to capitalize on his own company, Martin took a full-

time position as a data scientist at a local university. His startup was put on hold. His cofounder secured a salaried position in the northwest. Since then, Martin has successfully established his career as a data scientist in important research organizations in Honolulu, but has not pursued his virtual collaboration project further. Meanwhile, the competitor mentioned earlier raised an additional $400 million in capital and was valued most recently at over $17 billion.

Milestones

Martin achieved substantial milestones as an early-stage entrepreneur, which was accompanied by an accumulation of seed capital for his business. In addition to winning the 2018 University Venture Competition, he was heavily recruited for numerous prestigious entrepreneurship support organizations, including two nationally recognized startup accelerators. In 2021, the Hawai‘i Venture Capital Association recognized him and his cofounder as finalists for the Technology Entrepreneur of the Year Award.

Discussion

Martin’s journey from computer scientist to entrepreneur to data scientist was heavily influenced by his commitment to remain in the United States to pursue his career. His options were further narrowly defined by a desire to stay specifically in Hawai‘i, where the opportunities both as a tech entrepreneur and a data scientist are more limited by market size alone. His foray into entrepreneurship, beginning during his graduate studies, enabled him to see a path toward that goal by building his tech startup. He rapidly acquired the knowledge and skills to develop the new business despite having no business training or experience. Technology innovation is notable for its dynamic nature and the opportunity for rapid growth. Martin leveraged his passion for collaboration tools into a path toward high-growth entrepreneurship. Unlike many research

specialists, Martin had the foresight and work rate to pursue his entrepreneurship goals simultaneously with the incredibly strenuous pursuit of a PhD in Computer Science.

Martin embraced experiential learning of entrepreneurship, participating in six distinct programs designed to move founders along toward market readiness and growth. In four of those sequential programs, he was embedded in LSM but appeared to "stall out" as far as the iteration of the business model during the UH Venture Accelerator. This "stalling" should be evaluated on the backdrop of significant progress both with product development and with strong market feedback. His timing with respect to the acceptance of remote work could not have been better. The global pandemic forced the rapid adoption of remote work and all its advantages and disadvantages. Timing alone strongly supported his choice to continue down the chosen path as far as going to market with a broad platform to support remote teams in all industries. That said, in its earlier days, the company appeared to be achieving a strong fit between its product and the problem setting for design engineering firms. This suggests a counterfactual path in which Martin had narrowly focused on his early adopters and built a useful product that solved a big problem for a smaller but sizable market segment.

Summary

Martin survived for a time in the "valley of death" by making swift and impressive progress in developing his technology venture. He put his computer science skills to work effectively to achieve rapid milestones that resulted in early successes in terms of signaling positive potential market adoption. This cascaded into a strong opportunity to acquire the initial resources to start and grow a successful technology venture. His inability to secure sufficient funding to continue this high-growth opportunity has many possible causes. Timing may have been the most important factor. Personally, Martin always maintained a key focus on his own

ability to remain in the country. He made numerous choices around building his startup with that goal in mind, including forming an entity that was eligible to sponsor his work status. He multitasked his graduate studies, possibly at the expense of his startup progress, to make sure that his current residency status was never in question and to buy himself time after graduation. Finally, the effectiveness of the timing of his company's entry into the market has more than one possible explanation.

That his product was well timed for the global pandemic circumstances may be viewed as both an opportunity and a threat. On the one hand, it is unquestionable that the pandemic conditions accelerated the demand for improved collaboration tools for remote work: a huge opportunity. Arguably, that same circumstance forced major workplace productivity software developers (Microsoft, Google, Apple, Amazon, etc.) to redirect massive amounts of capital into improving their own platforms for their massive existing customer base. Thus, what seems like fortuitous timing for Martin's venture, may also be viewed as a Quixotical attempt (in hindsight) to compete with the dominant incumbents. LSM helped Martin build resources for his venture, while simultaneously extending the runway of his residency status. Ultimately, he chose to step away from his entrepreneurial journey, at least for now, in favor of a permanent position in a sponsor organization that could satisfy his long-term goal of remaining in Hawai‘i.

4.3.4 Case Four: Healthcare Entrepreneur: Colin (2021-2024)

Introduction

Colin was a graduate student in business when he and his cofounders started a digital healthcare company aiming to improve healthcare outcomes for the elderly community. At the time, he was working full time in the long-term care industry and recognized opportunities to solve problems in that space. Colin with his team participated in cohort six of the accelerator

(2021) as an MBA alumnus. Since a requirement for participation is that at least one student be an active member of eligible teams, Colin recruited several current students to join his founding team. They made rapid progress in the accelerator, shifting away from their original business model while remaining in the same general digital healthcare segment. Upon successful completion of the accelerator, Colin quit his job to pursue this venture full-time. He and a new cofounder participated in several advanced accelerator programs in 2022, raising $150,000 in seed capital. Subsequently, they developed and launched a minimum viable product with early customers. In 2023 and 2024, they raised $2,500,000 and $1,000,000 in venture capital, respectively. The business continues to grow both in revenue and personnel.

Timeline

Early career years

Colin was born and raised in Mililani, Oahu, and attended a top private school in Honolulu known for excellence in STEM education. While in high school, he volunteered in several senior living facilities, engaging older adults in recreational activities and learning important lessons about empathy and personal connection. These experiences sparked a curiosity about public health and ultimately led him to pursue a degree in health sciences. Colin worked in several nonprofit and for-profit senior living organizations for eight years after receiving his undergraduate degree. These early career roles exposed him to numerous inefficiencies in that system and motivated him to seek better ways to integrate healthcare and technology. He was particularly concerned with the issue of loneliness and inactivity among his elderly clients and became aware of how these issues could impact their quality of life and longevity.

Graduate School

Driven to learn more about how to solve real business problems in the healthcare sector, he enrolled in an executive MBA program at the university, where graduate students study as a cohort in an intensive, two-year, night and weekend program while continuing to work full time. This allowed Colin to incorporate problems he saw in his day job in the healthcare industry into projects he worked on in his classes. During this program, he enrolled in an elective course called New Venture Management, taught by an entrepreneur professor who was also the director of an entrepreneurship center in the college. In an interview, he cited this class as exposing him to entrepreneurship possibilities, leading him to participate in numerous extracurricular experiential education programs offered by the center, allowing him to develop an entrepreneurial mindset.

Becoming an entrepreneur

His first entrepreneurial venture, developed while he was a graduate student, pertained to creating a platform for pharmacists that allowed them to provide basic management of prescriptions for patients to free up doctors to focus on higher-impact patient care. The concept addressed a fundamental inefficiency in the healthcare market. He established an initial team and applied and was accepted in the winter of 2020 into the university's 12-week advanced accelerator (distinguished from the summer program), which offered up to $25,000 in an equity investment for successful completion of the program. His team included several leaders from the pharmacy college and experienced pharmacists who were intent on finding a better way to manage chronic diseases. The program followed LSM rigorously and forced teams to report on their weekly progress, validating every aspect of their business model through up to 10-15 customer and industry stakeholder interviews per week. During the accelerator, customer validation supported the solution the team proposed to create and validated that the problem

existed in the market. By the end of the program, the team had accumulated more than 100 customer interviews with positive signals about the venture's potential. Nevertheless, although the team successfully completed the program, Colin's cofounders (employed full-time in the pharmacy college) were not committed to the venture, and Colin was also not willing to quit his full-time job to pursue the pharmacy venture without a strong team.

Not discouraged by the initial failure in the first venture, Colin founded a new company and, in the fall of 2020, applied and was accepted to a university program offering six months of mentoring from a dedicated advisory board of experienced business professionals across a wide range of industries and experiences. Three separate ventures were accepted into this program. At the end of the program, based on achieved milestones, the entire group of advisors recommended whether the participating teams should be awarded a $10,000 grant. During this period, Colin maintained full-time employment as a manager in a senior care facility and continued to incorporate his insights into solving problems in that industry. This company sought to build an online platform that paired young people seeking community service hours with elderly people seeking companionship. The company intended to be the trusted platform for curing loneliness among the elderly while allowing younger people to learn empathy and build valuable experience. Colin's two cofounders were colleagues from his MBA cohort working in the healthcare industry. They achieved their planned milestones and were awarded the full grant of $10,000.

In the spring of 2021, Colin and his team applied to participate in the summer accelerator program. By the time he founded this venture, Colin had completed his graduate degree. Because the accelerator required at least one team member to be an active university student, he recruited several students to join his team. The founding team consisted of Colin, two cofounders from his

graduate school cohort, and two new team members, both undergraduate students. Since the undergraduate students were tasked with a lot of the daily work of interacting with their target users in a customer support function, Colin and his cofounders elected to use the funding they received for participating in this program entirely to the undergraduate team as compensation for their work.

Due to the pandemic, the entire program was run online, with weekly all-day Zoom sessions and all meetings with mentors, coaches, and potential customers conducted online. Feedback from exit interviews noted the difficulty of participating in a program like this that was entirely synchronous online. Of note, Colin commented that the online mode did not foster the kind of between-team interactions he experienced during the earlier accelerator and that it was more challenging to benefit from the experiences of other teams in the online mode. He summarized this by remarking that they could have benefited from a more cohesive cohort model. Like the earlier accelerator, the program required Colin and his team to apply LSM to design their business model. The team completed 100 customer interviews, creating 65 separate hypotheses, validating 35, and invalidating 15. During this business model validation process, they also pivoted based on customer feedback from a venture focused on curing loneliness among the elderly to one that gathered data around the social determinants of health among the elderly to predict and improve healthcare outcomes. Colin remained consistent with his career vision while revising his views about the business opportunity based on feedback from the marketplace.

In the valley of death

Colin continued to develop the new venture after leaving the accelerator. However, his two cofounders, separated by several months, left the company, and Colin recruited a technical

cofounder. This recruitment was in part a response to the feedback of his advisors during the previous program that a cofounding team pursuing a technology solution, but overweighted by business expertise, would be viewed as incomplete. In 2022, Colin and his cofounder were accepted into Techstars, a prestigious global accelerator that offered $120,000 in exchange for an equity stake in the venture. They entered Techstars in a cohort based in Los Angeles and temporarily relocated the company there. Subsequently, in 2023, the company participated in the AgeTech Collaborative Accelerator program. AARP offers the AgeTech Collaborative as an innovation network to support technological advancements that improve aging experiences. This program connects startups, investors, enterprises, and business service providers to drive the development of solutions in the AgeTech sector, which is the startup sector solving technological problems for aging communities. The accelerator program offers tailored support, access to AARP's research, and opportunities to collaborate with experts and industry leaders. Colin and his team joined this accelerator to benefit from the mentorship, opportunities for pilot testing of their platform, and its connections within the broader AgeTech community, hoping it would help them scale their platform.

Colin's company continued to progress and utilized the social capital they developed in the various accelerators to understand their business model and secure numerous pilot customer contracts. Several advisors assigned to Colin in earlier university programs, including their coach during the summer accelerator, became important stakeholders in the new venture, either as advisory board members, seed investors, or industry experts who connected them with essential healthcare and technology industry contacts. The company's early contracts came directly from these coaching, mentoring, and advisory relationships. The pilot contracts enabled them to raise their first venture capital round of funding from a collection of five firms for $2.5 million in May

of 2023, from a consortium of eleven institutional investors. They invested this capital in 1) expanding their team, 2) further developing their platform, and 3) securing additional revenue-generating customers. In June 2024, the company secured an additional $1 million from four new investors.

Today, the digital health company provides an AI-powered care navigation platform to help healthcare providers, community health workers, and organizations address the social determinants of health, such as housing, food insecurity, and transportation. Their technology enables care coordination, data-driven insights, and billing support for community-based services, ensuring sustainable reimbursement. Serving healthcare providers, insurers, and nonprofits across 27+ states, the company integrates social care into healthcare to improve health outcomes and reduce costs. Their customizable digital platform connects community-based health organizations and healthcare providers with their clients to make more informed and timely decisions about their clients' needs. Colin and his team saw the growing need for better decision-making in healthcare, driven by an improved understanding of the social determinants of health outcomes.

Achievements

Colin has received several notable recognitions as he built his business venture. In February 2023, he was named a finalist for Hawai‘i Business Magazine's Tech Entrepreneur of the Year award. In May 2024, he was honored on Rock Health's Top 50 in Digital Health list for his leadership in transforming community health work. In October 2024, the company was honored as a Rising Star in the Health Equity category at The Digital Health Hub Foundation Awards in Las Vegas.

Discussion

Colin's journey from an early professional career in the senior care industry to the CEO of a growing venture-backed healthcare company has involved numerous twists and turns. At the beginning of his career as a middle manager in a healthcare organization, he observed several unmet needs in the serving of customers that he continued to explore as his career developed. His pursuit of solutions to these unmet needs led him to graduate school, where he first became exposed to entrepreneurship as a career option in the new venture management course, an elective course in the executive MBA program. Progressively, Colin gained more interest and enthusiasm for entrepreneurship as a career option by taking advantage of numerous extracurricular opportunities supporting entrepreneurship that the university offers, including two cohort-based accelerator programs and a six-month advisory program. The strategy and plan for his startup venture were revised during each of these intensive experiences. However, he never shifted away from the general mission of improving healthcare for the aging population. The early part of his entrepreneurial journey is notable because he maintained full-time employment in parallel to his pursuit of more skills and knowledge, until he felt he had developed sufficient resources to devote himself entirely to the startup.

Colin's motivation to be an entrepreneur has always been driven by empathy for the condition of the aging population. He was motivated to start his first venture based on inefficiencies in caring for patients with chronic conditions. He founded his current business initially around a desire to address loneliness among the elderly. Seeking resources to solve real problems among the elderly, he reorganized the company around a mission to improve health outcomes for the target customer segment using feedback from direct customer interviews.

Consistent with the pedagogical approach of LSM, Colin has swiftly incorporated customer and industry stakeholder feedback to iterate the business model toward more

prospective market segments. Starting with a solution for improving chronic care, he pivoted to solving loneliness among the elderly. Next, he expanded his approach from this narrower solution to a platform enabling the improvement of healthcare outcomes based on data around the social determinants of health. Colin has enthusiastically incorporated LSM into his entrepreneurial journey. He builds his business based on customer feedback and has demonstrated high coachability from his many advisors.

Summary

Colin's entrepreneurship journey is notable for his embrace of the lean startup methodology, particularly the "pivot." "Pivoting" is a key strategy under LSM that describes how founders should revise their business model and implementation approach based on iterative real-world insights from the marketplace. Uncertain about the business model but committed to the healthcare problem among the elderly, he used LSM to pivot several times based on direct customer feedback. He also emerged as a highly coachable entrepreneur and has surrounded himself with committed advisors who see his potential, even if they may lack a clear understanding of where the business is heading. This is consistent with a pattern in entrepreneurship where stakeholders tend to be more likely to support teams with strong potential rather than ventures with strong market potential. Some stakeholders (including investors) are attracted more to strong teams than to strong ideas. This logic is relevant to Colin and his team: they display a convincing commitment to positively impacting the eldercare community, attracting stakeholders inspired by their passion for positive impact in the enormous market for elderly care.

4.3.5 Case Five: Social Entrepreneur: Travis (2016-2024)

Introduction

Travis participated in cohort one (2016) of the university accelerator, aiming to bring to market a solution for affordable college education. His educational technology venture had a strong mission orientation. He had strong initial traction for his business, having placed well in a university pitch competition and secured several pilot customers. He had been accepted into an advanced accelerator program, wherein he would have received up to $50,0000 in seed funding. Still, he chose instead to participate in the university accelerator to learn more about the best approach to validate market feasibility and the proposed business model. Today, he remains at the helm of his startup, mainly in its original form regarding business model. In 2018, he moved the headquarters to Silicon Valley to be closer to the technical talent and financial resources he views as essential for the business's success. Between 2020 and 2023, Travis raised $3,000,000 in external capital funding and continues to run the business despite numerous challenges.

Timeline

Early years (before 2016)

Travis was born and raised in Honolulu and attended public school there. He came from a background that emphasized perseverance and hard work. Despite not being a top student academically, he recognized the barriers students like himself faced in obtaining a higher education. After high school, Travis attended community college for a time but struggled financially. When he sought out options for financial aid, he found the choices complicated and unapproachable. At one point, Travis attended college and lived in a warehouse to conserve funds. He enacted a plan to forego paying for meals for one week a month to save $50/month. When he had accumulated $500 in savings in this way, he decided to offer the money as a scholarship to a student in a situation like his own. However, he could find no way to provide this to scholarship-granting organizations because the dollar amount was too low. This personal

struggle and a passion for helping others created the underlying motivation to make his startup venture.

Becoming an entrepreneur (2015-2017)

In 2015, recognizing the challenges students face in accessing scholarships, he devised an online platform designed to streamline the scholarship process for students, schools, and scholarship providers. One important factor that motivated him was the realization that many scholarships go unrewarded because of insufficient applicants. This mismatch between available scholarships and students needing financial support became a problem that Travis believed he could solve. Although he had no experience with entrepreneurship, he was resourceful and sought out opportunities to get outside support for his budding idea.

His first serious foray into entrepreneurship took place that fall when he entered and finished second place in a pitch competition run by the university's entrepreneurship center, open to all students in the broader university system. The second-place award was $1,000. The competition required him to submit a short video describing a 'breakthrough' innovation. A panel of judges selected three submissions to compete in a final, in-person event. A benefit of participating in this competition was the coaching he received during the competition, the feedback he got from competition judges, as well as the networking opportunities that arose from pitching his concept in front of a large community of people from the university and the broader startup ecosystem.

Travis was not eligible to take courses at the main university campus as a community college student. Undeterred, he asked an entrepreneurship professor he had met during the competition above, if he could audit his class, New Venture Marketing. Travis utilized the course to develop the concept for his scholarship venture further. During the class, he formed a project

team that developed an initial market analysis and a deep understanding of the scholarship ecosystem. This coursework further convinced Travis that there was a big problem to be solved. Despite not being a registered student in the class, Travis actively participated and accumulated knowledge about the opportunity. He also recruited a cofounder from among his classmates. His resourcefulness did not go unnoticed by the startup ecosystem in Honolulu. In 2016, he was named the Hawai‘i Venture Capital Association’s Student Entrepreneur of the Year.

In the valley of death (2017-2024)

With initial validation in hand from the competition and reinforced from the new venture marketing class, Travis began to build the foundation of his scholarship platform. He sought out scholarship granting organizations throughout the state, explaining his mission to help send one million students to college. Nearly all these institutions complained about having an insufficient pipeline of applicants for their scholarships. In fact, in some years their scholarships went unawarded. Travis got many of these organizations to agree to let him publicize their scholarships on his yet to be built platform.

Despite lacking the necessary skills to build a software platform and having the resources to hire experts for that purpose, Travis moved ahead. In the spring of 2016, he built a very basic website where students could find listings of available scholarships and a rudimentary application process. In fact, Travis would hand-process these applications and convert them into a format that could be sent to the respective scholarship organizations. Although site users were unaware, for many months, there was no automated system for processing the applications, which were increasing in number as the word got out about this useful service. As a next step, Travis realized that he needed to make a fully functioning product because the current approach could not scale very far with everything done by hand.

In the Spring of 2017, Travis applied for and was accepted into the university's innovation commercialization accelerator as a phase 1 company, which made him eligible for an equity investment of up to $25,000 upon successful completion of the 12-week program. He also would become a strong candidate for the second phase, where an additional $50,000 investment was possible. Around that same time frame, the university's entrepreneurship center developed a new program called Summer Startup Launchpad, which was a 6-week intensive program where early-stage entrepreneurs could receive coaching and feedback in a cohort-based environment along with up to ten other teams. As it happened, the new program's start in the Summer of 2017 was only a few weeks after the innovation accelerator's program kicked off. Hedging his bets, Travis had also applied for the new summer program where the completion award amounted to a $3,000 grant. He was accepted into that program as well. Despite the higher dollar amounts, Travis elected to participate in the new summer program rather than the innovation accelerator. He was concerned about being too early stage for the other accelerator and was uncomfortable with taking on investors for the business when he remained unsure of whether it would be a non-profit social impact organization or a for-profit venture.

During the summer accelerator, Travis and his cofounder gathered more customer insights, continued to build a database of available scholarships, and tested various business models. For the venture to be economically viable, he needed to ascertain who would pay for this improved efficiency between scholarship applicants and awarders. His customer feedback strongly suggested that students (or their parents) would happily pay a fee to his firm for the successful scholarship award, essentially a finder's fee. He also found that most grant-making institutions were willing to pay his company for supplying an increase in applications. Despite the customer feedback, Travis felt that there was a problem in principle with making money from

families struggling to finance their children's education. Although it would be paid for out of a portion of the grant award, and his customers appeared happy to pay that fee, he strongly opposed the idea, instead of charging scholarship organizations a per-applicant fee.

After the completion of the summer accelerator, Travis devoted himself full-time to his mission of sending one million students to college. Throughout 2017, the company focused on becoming a clearinghouse site that connected students to available scholarships. Although their system was implemented mainly manually on the back end, they managed to achieve the goal of 100% of scholarships available in the state being available through their website. They also began the work on adding nationwide scholarships to the platform, recognizing that their venture's growth would depend upon expanding beyond Hawai‘i. To achieve this, however, it was no longer realistic to manually process student applications. In Spring 2018, Travis was accepted into a nationally recognized software accelerator based in Honolulu, participating in its 10th cohort between May and July 2018. The accelerator provided a seed investment of $25,000 in exchange for a 6% stake in the company and the opportunity to receive up to $250,000 in matching funding tied to achieving certain milestones.

With this first equity investment capital, Travis built automated backend processing of student applications, which opened the opportunity to expand nationwide. This accelerator possessed an extensive mainland-based network of investors, several of whom impressed upon Travis that the business would be able to achieve faster growth by relocating to San Francisco, where it would have more ready access to investors and technologists, both of which were essential for the growth of the company. A core aspect of Travis' growth strategy was building relationships with college counselors at as many high schools as possible, leading to more widespread awareness among college-bound students. By the end of 2019, the company was live

in 27 states and signed up more than 30 school counselors daily. By February 2020, the company was officially launched in all 50 states. They were signing up schools at the rate of 100 per day, which amounted to more than 1,000 students daily. These growth metrics positioned the company well for attracting additional outside investors.

The company initially hoped to raise only $100,000 to fund additional marketing. However, their growth also came with substantial platform development requirements, so they expanded their fundraising efforts, seeking to raise up to $3,000,000 in venture capital. Over four years, they successfully raised the full round in three tranches (2021, 2022, and 2024). By 2024, the total funds raised by the company amounted to $3,125,000. With this fundraising, the company was able to bring on a formal board of directors and a full-stack development team. Another significant development during that period was Travis' temporary replacement as the President and CEO of the venture. His inexperience leading a high-growth company caused his Board of Directors to conclude initially that they needed to bring in a more seasoned leader. Between 2021 and 2023, Travis stepped aside from this leadership role. However, in 2023, he returned to the role full-time, and the interim President became Chairman of the Board. The company continues to grow and support its mission of helping millions of high school students attend college.

Milestones

Travis's journey from living in a warehouse to leading a high-growth technology company is marked by numerous key events and milestones. His perseverance as a struggling student and entrepreneur was noticed early in his strong second-place finish in a university pitch competition. This also gained him the notice of the startup ecosystem, which nominated him for HVCA Student Entrepreneur of the Year in 2016. These two key milestones kickstarted his

entrepreneurial journey and, along with the intense bootstrapping of the company, gave him the momentum he needed to acquire additional capital over the next five years.

Discussion

Travis has insisted that he is a stubborn entrepreneur, motivated as much by the early feedback from his teachers and family that he could "not do it" as much as by the members of the startup community in Honolulu who saw something special in his perseverance and grit. The early life lessons inspired him to become an entrepreneur and to follow a specific new venture path, which could help many others in a similar situation of lacking the financial resources for a traditional higher education. Instead of acquiring the resources for himself to receive a higher education, he devoted himself to building a platform that could accomplish that for others.

He was told "no" by his family when he wished to go to college and "no" by the university when he applied anyway. He attended classes at two community colleges instead and audited courses at the university, which he thought would equip him as an entrepreneur. The idea for the venture came from his personal experience. Even after being accepted into the summer accelerator, Travis continued to reject feedback that he should monetize the business with a fee from the student applicants whom he was helping.

The first two years of the business (2016-2018) were lean years where he did all the work himself, even manually processing student applications in the background, while his users believed the whole process was automated. This bootstrapping was a key component to his early survival in the "valley of death," but was also a requirement derived from his perceived inexperience as an entrepreneur. At each step, he needed to prove that he could deliver on the company's mission before he could gain external resources to move forward. He demonstrated the concept of the value proposition to the key stakeholders (scholarship organizations, school

counselors, and college-bound students and their families). This user growth attracted major investors who materially bridged the valley of death funding gap.

Summary

Travis' inexperience can be viewed as a liability and an asset in his entrepreneurial journey. His inexperience made him unaware of the many challenges he would face in solving this market problem. Being unaware of the hardship, he moved forward undeterred. He may have used his uncertainty about his qualifications to make essential but contrarian decisions about how to move forward. For example, his decision to pass on a potential $75,000 investment in favor of a possible $3,000 grant looked puzzling to those around him in the short term. It was driven by his uncertainty about the company's readiness to take on investors. As a mission-driven person, he also balked at revising the mission to more effectively monetize the business despite numerous coaches and mentors recommending that he do so. Although the company has not built a sustainable monetization model, Travis has attracted many stakeholders, such as investors and partners, who continue to support the firm's mission. In this way, Travis' journey through the "valley of death" is unfinished.

4.3.6 Case Six: Environmental Entrepreneur: Sarah (2018-2024)

Introduction

Sarah is passionate about protecting the environment. A fashion and design student by training, she is deeply concerned with the environmental waste and social inequities associated with fast fashion. She founded an apparel design and manufacturing company to reduce waste, eliminate environmental damage, and incorporate fair trade practices. She had no previous background as an entrepreneur. Still, she participated in many of the programs offered by the university in this regard, including several entries into the annual business plan competition. She

participated in cohort three (2018) of the accelerator. In 2019, she was named Student Entrepreneur of the Year by the university and continued to develop her venture. In 2021, she left the area to pursue graduate studies in a different field and discontinued working on the startup.

Timeline

College years (2016-2020)

Sarah was born and raised on Oahu and attended the university for an undergraduate degree in Fashion Design. From an early age, she participated in numerous beach cleanups and learned of the detrimental effects of microplastics on marine life. As a student, she developed this knowledge into a passion for ocean-friendly fashion processes. Such processes could significantly reduce or eliminate the plastic waste that enters the oceans because of the materials and methods used to make apparel products. As part of the major, she took a course culminating in a retail startup competition cohosted by the entrepreneurship center and winning a first-place prize of $3,000. Her idea was to create a venture that designed and manufactured ocean-friendly apparel.

In 2017, she joined the student-run university entrepreneurs club, whose mission was to foster collaboration among like-minded student entrepreneurs. After discovering that many of the club members were also aspiring apparel designers, Sarah and her associates thought they might collaborate to build their respective brands and share the upfront costs of launching retail sales. In the summer of 2018, Sarah and the President of the club began developing the plan for a student-run pop-up shop at a downtown retail location, which would sell products from a wide variety of student-founded companies, including her own. This project was entirely created by undergraduate students, who negotiated a lease, built out the pop-up location, staffed the store,

managed inventory and transaction processing, and shared the sales proceeds. During that same year, she founded and implemented a multi-day ocean-friendly clothing festival and fashion show that featured the work of many local and international apparel designers with a shared interest in protecting the environment. The collaborative team began retail operations in the spring of 2019, operating the shop through early 2020 when the property manager chose to redevelop the site for alternative use.

Becoming an entrepreneur

In 2018, Sarah and her business partner, also her fiancé, substantially devoted themselves to building the brand and product offerings while finishing their undergraduate degrees. They envisioned the company as a multi-purpose fashion design and retail company offering unique, limited edition, eco-friendly clothing of the highest quality and wearable art pieces. Early on, the company focused on sales and local event production in Hawai‘i, which incorporated environmental awareness and education toward ocean conservation and fair-trade practices within the fashion industry. Much of this was accomplished through local pop-up events and fashion shows, several of which extended to the mainland. These events included weekend and night markets. Sarah also organized a multi-day ocean-friendly fashion festival annually. Sarah felt it was important to give back to the community. A portion of sales supported a vocational learning center for women with disabilities through a collaboration and partnership with their designer in India.

In 2018, they applied and were accepted to the third cohort of the summer accelerator. Their idea for the venture was well formed by that time, having established a mission and vision for the company and initial product designs developed through Sarah’s work toward her major. With some difficulties, Sarah and her partner attempted to apply LSM to validate their target

customer segment and value proposition. First, they reported difficulty finding potential customers to explore the problem space, resorting to the "brute force" method of polling tourists in busy shopping areas in Waikiki. This resulted in many rejections (people unwilling to participate in the interviews) and a few who confirmed their environmental concerns. As a result, they had difficulty identifying a specific market segment for their proposed solution that addressed the fashion industry's problem. Secondly, while the people they interviewed generally cared about the environment and believed that apparel manufacturing processes were polluting, they did not appear to be willing to pay more for products produced in an environmentally friendly manner without seeing how their proposed solution would work.

After the six-week program culminated, Sarah remained committed to the business materially in its original form with no substantial iteration of the business model. She developed a strong plan for connecting with ecosystem partners (hotels, event spaces, retail operations), hoping to gain sales traction for her designs. In exit interviews, she indicated a desire to have more programs focus on implementation aspects of the business (e.g., intellectual property, accounting, sales training). The latter points to a commitment to implementing the business, although the customer discovery efforts completed during the program were inconclusive. That is, Sarah entered the program committed to the cause and left the program with the same commitment to the presupposed business plan.

Sarah participated in many university programs that supported student entrepreneurship throughout her undergraduate studies. Beginning in the fall of 2018, she enrolled in an entrepreneur's practicum course offered by the entrepreneurship director and adjunct faculty member, which mentored student entrepreneurs in developing their businesses further through a weekly collaborative session that ran for the entire academic year. During this period, she also

won competitions, participated in others, and gained exposure to many stakeholders in the local startup ecosystem and groups within the fashion industry and, more specifically, within the environmental movement. In the spring of 2019, she reapplied to the summer accelerator with a new partner and a new concept for a retail apparel venture, but was not accepted. Her proposed business partner was not a student eligible for the program, and Sarah's participation would have been limited due to other commitments. For this reason, the team was not accepted into that year's program. Nevertheless, throughout her university involvement, and after graduation, Sarah remained steadfastly committed to the company's original mission. In the spring of 2019, she was recognized by the university's entrepreneurship center as the 2018-2019 Student Entrepreneur of the Year.

In the valley of death

Sarah graduated in the Spring of 2020 while continuing to pursue her mission-driven startup. After graduation, she supplemented her income from the startup by working as a research assistant in the fashion design department at the university. She was hired as an adjunct professor for the 2019-2020 school year to run the retail startup course and competition, applying her current experiences to help other aspiring fashion entrepreneurs. Sarah and her partner continued participating in local fashion events and selling their designs at various pop-up markets and festivals. She also applied and was accepted to attend a prestigious mainland graduate program in design in 2020, but opted not to pursue it due to its cost.

During 2020-2021, the business struggled to sustain itself. Sarah continued teaching the retail startup course and hosting the competition. In the spring of 2021, she won a small faculty fellowship to support the cash prizes for the students participating in this competition.

A deeply spiritual person, Sarah and her (now) husband moved to Washington State in 2021 to attend Bible school, graduating in 2022. Sarah became a social media and marketing manager for a growing online jewelry brand. At this point, she ceased working on her environmentally friendly apparel business.

Discussion

Sarah's journey in the 'valley of death' highlights the complexities of entrepreneurship, particularly in mission-driven businesses that aim to balance profitability with sustainability. For example, the apparel industry supply chain offers numerous channels to lower materials sourcing, manufacturing, and shipping costs. Many of these options involve environmentally wasteful and/or unfair trade practices. Sarah refused to utilize these approaches in her business model because they were inconsistent with her environmental and social mission. In this way, she traded opportunities for greater profitability to preserve her sustainable mission. Despite facing challenges in customer discovery and market validation, she remained steadfast in her commitment to sustainable fashion, reflecting the mindset of a purpose-driven entrepreneur.

Sarah's early experience acquiring the initial resources for her startup demonstrates the value of university-led entrepreneurial programs, which provided mentorship, seed funding opportunities, and hands-on training. However, her difficulties in implementing LSM suggest that more structured guidance on market validation, customer acquisition, and business model iteration might have further supported her venture's development. Adopting LSM may be more challenging for a mission-driven entrepreneur like Sarah than for a profit-driven entrepreneur, where a narrower range of future possible business models is necessitated. That is, Sarah remained so committed to the cause of fashion in the context of ocean preservation that it was more challenging to iterate on the business model. A commitment to a specific mission leaves

less flexibility to adapt. In this way, her commitment to ocean-friendly fabrics may have been a liability when building an economically sustainable business venture in the apparel sector.

Summary

Sarah's journey as an environmental entrepreneur is a testament to the dedication, resilience, and innovation required to navigate the entrepreneurial journey, particularly with social impact. While the development of her startup faced many challenges that ultimately led to her stepping away from it, her efforts in sustainable fashion made a lasting impact on the local community. She developed many vital relationships both locally and internationally within the fashion industry. Sarah also made a strong name for herself as a champion of the environment, particularly as it relates to the detrimental effects on the oceans due to microplastics. While her journey as a social impact entrepreneur has not been easy, and is currently on hiatus, it underscores the importance of adaptability, ecosystem support, and market validation in building a successful venture. It also highlights the limitations of mission-driven ventures. Nevertheless, through her experiences as a founder, educator, and environmental advocate, Sarah will likely continue to inspire future social impact entrepreneurs to remain committed to their passions while remaining mindful of the fundamental challenges in the "valley of death."

4.4 Cross-Case Analysis

In addition to analyzing each case's findings, a cross-case analysis was performed to find common themes or parallels that may illuminate the relationship between experience and persistence in a startup venture.

Numerous categorical themes emerged from the cross-case analysis (see Table 30 below), which may be divided roughly into demographic and engagement themes. For demographic themes, the study categorized the entrepreneurs by type, gender, educational field of study, previous startup experience, and previous work experience. Engagement themes capture the

extent to which the participants were observed to actively engage with the methodology of the accelerator program, as well as its coaches and mentors. Three engagement themes emerged: LSM engagement, pivots, and coachability. LSM engagement related to the level of engagement in the customer discovery process and could be measured 1) empirically by the number of interviews conducted by the entrepreneur during the program, 2) qualitatively by observing their reported experience with and or insights from that process, and 3) the extent to which they continued to utilize the LSM process after completion of the accelerator. Pivots are common in entrepreneurship and are defined as a fundamental shift in the startup's strategies based on insights from market feedback, including target customers, industry experts, and other ecosystem stakeholders (Ries, 2011). Among the cases here, widely varying pivots, or iterations of the business model, were observed, which appear to have a bearing on the entrepreneurs' survival in the valley of death. Lastly, coachability is an observed characteristic relating to the entrepreneur's reaction to and willingness to adopt direct feedback from the many coaches, mentors, and subject matter experts to whom they were exposed during the accelerator program. Participant coachability was observed by direct feedback from assigned coaches, as well as through mentor interaction and exit survey responses.

Type. Each case participant is associated with a distinct venture type. Violet is characterized as a necessity entrepreneur since her biography is closely associated with becoming an entrepreneur to support her most basic needs. Arthur, a scientist by training and hardware entrepreneur, may also be considered a necessity entrepreneur as he was at least in part motivated to become an entrepreneur to maintain legal status in the US. Martin is a highly trained software engineer who chose to pursue entrepreneurship firmly within his area of specialization. He too made decisions regarding the venture related to his work visa status but

was at first motivated by the desire to innovate within his field. Colin is categorized generally as a healthcare entrepreneur in that he leveraged an established career in his segment of the broader healthcare industry to identify an opportunity and build his startup. Travis and Sarah, social impact and environmental entrepreneurs respectively, are both mission driven and their experience with LSM was similarly challenged by their unwillingness to stray too far from their original missions. This insight regarding the misalignment of LSM with mission driven ventures may be important to entrepreneurship support organizations. When motivated by a specific mission, it may be more difficult for entrepreneurs to undertake the iterations (pivots) necessary to survive in the valley of death.

Education. While the fields of study undertaken by the participants had a strong relationship to the nature of their respective startup ventures, neither the level of education nor the field revealed an impact on their persistence in the valley of death. All six entrepreneurs chose to pursue startups in areas for which they had significant passion and reasonable experience. Violet, Colin and Travis pursued business education, specifically entrepreneurship education, to enable their startup efforts. Sarah pursued an undergraduate degree in the field where she was developing her startup simultaneously. Arthur and Martin developed their startup ventures from within their field of technical expertise. All participants pursued significant additional extracurricular training in entrepreneurial techniques for the direct benefit of their respective startup.

Startup Experience. Only Violet and Sarah reported previous startup experience in their accelerator application interviews. Violet had many years of direct experience in the jewelry business prior to entering the university and seeking out formal business training. Sarah founded her company several years before coming to the university, although her significant commitment

of resources to it emerged coincident with her participation in university entrepreneurship education. The remaining participants reported no prior startup experience before founding the venture with which they participated in the accelerator. Politis (2008) reported that prior startup experience played a role in allowing entrepreneurs to cope with uncertainty, as well as to cope with failure. In this study, all participants other than Violet and Sarah, were new to entrepreneurship and to coping with uncertainty in that context. Therefore, prior experience may not be a necessary condition for surviving in the valley of death.

Work Experience. The impact of prior work experience did not emerge as an important theme in cross-case analysis. This may be interesting in that prior work experience does not appear to be relevant in impacting the success of nascent entrepreneurs (at least in this study) one way or another. Prior studies have found that prior business experience was an important antecedent to success in entrepreneurship (Staniewski, 2016; Ramayah, Ahmad & Fei, 2012; Edelman, Manolova, & Brush, 2008). Relatedly, Gielnik, Zacher & Wang (2018) also found that age was negatively related to entrepreneurial success, but that prior experience moderated this relationship such that experienced older entrepreneurs performed better than others. Arthur, Colin and Martin obtained significant work experience prior to engaging in entrepreneurship. Only Colin and Martin pursued startup activities directly related to this experience.

LSM Engagement. The degree to which participants engaged with the overarching methodology of the accelerator, conducting customer interviews, interacting actively with mentors, adopting feedback from coaches, appears to be a major theme related to survival in the valley of death. In the case of all four entrepreneurs who continue to operate their businesses today (Violet, Arthur, Colin, and Travis), high levels of LSM engagement were observed. Each conducted more than one hundred interviews during the six-week period. In the case of Arthur

and Colin, they adopted LSM into their startup operations and report continuing to utilize its tenets to iterate on their respective businesses.

Pivots. The basic premise of LSM lies in building a solution that fits a validated market problem (Blank, 2013; Ries, 2011). This requires continuous iteration and pivoting from one model for the venture to a new one based on that validation. The relative number and scope of pivots undertaken by the participants appears to be a key factor in their venture survival. As with LSM engagement, pivoting enabled Violet, Arthur and Colin to refine their business models, as well as their target customer segment. In the cases of Arthur and Colin, their current ventures resemble their starting conceptual ventures only in that they remain in the broadest industry categories. Violet remained within the same original industry (jewelry) but iterated her business model several times before settling on the hands-on retail experience with which she has been successful. For the remaining cases, material pivots were not reported.

Coachability. The extent to which the six participants were observed to absorb and incorporate feedback from coaches, mentors and program leadership also emerged as an important theme that appeared to impact longer-term survivability of the venture. Hallen, Cohen and Bingham (2020) identify accelerators as providing "broad, intensive and paced consultation," which they define as structured interactions with a diverse set of stakeholders, including mentors, program directors, customers, guest speakers, alumni, and peers. In the present study, the coachability theme provides evidence for the impact of these structured interactions. Four of the six participants were observed to be highly coachable in the context of the accelerator program. All four indicated the value they placed on coaches and mentors in exit interviews where they rated these factors highly, as well as provided specific support within commentary sections. Coaches and mentors during the respective accelerator cohorts also noted

their views on coachability during weekly program coordination meetings. Three of those four coachable entrepreneurs continue to thrive in their startup ventures. It should be noted that the extent to which a participant was deemed coachable is distinguished from the other engagement themes (LSM and Pivots). Martin, for example, readily embraced mentor and coach interactions, even bringing one coach onto his founding team for a time. However, his coachability did not equate to agility in iterating the business model from its original form. He and his team focused more on utilizing feedback loops to add and improve on features and functions within the basic platform, rather than wholesale changes to the business strategy. Similarly, Violet executed a pivot from an online business to a brick-and-mortar business despite the input of mentors and coaches, distinguishing adaptability from coachability.

Table 35: Cross-case categorical themes

Case	1	2	3	4	5	6
Name	*Violet*	*Arthur*	*Martin*	*Colin*	*Travis*	*Sarah*
Type	Necessity	Hardware	Software	Healthcare	Social impact	Environmental
Gender	F	M	M	M	M	F
Education	Business	Science	Science	Business	n/a	Business
Startup Experience	Yes	No	No	No	No	Yes
Work Experience	No	Yes	Yes	Yes	No	No
LSM Engagement	High	High	Medium	High	High	Low
Pivots	Yes	Yes	No	Yes	No	No
Coachability	Yes	Yes	Yes	Yes	No	No
Surviving (to date)*	Yes	Yes	No	Yes	Yes	No

*defined as currently still in entrepreneurship

4.5 Discussion

Experience. Each case participant entered the accelerator program with varying levels of experiential resources such as prior startup experience, work or educational experience that related to the startup activities. Hallen, Bingham and Cohen (2014) note that the prior experience of accelerator participants, including previous startup experience, relevant work experience or educational background, did not have a statistically significant effect on the outcomes of

accelerator participants. In this study, the experiential priors of participants appear to impact their survival in the valley of death. Their initial motivations for becoming an entrepreneur proved to be a significant determinant of the path they would take with their startup. The motivations of Travis and Sarah were mission oriented. This contributed to their apparent inflexibility with their chosen business model. While they actively sought out validation from customers during the accelerator, they did not incorporate insights from these interactions into their respective business models. Rather, they interpreted feedback as validation that their original business model, and therefore their mission, was the correct one. Violet and Colin were motivated by the significant experience they had accumulated with their respective industry sectors, and sought out additional resources (entrepreneurship education and training) to help them solve problems they discovered in those industries. Arthur and Martin, both engineers by training, were motivated to build highly technical solutions within their respective industries.

Engagement. Engagement themes emerge as important indicators of survival in the valley of death. Whereas Violet, Arthur, Colin and Travis exhibited high levels of LSM engagement and are surviving as early-stage entrepreneurs, Martin and Sarah, medium and low LSM engagement respectively, have not survived this period. Unlike Violet, who displayed "natural" instincts from a very early age for the kind of experimentation and learning from failure associate with LSM, Arthur learned entrepreneurial these skills and practiced them through several iterations of his business. In Martin's case, his commitment to building a fully featured collaboration tool took priority over his absorption of knowledge about the problem to be solved in the marketplace. Sarah struggled to find customers to interview during the accelerator program. When she did find customers to interview, her insights tended to be confirmatory on her predetermined solution rather than contributing to iteration of the business model. Neither

Martin nor Sarah materially pivoted their ventures based on market feedback. On the other hand, three of the other four cases did materially pivot (Burnell & Fisher, 2023). All four of those survive.

Learning to Fail. The Lean Startup Methodology is built around the process of investing in low-cost experiments that allow for rapid iteration of the startup business model, as entrepreneurs learn from these experiments. In this process, as in the scientific approach, most experiments fail. In this way, learning to fail – or rather, learning from failure – becomes an important quality for nascent entrepreneurship. All of the six entrepreneurs displayed some level of learning from failure. However, they each embraced the learning to fail process to widely varying degrees. While Violet learned from an early age to turn adversity into learning, she also welcomed, in fact actively sought out, feedback from customers, mentors and other stakeholders. Arthur and Martin also embraced the iterative processes as trained scientists, although Arthur may have adopted LSM more vigorously in the period following the accelerator to continually develop his business model. Colin also embraced external feedback from a wide range of inputs to continuously improve the fit between his proposed solution and the problems he saw in the healthcare marketplace. Finally, while both Travis and Sarah obtained substantial training on the iterative process of incorporating market feedback into their business models, they did not actively incorporate this feedback in a significant manner such that their respective businesses remained fundamentally the same coming out of the accelerator as it was going into the program. In fact, even during their struggles in the "valley of death," material changes to their business model were not observed. They represent mission-driven entrepreneurs who worked hard to overcome the many obstacles facing entrepreneurs, but leveraging LSM was not clearly one of the strategies they deployed for doing so.

4.6 Significance

Findings from this study add to the literature by providing insights into how to bridge the gap between entrepreneurial intention and sustained action in the early years of nurturing the enterprise in the "valley of death." The extent to which prior experience relates to success in adopting lean methodologies is an important finding that contributes to EE research and may be useful for educators and ESO leaders in improving outcomes for their startup cohorts. Also significant is the finding that engagement with LSM appears to be important to survival in the highly uncertain early stages of a startup venture. In this study, entrepreneurs who were observed to be highly engaged, who embraced business model iteration, and welcomed a variety of feedback from expert coaches and mentors appear to experience increased survivability. On the other hand, entrepreneurs who exhibited less willingness to engage with potential customers for feedback, iterate their business based on that feedback, or synthesize and incorporate the expertise of coaches and mentors appear less likely to survive. There are many more factors that implicate the persistence and survival of nascent entrepreneurs. However, in all six of these cases, evidence is seen that experiential education programs like the lean startup methodology play a role in reducing the myriad uncertainties that entrepreneurs face in the valley of death.

CONCLUSION

5.1 General Discussion

The three studies offer a glimpse of a new approach to educating nascent entrepreneurs by providing empirical evidence differentiating risk from uncertainty for startup founders. The first two quantitative studies provide evidence that risk attitudes are not durable constructs for entrepreneurs, and so the myth of the risk-taking entrepreneur may be overwrought. Essay one provided two important general insights: first, risk attitudes vary within a regional cultural context, and second, cushion theory challenges the prevailing notion that individualistic cultures are greater risk takers at the domain-specific level. Essay two further undermines the risk-taking construct in entrepreneurship education by revealing its malleability within an experiential learning program. The lean startup methodology teaches nascent entrepreneurs to reduce uncertainty and not accept risks. Finally, an essential pedagogical theme emerged from essay three, implying that adherence to an uncertainty-reducing modus operandi like the Lean Startup Methodology improves the likelihood of surviving the challenging early period of entrepreneurship when resources are scarce and economic sustainability has not yet been achieved.

5.2 Other Factors (Alternative Explanations)

In this section, I address alternative explanations for the findings described above. These other factors should be considered in the context of further research into how entrepreneurship educators address the risk attitudes and survival dynamics of nascent entrepreneurs.

Self-Efficacy. LSM equips startup founders with a specific roadmap for developing their entrepreneurial ventures. This enablement likely impacts an individual's belief in their ability to perform the tasks necessary to be successful in entrepreneurship; that is, it may improve participants' sense of entrepreneurial self-efficacy (Gielnik, Bledow & Stark, 2020; Chen,

Greene, & Crick, 1998). This is a reasonable alternative explanation for why entrepreneurs may display increased risk tolerance after participation in an accelerator. Their participation has given them the sense that they now have the skills to succeed, and they may report greater risk tolerance.

Social Learning. Social learning occurs when individuals emulate the behavior of others either consciously or unconsciously (Reed et al., 2010). The emergence of social learning is likely a byproduct of cohort-based experiential education programs such as university entrepreneurship accelerators like the sample, wherein this research drew its participants (Cartland & Maras, 2023). Startup ecosystems are often collaborative communities wherein participants learn from and emulate each other as they progress their ventures. This community-based learning may also explain changes in perspective (for example, in risk attitudes) among entrepreneurs entering and graduating from an accelerator program.

Ecological Factors. Environmental factors undoubtedly play a significant role in the tendencies of entrepreneurs and may explain regional differences in aspects like risk attitudes. Suresh and Ramraj (2012) present a conceptual framework highlighting how environmental factors significantly influence entrepreneurial success, emphasizing that entrepreneurship is not solely driven by individual traits but also by the broader ecosystem. This ecosystem differs in unique ways by region, and these differences may explain important differences in the attitudes of entrepreneurs in the current research.

Community Size. The relative size of a regional population may importantly bear on the individual dynamics of the entrepreneurial ecosystem. Stam & Van de Ven (2021) note that population plays a foundational role by shaping and interacting with nearly every startup ecosystem component. A larger and denser population enhances market demand for early-stage

companies, facilitates stronger social and professional networks for individual founders, attracts diverse talent to the region for career opportunities, and increases the availability of knowledge and financial resources multiplicatively through the law of large numbers (Malecki, 2018). Population diversity can also enrich entrepreneurial culture and foster leadership by creating more open environments for innovation and collaboration. Thus, population serves as a critical contextual factor underpinning entrepreneurial ecosystems' vitality and functionality. This population-level explanation for entrepreneurial characteristics may also implicate individual-level traits like entrepreneurial risk attitudes, thereby explaining regional differences in those attitudes based on population-level characteristics.

5.3 Research Significance (Theory and Practice)

These three essays contribute to the literature in several ways. The cross-cultural study (essay one) supports the cushion theory in finding regional differences among nascent entrepreneurs, providing evidence against a boilerplate approach to entrepreneurship education wherein all participants are treated the same. The evidence of longitudinal variance in risk attitudes (essay two) also supports the rethinking of entrepreneurship education curricula in support of managing uncertainty rather than taking risks. Essay three contributes significant findings in the similarities and differences of the lived experience of nascent entrepreneurs and how a shared experience of an accelerator program shaped their survival in the valley of death. Specifically, it suggests that a path to longer-term survival in entrepreneurship can be achieved by applying methods like LSM. Reframing the entrepreneurship curricula (or at least a small portion of it) from one that emphasizes matters of risk (known unknowns) to one that incorporates uncertainty (unknown unknowns) can be a significant improvement for the field in terms of entrepreneurial engagement.

For practice, understanding the risk attitudes of entrepreneurs at a more fine-grained level may have profound implications for several stakeholders in the innovation ecosystem, including investors, educators, government agencies, as well as entrepreneurs themselves as they make key decisions about the uncertainties of moving ahead in the game of new ventures. Entrepreneurship may depend more significantly on uncertainty reduction rather than risk taking, which has significant implications for practice. Entrepreneurship educators might improve student outcomes by recognizing this difference and encouraging nascent entrepreneurs to experiment, iterate based on external feedback, and employ other techniques that reduce entrepreneurial uncertainty. Entrepreneurship is not about risk. It is rich with opportunities to turn uncertainty into helpful information.

5.4 Limitations

This research is limited to the experience of entrepreneurs in a single accelerator and its comparison student group (Essay one), albeit over several different cohorts and periods. Hawai‘i is unique in many ways, not the least of which include its geographic isolation, small population, fledgling startup ecosystem relative to larger mainland urban centers, and unique ethnic diversity. Any of these factors pose limitations regarding the generalizability of the findings to other ecosystems. Both quantitative studies (Essay One and Two) utilize self-reported risk preference data and are subject to the bias of how those participants wish to be perceived. The mixed methods approach of the last study (Essay Three) may minimize this self-report bias by including rich qualitative descriptions of the experience of a subset of the same group of entrepreneurs. Nevertheless, all three essays are limited by the primarily self-reported nature of the data.

5.5 Future Research

These studies offer numerous areas of future research, several of which are listed below:

- Future replication studies of cross-cultural variance of domain-specific entrepreneur risk attitudes should include other within-country regional samples to validate the claim that entrepreneurship education is, in fact, a local matter and requires a refined approach to accommodate local differences.
- In a future replication of the impact of LSM on accelerator participants, a control group design should be employed. One approach would be to draw a control group from the accelerator applicants who were not accepted into the program. This would allow for a more precise understanding of the impact of LSM on the experimental group relative to the control group. Larger samples could be sought for in such a replication study.
- There is no shortage of important stories about early-stage entrepreneurs and their struggles. These are often masked by mythologized stories of the late-stage entrepreneurs - the survivors. However, there may not be as much to learn from this small group of "successful" entrepreneurs as from the larger group of entrepreneurs who struggled in the early period. An extensive case analysis should extend the findings of essay three.
- LSM is derived indirectly from Toyota's Production principles, which emphasize Genchi Genbutsu ("loosely: "go find out") approaches to problem solving. Future research should consider how and whether LSM was incorporated into the long-term modus operandi of nascent entrepreneurs long after their early stages, whether they continued to pursue entrepreneurship in a traditional form (e.g., as a startup founder) or moved into less entrepreneurial pursuits. This research should show the long-term impact of LSM on careers regardless of outcome.

REFERENCES

Ahmed, M. A., Khattak, M. S., & Anwar, M. (2020). Personality traits and entrepreneurial intention: The mediating role of risk aversion. *Journal of Public Affairs*, e2275.

Ahmed, S. U. (1985). nAch, risk-taking propensity, locus of control and entrepreneurship. *Personality and Individual differences*, *6*(6), 781–782.

Akerlof, G. A. (1978). The market for "lemons": Quality uncertainty and the market mechanism. In *Uncertainty in economics* (pp. 235-251). Academic Press.

American Economic Association, Royal Economic Society, & Simon, H. A. (1966). *Theories of decision-making in economics and behavioural science* (pp. 1–28). Palgrave Macmillan UK.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179–211.

Aldrich, H. E., & Ruef, M. (2018). Unicorns, gazelles, and other distractions on the way to understanding real entrepreneurship in the United States. *Academy of Management Perspectives*, *32*(4), 458-472.

Aldrich, H. E., & Zimmer, C. (1986). Entrepreneurship through social networks. D. Sexton, R. Smilor, eds.

Al-Shaikh, M. E., & Siddiqui, K. A. (2021). Crossing the valley of death: lessons for young entrepreneurs. *Entrepreneurship and Sustainability Issues*, *9*(1), 644.

Alvarez, S.A. and Barney, J.B. 2005. How do entrepreneurs organize firms under conditions of uncertainty?. *Journal of Management*, 31(5):776-793.

Alvarez, S., & Barney, J. B. (2007). The entrepreneurial theory of the firm. *Journal of Management Studies*, *44*(7), 1057-1063.

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

Arenius, P., & Minniti, M. (2005). Perceptual variables and nascent entrepreneurship. *Small business economics*, *24*(3), 233-247.

Ariely, D. (2008). *Predictably irrationality*. New York: Harper Collins.

Arpiainen, R. L., & Kurczewska, A. (2017). Learning risk-taking and coping with uncertainty through experiential, team-based entrepreneurship education. *Industry and Higher Education*, *31*(3), 143-155.

Arrow, K. J. (1951). Alternative approaches to the theory of choice in risk-taking situations. *Econometrica: Journal of the Econometric Society*, 404–437.

Asquith, P., Ritter, J. R., & Pathak, P. A. (2004). Short Interest and Stock Returns. *NBER Working Paper*, (w10434).

Astebro, T., Herz, H., Nanda, R., & Weber, R. A. (2014). Seeking the roots of entrepreneurship: Insights from behavioral economics. *Journal of Economic Perspectives*, *28*(3), 49-70.

Ayton, P., Bernile, G., Bucciol, A., & Zarri, L. (2020). The impact of life experiences on risk-taking. *Journal of Economic Psychology*, *79*, 102274.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179–211.

Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The relationship between entrepreneurship education and entrepreneurial intentions: A meta–analytic review. *Entrepreneurship theory and practice*, *38*(2), 217–254.

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

Bandera, C., Collins, R., & Passerini, K. (2018). Risky business: Experiential learning, information and communications technology, and risk-taking attitudes in entrepreneurship education. *The International Journal of Management Education*, *16*(2), 224-238.

Barney, J. B. (1996). The resource-based theory of the firm. *Organization science*, *7*(5), 469–469.

Baron, R. A. (2000). Counterfactual thinking and venture formation: The potential effects of thinking about "what might have been". *Journal of Business Venturing*, *15*(1), 79–91.

Baron, R. A. (2004). Potential benefits of the cognitive perspective: expanding entrepreneurship's array of conceptual tools. *Journal of Business Venturing*, *19*(2), 169–172.

Baron, R. A., & Hmieleski, K. M. (2018). *Essentials of entrepreneurship, second edition: Changing the world, one idea at a time*. Edward Elgar Publishing.

Barr, S. H., Baker, T. E. D., Markham, S. K., & Kingon, A. I. (2009). Bridging the valley of death: Lessons learned from 14 years of commercialization of technology education. *Academy of management learning & education*, *8*(3), 370–388.

Barron, E., & Amorós, J. E. (2020). Bridging the valley of death: Lessons from an entrepreneurial program. *International Journal of Entrepreneurship*, *24*(1), 1-8.

Baum, J. R., Frese, M., & Baron, R. A. (Eds.). (2014). *The psychology of entrepreneurship*. Psychology Press.

Bayes, T. (1763). LII. An essay towards solving a problem in the doctrine of chances. By the late Rev. Mr. Bayes, FRS, communicated by Mr. Price, in a letter to John Canton, AMFR S. *Philosophical transactions of the Royal Society of London*, (53), 370–418.

Bergman, B. J., & McMullen, J. S. (2021). Helping entrepreneurs help themselves: A review and relational research agenda on entrepreneurial support organizations. *Entrepreneurship Theory and Practice*, 10422587211028736.

Bianchi, M., & Verganti, R. (2021). Entrepreneurs as designers of problems worth solving. *Journal of Business Venturing Design*, *1*(1-2), 100006.

Bilalić, M., McLeod, P., & Gobet, F. (2008). Why good thoughts block better ones: The mechanism of the pernicious Einstellung (set) effect. *Cognition*, *108*(3), 652-661.

Blank, S. (2013). Why the lean start-up changes everything. *Harvard Business Review*, 91(5), 63–72.

Block, J., Sandner, P., & Spiegel, F. (2015). How do risk attitudes differ within the group of entrepreneurs? The role of motivation and procedural utility. *Journal of Small Business Management*, *53*(1), 183-206.

Bocken, N., & Snihur, Y. (2020). Lean Startup and the business model: Experimenting for novelty and impact. *Long Range Planning*, *53*(4), 101953.

Bortolini, R.F., Nogueira Cortimiglia, M., Danilevicz, A.d.M.F. and Ghezzi, A. (2021). "Lean Startup: A comprehensive historical review", *Management Decision*, 59(8), pp. 1765-1783. https://doi.org/10.1108/MD-07-2017-0663

Boholm, A. (1998). Comparative studies of risk perception: a review of twenty years of research. *Journal of Risk Research*, 1(2): 135–163.

Bontempo, R. N., Bottom, W. P., & Weber, E. U. (1997). Cross-cultural differences in risk perception: a model-based approach. *Risk Analysis*, 17(4): 479–488.

Brachert, M., & Hyll, W. (2014). On the stability of preferences: Repercussions of entrepreneurship on risk attitudes. *Journal of Economic Psychology*, 42, 99–114. https://doi.org/10.1016/

Brenot, J., Bonnefous, S., & Marris, C. 1998. Testing the cultural theory of risk in France. *Risk Analysis*, 18(6): 729-739.

Breuer, W., Kollath, J. A., Salzmann, A. J., & Nitzsch, R. V. (2017). The assessment of risk behavior: A cross-cultural analysis using the DOSPERT scale. In *Behavioral Finance: WHERE DO INVESTORS' BIASES COME FROM?* (pp. 159-180).

Breznitz, S. M., & Zhang, Q. (2019). Fostering the growth of student start-ups from university accelerators: An entrepreneurial ecosystem perspective. *Industrial and Corporate Change*, *28*(4), 855-873.

Brockhaus Sr, R. H. (1980). Risk-taking propensity of entrepreneurs. *Academy of management Journal*, *23*(3), 509-520.

Brooks, C., & Williams, L. (2024). People are people: A comparative analysis of risk attitudes across Europe. *International Journal of Finance & Economics*, *29*(3), 3545-3566.

Buckley, P. J., Chen, L., Clegg, L. J., & Voss, H. 2016. Experience and FDI risk-taking: a microfoundational reconceptualization. *Journal of International Management*, 22(2): 131-146.

Burnell, D., Stevenson, R., & Fisher, G. (2023). Early-stage business model experimentation and pivoting. *Journal of Business Venturing*, *38*(4), 106314.

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

Busenitz, L. W., & Lau, C. M. 1996. A cross-cultural cognitive model of new venture creation. *Entrepreneurship: Theory and Practice*, 20(4): 25-40.

Butler, J. E., Doktor, R., & Lins, F. A. 2010. Linking international entrepreneurship to uncertainty, opportunity discovery, and cognition. *Journal of International Entrepreneurship*, 8(2): 121-134.

Caliendo, M., Fossen, F. M., & Kritikos, A. S. (2009). Risk attitudes of nascent entrepreneurs–new evidence from an experimentally validated survey. *Small business economics*, *32*, 153-167.

Campara, J., Da Costa Jr, N., Matsushita, R., & Da Silva, S. (2021). Two selves and two minds in a longitudinal survey of risk attitudes. *Journal of Behavioral and Experimental Finance*, *29*, 100444.

Campbell, D. T. (1969). Reforms as experiments. *American psychologist*, *24*(4), 409.

Cantillon, R. (1755). An essay on commerce in general. *History of economic thought books*.

Carayannis, E. G., Evans, D., & Hanson, M. (2003). A cross-cultural learning strategy for entrepreneurship education: outline of key concepts and lessons learned from a comparative study of entrepreneurship students in France and the US. *Technovation*, *23*(9), 757-771.

Cartland, Y., & Maras, S. (2023). Re-contextualising start-up communities as social learning systems. *Creative Industries Journal*, *16*(2), 146-162.

Casson, M. (1982). *The entrepreneur: An economic theory*. Rowman & Littlefield.

Cera, G., Mlouk, A., Cera, E., & Shumeli, A. (2020). The impact of entrepreneurship education on entrepreneurial intention. A quasi-experimental research design. *Journal of Competitiveness*.

Çera, G., Çera, E., Rozsa, Z., & Bilan, S. (2021). Entrepreneurial intention as a function of university atmosphere, macroeconomic environment and business support: a multi-group analysis. *European Journal of Training and Development*, *45*(8/9), 706-724.

Chen, C. C., Greene, P. G., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers?. *Journal of business venturing*, *13*(4), 295-316.

Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of economic behavior & organization*, *81*(1), 1-8.

Chuang, Y., & Schechter, L. (2015). Stability of experimental and survey measures of risk, time, and social preferences: A review and some new results. *Journal of development economics*, *117*, 151-170.

Ciavarella, M. A., Buchholtz, A. K., Riordan, C. M., Gatewood, R. D., & Stokes, G. S. (2004). The Big Five and venture survival: Is there a linkage?. *Journal of Business Venturing*, *19*(4), 465-483.

Cohen, S. (2013). What do accelerators do? Insights from incubators and angels. *Innovations: Technology, Governance, Globalization*, *8*(3-4), 19-25.

Cohen, S., Fehder, D. C., Hochberg, Y. V., & Murray, F. (2019). The design of startup accelerators. *Research Policy*, *48*(7), 1781-1797.

Cohen, S., & Hochberg, Y. (2014). Accelerating startups: The seed accelerator phenomenon.

Cohen, W. M., & Levinthal, D. A. (2000). Absorptive capacity: A new perspective on learning and innovation. In *Strategic Learning in a Knowledge economy* (pp. 39-67).

Colombo, M. G., Rossi-Lamastra, C., & Wright, M. (2018). 10. Accelerators: insights for a research agenda. *Accelerators: Successful Venture Creation and Growth*, 188.

Corbett, A. C. (2007). Learning asymmetries and the discovery of entrepreneurial opportunities. *Journal of business venturing*, *22*(1), 97-118.

Corbett, A. C. (2005). Experiential learning within the process of opportunity identification and exploitation. *Entrepreneurship Theory and Practice*, *29*(4), 473-491.

Cordell, D. M. (2002). Risk tolerance in two dimensions. *Journal of financial planning*, *15*(5), 30.

Crișan, E. L., Salanță, I. I., Beleiu, I. N., Bordean, O. N., & Bunduchi, R. (2021). A systematic literature review on accelerators. *The Journal of Technology Transfer*, *46*, 62-89.

Crocker, J., Fiske, S. T., & Taylor, S. E. (1984). Schematic bases of belief change. In *Attitudinal judgment* (pp. 197-226). Springer, New York, NY.

Das, T. K., & Teng, B. S. (1998). Time and entrepreneurial risk behavior. *Entrepreneurship theory and practice*, *22*(2), 69-88.

Davidsson, P. (2006). Nascent entrepreneurship: empirical studies and developments. *Foundations and trends® in entrepreneurship*, *2*(1), 1-76.

de Blasio, G., De Paola, M., Poy, S., & Scoppa, V. (2021). Massive earthquakes, risk aversion, and entrepreneurship. *Small Business Economics*, *57*(1).

De Groot, K., & Thurik, R. (2018). Disentangling risk and uncertainty: When risk-taking measures are not about risk. *Frontiers in psychology*, *9*, 2194.

Delmar, F., & Shane, S. (2006). Does experience matter? The effect of founding team experience on the survival and sales of newly founded ventures. *Strategic Organization*, *4*(3), 215-247.

T. Dohmen, A. Falk, D. Huffman, U. Sunde, J. Schupp, G. Wagner (2011). Individual risk attitudes: measurement, determinants, and behavioral consequences

Journal of the European Economic Association, 9 (3), pp. 522-550.

Douglas, M., & Wildavsky, A. 1983. *Risk and culture: an essay on the selection of technological and environmental dangers***.** University of California Press.

Dweck, C. S. (2006). *Mindset: The new psychology of success*. Random House Incorporated.

Duckworth, A. (2016). *Grit: The power of passion and perseverance*. Simon and Schuster.

Duong, C. D. (2022). Exploring the link between entrepreneurship education and entrepreneurial intentions: the moderating role of educational fields. *Education+ Training*, *64*(7), 869-891.Eesley, C. E., & Lee, Y. S. (2021). Do university entrepreneurship programs promote entrepreneurship? *Strategic Management Journal*, *42*(4), 833-861.

Duxbury, T. (2012). Towards more case study research in entrepreneurship. *Technology Innovation Management Review*, *2*(3), 9.

Edelman, L. F., Manolova, T. S., & Brush, C. G. (2008). Entrepreneurship education: Correspondence between practices of nascent entrepreneurs and textbook prescriptions for success. *Academy of Management Learning & Education*, *7*(1), 56-70.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of management journal*, *50*(1), 25-32.

Eesley, C. E., & Lee, Y. S. (2021). Do university entrepreneurship programs promote entrepreneurship? *Strategic Management Journal*, *42*(4), 833-861.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they?. *Strategic management journal*, *21*(10-11), 1105-1121.

Eisenmann, T. (2021). *Why startups fail: A new roadmap for entrepreneurial success*. Crown Currency.

Eisenmann, T. R., Ries, E., & Dillard, S. (2012). Hypothesis-driven entrepreneurship: The lean startup. *Harvard Business School Entrepreneurial Management Case*, (812-095).

Ellwood, Andy. (2012). The Dream Team: Hipster, Hacker, and Hustler. *Forbes. https://www.forbes.com/sites/andyellwood/2012/08/22/the-dream-team-hipster-hacker-and-hustler/#401e21662c85*

Ellsberg, D. (1961). The crude analysis of strategy choices. *The American Economic Review*, *51*(2), 472-478.

Elston, J. A., Harrison, G. W., & Rutström, E. E. (2005). Characterizing the entrepreneur using field experiments. *Max Planck Institute of Economics Working Paper*.

Entrialgo, M., & Iglesias, V. (2016). The moderating role of entrepreneurship education on the antecedents of entrepreneurial intention. *International entrepreneurship and management journal*, *12*, 1209-1232.

Fairlie, R. W. (2024). Indicators of Entrepreneurial Activity: 2023. *Available at SSRN 4708111*.

Fairlie, R. W. (2022). 2021 National Report on Early-Stage Entrepreneurship in the United States. *Available at SSRN 4061122*.

Fairlie, R. W., & Holleran, W. (2012). Entrepreneurship training, risk aversion and other personality traits: Evidence from a random experiment. *Journal of Economic Psychology*, *33*(2), 366-378.

Fan, J. X., & Xiao, J. J. (2005). A cross-cultural study in risk tolerance: Comparing Chinese and Americans. *Available at SSRN 939438*.

Fayolle, A., & Liñán, F. (2014). The future of research on entrepreneurial intentions. *Journal of business research*, *67*(5), 663-666.

Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of small business management*, *53*(1), 75-93.

Fehder, D., & Hochberg, Y. (2014). Accelerators and the regional supply of venture capital investment.

Felin, T., Gambardella, A., Stern, S., & Zenger, T. (2019). Lean startup and the business model: Experimentation revisited. *Forthcoming in Long Range Planning (Open Access)*.

Fischhoff, B., Watson, S. R., & Hope, C. 1984. Defining risk. ***Policy Sciences***, 17(2): 123-139.

Forlani, D., & Mullins, J. W. (2000). Perceived risks and choices in entrepreneurs' new venture decisions. *Journal of business Venturing*, *15*(4), 305-322.

Foss, N. J., & Klein, P. G. (2012). *Organizing entrepreneurial judgment: A new approach to the firm*. Cambridge University Press.

Frese, M. (2009). *Toward a psychology of entrepreneurship: An action theory perspective*. Now Publishers Inc.

Frese, M., & Gielnik, M. M. (2023). The psychology of entrepreneurship: action and process. *Annual Review of Organizational Psychology and Organizational Behavior*, *10*(1), 137-164.

Furr, N. (2022). *The upside of uncertainty: A guide to finding possibility in the unknown*. Harvard Business Press.

Gardner, Daniel (2008). The Science of Fear: How the Culture of Fear Manipulates Your Brain**.** New York: Dutton.

Georgescu, M. A., & Herman, E. (2020). The impact of the family background on students' entrepreneurial intentions: An empirical analysis. *Sustainability*, *12*(11), 4775.

Georgalos, K. (2018). Entrepreneurship under risk and uncertainty: A review of the experimental evidence. *Inside the mind of the entrepreneur: Cognition, personality traits, intention, and gender behavior*, 59-74.

Gielnik, M. M., Bledow, R., & Stark, M. S. (2020). A dynamic account of self-efficacy in entrepreneurship. *Journal of Applied Psychology*, *105*(5), 487.

Gielnik, M. M., Zacher, H., & Wang, M. (2018). Age in the entrepreneurial process: The role of future time perspective and prior entrepreneurial experience. *Journal of Applied Psychology*, *103*(10), 1067.

Gorgievski, M. J., & Stephan, U. (2016). Advancing the psychology of entrepreneurship: A review of the psychological literature and an introduction. *Applied Psychology*, *65*(3), 437–468.

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological assessment*, *4*(1), 26.

González-López, M. J., Pérez-López, M. C., & Rodríguez-Ariza, L. (2019). Clearing the hurdles in the entrepreneurial race: the role of resilience in entrepreneurship education. *Academy of Management Learning & Education*, *18*(3), 457-483.

Grable, J. E., & Roszkowski, M. J. (2007). Self-assessments of risk tolerance by women and men. *Psychological Reports*, *100*(3), 795-802.

Graham, R. (2014). Creating university-based entrepreneurial ecosystems: evidence from emerging world leaders. *Massachusetts Institute of Technology*.

Grable, J. E., & Lytton, R. H. (2003). The Development of a Risk Assessment Instrument: A Follow-Up Study. *Financial services review*, *12*(3).

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

Guiso, L., Sapienza, P., & Zingales, L. (2018). Time-varying risk aversion. *Journal of Financial Economics*, *128*(3), 403-421.

Gulati, R., & DeSantola, A. (2016). Start-ups that last. *Harvard Business Review*, *94*(3), 14.

Gürol, Y., & Atsan, N. (2006). Entrepreneurial characteristics amongst university students: Some insights for entrepreneurship education and training in Turkey. *Education+ training*

Hahn, D., Minola, T., Bosio, G., & Cassia, L. (2020). The impact of entrepreneurship education on university students' entrepreneurial skills: a family embeddedness perspective. *Small Business Economics*, *55*, 257-282.

Hallen, B. L., Cohen, S. L., & Bingham, C. B. (2020). Do accelerators work? If so, how?. *Organization Science*, *31*(2), 378-414.

Hallen, B. L., Bingham, C. B., & Cohen, S. (2014). Do accelerators accelerate? A study of venture accelerators as a path to success?. In *Academy of Management Proceedings* (Vol. 2014, No. 1, p. 12955). Briarcliff Manor, NY 10510: Academy of Management.

Hameed, I., & Irfan, Z. (2019). Entrepreneurship education: a review of challenges, characteristics and opportunities. *Entrepreneurship Education*, *2*(3), 135–148.

Harms, R., & Schwery, M. (2020). Lean startup: operationalizing lean startup capability and testing its performance implications. *Journal of Small Business Management*, *58*(1), 200-223.

Hanoch, Y., Johnson, J. G., & Wilke, A. (2006). Domain-specificity in experimental measures and participant recruitment: An application to risk-taking behavior. *Psychological Science*, *17*(4), 300–304.

Hanna, S. D., Gutter, M. S., & Fan, J. X. (2001). A measure of risk tolerance based on economic theory. *Journal of Financial Counseling and Planning*, *12*(2), 53.

Harms, R., & Schwery, M. (2020). Lean startup: operationalizing lean startup capability and testing its performance implications. *Journal of Small Business Management*, *58*(1), 200-223.

Hausberg, J. P., & Korreck, S. (2018). Business incubators and accelerators: a co-citation analysis-based, systematic literature review. *The Journal of Technology Transfer*, 1-26.

Hayward, M. L., Shepherd, D. A., & Griffin, D. (2006). A hubris theory of entrepreneurship. *Management Science*, *52*(2), 160–172.

Hebles, M.; Llanos-Contreras, O.; Yániz-Álvarez-De-Eulate, C. Perceived evolution of the entrepreneurial competence based on implementing a training program in entrepreneurship and innovation. *Rev. Esp. Orientac y Psicopedag*. 2019, 30, 9–26.

Helfat, C. E., & Peteraf, M. A. (2015). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. *Strategic Management Journal*, *36*(6), 831-850.

Henry, C., & Foss, L. (2015). Case sensitive? A review of the literature on the use of case method in entrepreneurship research. *International Journal of Entrepreneurial Behavior & Research*, *21*(3), 389–409.

Hisrich, R., Langan-Fox, J., & Grant, S. (2007). Entrepreneurship research and practice: A call to action for psychology. *American psychologist*, *62*(6), 575.

Hlady-Rispal, M., & Jouison-Laffitte, E. (2014). Qualitative research methods and epistemological frameworks: A review of publication trends in entrepreneurship. *Journal of Small Business Management*, *52*(4), 594-614.

Hsee, C. K., & Weber, E. U. (1999). Cross-national differences in risk preference and lay predictions. *Journal of Behavioral Decision Making*, *12*(2), 165-179.

Iacobucci, D., & Rosa, P. (2010). The growth of business groups by habitual entrepreneurs: The role of entrepreneurial teams. *Entrepreneurship Theory and Practice*, *34*(2), 351-377.

Jardim, J., Bártolo, A., & Pinho, A. (2021). Towards a global entrepreneurial culture: A systematic review of the effectiveness of entrepreneurship education programs. *Education Sciences*, *11*(8), 398.

Janney, J. J., & Dess, G. G. (2006). The risk concept for entrepreneurs reconsidered: New challenges to the conventional wisdom. *Journal of Business Venturing*, *21*(3), 385-400.

Johnston, L., Robinson, S., & Lockett, N. (2010). Recognising "open innovation" in HEI-industry interaction for knowledge transfer and exchange. *International Journal of Entrepreneurial Behavior & Research*, *16*(6), 540–560.

Jones, C., & English, J. (2004). A contemporary approach to entrepreneurship education. *Education+ training*, *46*(8/9), 416–423.

Kahan, D. M., Braman, D., Slovic, P., Gastil, J., & Cohen, G. L. (2007). The second national risk and culture study: Making sense of-and making progress in-the American culture war of fact. *GWU Legal Studies Research Paper*, 370: 08–26.

Kahneman, D. and Tversky, A. 1979. Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, 263-291.

Kahneman, D. (2011). *Thinking, fast and slow*. New York: Macmillan.

Kandel, B. (2020). Qualitative versus quantitative research. *Journal of product Innovation management*, *32*(5), 658.

Kerr, S. P., Kerr, W. R., & Xu, T. (2018). Personality traits of entrepreneurs: A review of recent literature. *Foundations and Trends® in Entrepreneurship*, *14*(3), 279–356.

Kier, A. S., & McMullen, J. S. (2018). Entrepreneurial imaginativeness in new venture ideation. *Academy of Management Journal*, *61*(6), 2265–2295.

Kirzner, I. (1973). *Competition and entrepreneurship*. The University of Chicago Press, Chicago.

Knight, F. H. (1921). Risk, uncertainty, and profit. *New York: Hart, Schaffner and Marx*.

Kolb, D. A. (1984). Experiential Learning. Englewood Cliffs, NJ: Prentice Hall.

Koudstaal, M., Sloof, R., & Van Praag, M. (2016). Risk, uncertainty, and entrepreneurship: Evidence from a lab-in-the-field experiment. *Management Science*, *62*(10), 2897-2915.

Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship theory and practice*, *29*(5), 577-597.

Kuyper, H., & Vlek, C. 1984. Contrasting risk judgments among interest groups. ***Acta Psychologica***, 56(1-3): 205-218.

Ladd, T., & Kendall, L. (2017). Resolving the risk paradox: Entrepreneurial cognition in the lean startup method. *The Journal of Applied Business and Economics*, *19*(11/12), 28–42.

Leatherbee, M., & Katila, R. (2016). *Stay the course or pivot? Antecedents of cognitive refinements of business models in young firms*. Working Paper.

Lehmann, H., & Lehmann, H. (2010). Research method: Grounded theory for descriptive and exploratory case studies. *The Dynamics of International Information Systems: Anatomy of a Grounded Theory Investigation*, 53-65.

Leong, K. S. (2017). *The role of educational experiences on the development of knowledge, skills, and dispositions of successful entrepreneurs in Hawai'i* (Doctoral dissertation, University of Hawai'i at Manoa).

Leppäaho, T., Plakoyiannaki, E., & Dimitratos, P. (2016). The case study in family business: An analysis of current research practices and recommendations. *Family Business Review*, *29*(2), 159-173.

Lichtenstein, S., Slovic, P., Fischhoff, B., Layman, M., & Combs, B. (1978). Judged frequency of lethal events. *Journal of experimental psychology: Human learning and memory*, *4*(6), 551.

Lortie, J., & Castogiovanni, G. (2015). The theory of planned behavior in entrepreneurship research: what we know and future directions. *International entrepreneurship and management journal*, *11*, 935-957.

Luchins, A. S. (1942). Mechanization in problem solving: The effect of einstellung. *Psychological monographs*, *54*(6), i.

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

Macko, A., & Tyszka, T. (2009). Entrepreneurship and risk-taking. *Applied psychology*, *58*(3), 469-487.

Malecki, E. J. (2018). Entrepreneurship and entrepreneurial ecosystems. *Geography compass*, *12*(3), e12359.

Mansoori, Y., Karlsson, T., & Lundqvist, M. (2019). The influence of the lean startup methodology on entrepreneur-coach relationships in the context of a startup accelerator. *Technovation*, *84*, 37-47.

Marion, T. J., Dunlap, D. R., & Friar, J. H. (2012). The university entrepreneur: a census and survey of attributes and outcomes. *R&D Management*, *42*(5), 401–419.

Marris, C., Langford, I. H., & O'Riordan, T. (1998). A quantitative test of the cultural theory of risk perceptions: Comparison with the psychometric paradigm. ***Risk analysis***, 18(5): 635–647.

Martínez-Gregorio, S., Badenes-Ribera, L., & Oliver, A. (2021). Effect of entrepreneurship education on entrepreneurship intention and related outcomes in educational contexts: A meta-analysis. *The International Journal of Management Education*, *19*(3), 100545.

McEwen, T. (2002). Influence of experiential learning on new venture creation: A conceptual model. *Journal of Business and Entrepreneurship*, *14*(2), 85.

McGrath, R.G., MacMillan, I.C. & Scheinberg, S. (1992). Elitists, risk-takers, and rugged individualists? An exploratory analysis of cultural differences between entrepreneurs and non-entrepreneurs. **Journal of Business Venturing**, 7(2): 115–135.

McIntyre, R. A. (2014). Overcoming "the valley of death". *Science progress*, *97*(3), 234–248.

McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review*, *31*(1), 132–152.

Mechitov, A. I., and S. B. Rebrik. 1990. "Studies of risk and safety perception in the USSR." ***Contemporary issues in decision making*** 261-270.

Merriam, S. (2009). *Qualitative research: A guide to design and implementation. San Francisco: John Wiley & Sons, Inc*.

Metcalf, L. E., Katona, T. M., & York, J. L. (2021). University startup accelerators: startup launchpads or vehicles for entrepreneurial learning?. *Entrepreneurship Education and Pedagogy*, *4*(4), 666-701.

Mian, S. A. (1996). Assessing value-added contributions of university technology business incubators to tenant firms. *Research policy*, *25*(3), 325–335.

Mian, S., Lamine, W., & Fayolle, A. (2016). Technology Business Incubation: An overview of the state of knowledge. *Technovation*, *50*, 1-12.

Miles, D. A. (2014). Developing a taxonomy for identifying entrepreneurial risk: An empirical study on entrepreneurial risk patterns of business enterprises. *Journal of Developmental Entrepreneurship*, *19*(01), 1450002.

Miller, K. D. (2007). Risk and rationality in entrepreneurial processes. *Strategic Entrepreneurship Journal*, *1*(1-2), 57-74.

Miner, J. B., & Raju, N. S. (2004). Risk Propensity Differences Between Managers and Entrepreneurs and Between Low- and High-Growth Entrepreneurs: A Reply in a More Conservative Vein. *Journal of Applied Psychology, 89*(1), 3–13.

Mitchell, R. K., Busenitz, L., Lant, T., McDougall, P. P., Morse, E. A., & Smith, J. B. (2002). Toward a theory of entrepreneurial cognition: Rethinking the people side of entrepreneurship research. *Entrepreneurship Theory and Practice*, *27*(2), 93–104.

Mitchell, R. K., Busenitz, L. W., Bird, B., Marie Gaglio, C., McMullen, J. S., Morse, E. A., & Smith, J. B. (2007). The central question in entrepreneurial cognition research. *Entrepreneurship Theory and Practice*, *31*(1), 1–27.

Morris, M. H., Webb, J. W., Fu, J., & Singhal, S. (2013). A competency-based perspective on entrepreneurship education: conceptual and empirical insights. *Journal of Small Business Management*, *51*(3), 352-369.

Mueller, S. L., & Thomas, A. S. (2001). Culture and entrepreneurial potential: A nine-country study of locus of control and innovativeness. *Journal of Business Venturing*, *16*(1), 51-75.

Müller, R. M., & Thoring, K. (2012). Design thinking vs. lean startup: A comparison of two user-driven innovation strategies. *Leading through design*, *151*, 91-106.

Nabi, G., Liñán, F., Fayolle, A., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: A systematic review and research agenda. *Academy of management learning & education*, *16*(2), 277-299.

Neck, H. M., Neck, C. P., & Murray, E. L. (2019). *Entrepreneurship: the practice and mindset*. Sage Publications.

Neergaard, H., & Ulhøi, J. P. (Eds.). (2007). *Handbook of qualitative research methods in entrepreneurship*. Edward Elgar Publishing.

Nicholson, N., Soane, E., Fenton-O'Creevy, M., & Willman, P. (2005). Personality and domain-specific risk-taking. *Journal of Risk Research*, *8*(2), 157–176. O'Donoghue, T., & Somerville, J. (2018). Modeling risk aversion in economics. *Journal of Economic Perspectives*, *32*(2), 91–114.

Oltedal, S., Moen, B. E., Klempe, H., & Rundmo, T. 2004. Explaining risk perception: An evaluation of cultural theory. *Trondheim: Norwegian University of Science and Technology*, 85: 1-33.

Oosterbeek, H., Van Praag, M., & Ijsselstein, A. (2010). The impact of entrepreneurship education on entrepreneurship skills and motivation. *European economic review*, *54*(3), 442-454.

O'Donoghue, T., & Somerville, J. (2018). Modeling risk aversion in economics. *Journal of Economic Perspectives*, *32*(2), 91–114.

Otache, I., Umar, K., Audu, Y., & Onalo, U. (2021). The effects of entrepreneurship education on students 'entrepreneurial intentions: A longitudinal approach. *Education+ Training*, *63*(7/8), 967–991.

Palich, L. E., & Bagby, D. R. (1995). Using cognitive theory to explain entrepreneurial risk-taking: Challenging conventional wisdom. *Journal of Business Venturing*, *10*(6), 425–438.

Pauwels, C., Clarysse, B., Wright, M., & Van Hove, J. (2016). Understanding a new generation incubation model: The accelerator. *Technovation*, 50, 13-24.

Petrakis, P. E. (2007). The effects of risk and time on entrepreneurship. *International Entrepreneurship and Management Journal*, *3*(3), 277.

Phillips, R. G. (2002). Technology business incubators: how effective as technology transfer mechanisms?. *Technology in society*, *24*(3), 299–316.

Pittaway, L., & Cope, J. (2007). Entrepreneurship education: A systematic review of the evidence. *International small business journal*, *25*(5), 479–510.

Pitchbook, (2017). Venture Ecosystem FactBook Seattle. Available at SSRN: https://pitchbook.com/news/reports/2017-pitchbook-venture-ecosystem-factbook-seattle

Politis, D. (2008). Does prior start-up experience matter for entrepreneurs' learning? A comparison between novice and habitual entrepreneurs. *Journal of Small Business and Enterprise Development*, *15*(3), 472–489.

Politis, D., & Gabrielsson, J. (2009). Entrepreneurs' attitudes towards failure: An experiential learning approach. *International Journal of Entrepreneurial Behavior & Research*, *15*(4), 364-383.

Powers, J. B., & McDougall, P. P. (2005). University start-up formation and technology licensing with firms that go public: a resource-based view of academic entrepreneurship. *Journal of Business Venturing*, *20*(3), 291-311.

Puglisi, M., Fasone, V., Pedrini, G., Gervasi, D., & Faldetta, G. (2021). Using a dual system of reasoning in small businesses: Entrepreneurial decisions and subjective risk intelligence. *International Entrepreneurship and Management Journal*, 1-25.

Radojevich-Kelley, N., & Hoffman, D. L. (2012). Analysis of accelerator companies: An exploratory case study of their programs, processes, and early results. *Small Business Institute Journal*, *8*(2), 54-70.

Ramayah, T., Ahmad, N. H., & Fei, T. H. C. (2012). Entrepreneur education: Does prior experience matter?. *Journal of Entrepreneurship Education*, *15*, 65.

Ratten, V., & Usmanij, P. (2021). Entrepreneurship education: Time for a change in research direction?. *The International Journal of Management Education*, *19*(1), 100367.

Read, S., & Sarasvathy, S. D. (2005). Knowing what to do and doing what you know: Effectuation as a form of entrepreneurial expertise. *The Journal of Private Equity*, *9*(1), 45-62.

Reed, M. S., Evely, A. C., Cundill, G., Fazey, I., Glass, J., Laing, A., ... & Stringer, L. C. (2010). What is social learning?. *Ecology and society*, *15*(4).

Renn, O., & Rohrmann, B. (Eds.). 2000. ***Cross-cultural risk perception: a survey of empirical studies*** *(Vol. 13)*. Springer Science & Business Media.

Rentfrow, P. J. (2010). Statewide differences in personality: toward a psychological geography of the United States. *American Psychologist*, *65*(6), 548.

Rideout, E. C., & Gray, D. O. (2013). Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of university-based entrepreneurship education. *Journal of Small Business Management*, *51*(3), 329-351.

Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. Crown Books.

Rohrmann, B. (2002). Risk attitude scales: Concepts and questionnaires. *Melbourne: University of Melbourne*, *12*.

Rothaermel, F.T., and M. Thursby. "University-Incubator Firm Knowledge Flows: Assessing Their Impact on Incubator Firm Performance." *Research Policy*, 34 (2005), pp. 305-320.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological monographs: General and applied*, *80*(1), 1.

Rumelt, R. P. (2005). Theory, strategy, and entrepreneurship. In *Handbook of entrepreneurship research: Interdisciplinary perspectives* (pp. 11-32). Boston, MA: Springer US.

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

Sarasvathy, S. D., & Venkataraman, S. (2011). Entrepreneurship as method: Open questions for an entrepreneurial future. *Entrepreneurship theory and practice*, *35*(1), 113-135.

Sarooghi, H., Sunny, S., Hornsby, J., & Fernhaber, S. (2019). Design thinking and entrepreneurship education: Where are we, and what are the possibilities?. *Journal of Small Business Management*, *57*, 78-93.

Say, J. B. (1803). A Treatise on Political Economy, 3rd US Edition. *Philadelphia: John Grigg*.

Salmony, F. U., & Kanbach, D. K. (2021). Personality trait differences across types of entrepreneurs: a systematic literature review. *Review of Managerial Science*, 1-37.

Salmony, F. U., & Kanbach, D. K. (2022). Changes in entrepreneurs' risk-taking propensity across venture phases. *Journal of Enterprising Culture*, *30*(01), 1-31.

Schildberg-Hörisch, H. (2018). Are risk preferences stable?. *Journal of Economic Perspectives*, *32*(2), 135-54.

Schneider, C. R., Fehrenbacher, D. D., & Weber, E. U. (2017). Catch me if I fall: Cross-national differences in willingness to take financial risks as a function of social and state 'cushioning'. *International Business Review*, *26*(6), 1023-1033.

Schumpeter, J. A. (1934). Change and the Entrepreneur. *Essays of JA Schumpeter*.

Seed-DB.com. https://www.seed-db.com/accelerators

Segal, G., Borgia, D., & Schoenfeld, J. (2005). The motivation to become an entrepreneur. *International journal of Entrepreneurial Behavior & research*.

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

Shane, S., & Stuart, T. (2002). Organizational endowments and the performance of university start-ups. *Management science*, *48*(1), 154-170.

Shane, S., Locke, E. A., & Collins, C. J. (2003). Entrepreneurial motivation. *Human resource management review*, *13*(2), 257-279.

Shane, S. A. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Edward Elgar Publishing.

Shaver, K. G., Schjoedt, L., Passarelli, A., & Reeck, C. (2017). The cognitive neuroscience of entrepreneurial risk: Conceptual and methodological challenges. In *Handbook of Research Methodologies and Design in Neuroentrepreneurship*. Edward Elgar Publishing.

Shaver, K. G. (1995). The entrepreneurial personality myth. *Business and Economic Review*, *41*(3), 20-23.

Shepherd, D. A., & Gruber, M. (2021). The lean startup framework: Closing the academic–practitioner divide. *Entrepreneurship Theory and Practice*, *45*(5), 967-998.

Shepherd, D. A., & Patzelt, H. (2018). Prior Knowledge and Entrepreneurial Cognition. *Entrepreneurial Cognition*, 7-49.

Shepherd, D. A., Williams, T. A., & Patzelt, H. (2015). Thinking about entrepreneurial decision making: Review and research agenda. *Journal of Management*, *41*(1), 11-46.

Shou, Y., & Olney, J. (2020). Assessing a domain-specific risk-taking construct: A meta-analysis of reliability of the DOSPERT scale. *Judgment and Decision Making*, *15*(1), 112-134.

Shwetzer, C., Maritz, A., & Nguyen, Q. (2019). Entrepreneurial ecosystems: a holistic and dynamic approach. *Journal of Industry-University Collaboration*, *1*(2), 79-95.

Simon, M., Houghton, S. M., & Aquino, K. (2000). Cognitive biases, risk perception, and venture formation: How individuals decide to start companies. *Journal of Business Venturing*, *15*(2), 113-134.

Singelis, T. M., Triandis, H. C., Bhawuk, D. P., & Gelfand, M. J. (1995). Horizontal and vertical dimensions of individualism and collectivism: A theoretical and measurement refinement. *Cross-cultural research*, *29*(3), 240-275.

Sirelkhatim, F., & Gangi, Y. (2015). Entrepreneurship education: A systematic literature review of curricula contents and teaching methods. *Cogent Business & Management*, *2*(1), 1052034.

Sjöberg, L., Moen, B. E., & Rundmo, T. 2004. Explaining risk perception. *An evaluation of the psychometric paradigm in risk perception research*. Trondheim, Norway: Rotunde.

Slovic, P. E. 2000. *The perception of risk*. Earthscan publications.

Slovic, P. (1987). Perception of risk. *Science*, *236*(4799): 280–285.

Slovic, P., Fischhoff, B., & Lichtenstein, S. 1980. Facts and fears: Understanding perceived risk. In *Societal risk assessment,* Springer US, 181-216.

Spinelli, S., Ensign, P. C., & Adams, R. J. (2014). *New venture creation*. McGraw-Hill Ryerson.

Stam, E., & Van de Ven, A. (2021). Entrepreneurial ecosystem elements. *Small business economics*, *56*(2), 809-832.

Staniewski, M. W. (2016). The contribution of business experience and knowledge to successful entrepreneurship. *Journal of Business Research*, *69*(11), 5147-5152.

Stewart Jr, W. H., & Roth, P. L. (2001). Risk propensity differences between entrepreneurs and managers: a meta-analytic review. *Journal of Applied Psychology*, 86(1): 145.

Suri, H. (2011). Purposeful sampling in qualitative research synthesis. *Qualitative research journal*, *11*(2), 63–75.

Taleb, N. N. (2007). *The Black swan: The impact of the highly improbable*. New York: Random House.

Tan, J. (2001). Innovation and risk-taking in a transitional economy: A comparative study of Chinese managers and entrepreneurs. *Journal of Business Venturing*, *16*(4), 359–376.

Tang, J., Kacmar, K. M. M., & Busenitz, L. (2012). Entrepreneurial alertness in the pursuit of new opportunities. *Journal of Business Venturing*, *27*(1), 77-94.

Tannenbaum, D., Fox, C. R., & Ülkümen, G. (2017). Judgment extremity and accuracy under epistemic vs. aleatory uncertainty. *Management Science*, *63*(2), 497-518.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, *18*(7), 509-533.

Teece, D.J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13): 1319–1350.

Tiemann, Adrian R., and Jerome J. Tiemann. 1985. Cognitive maps of risk and benefit perceptions. *Risk analysis in the private sector*. Springer US, 451-468.

Timmons, J. A., Spinelli, S., & Tan, Y. (2004). *New venture creation: Entrepreneurship for the 21st century* (Vol. 6). New York: McGraw-Hill/Irwin.

Triandis, H. (1988). Collectivism v. individualism: A reconceptualisation of a basic concept in cross-cultural social psychology. In *Cross-cultural studies of personality, attitudes, and cognition* (pp. 60–95). London: Palgrave Macmillan UK.

Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review, 96(3)*, 506-520.

Trivedi, R. (2016). Does university play significant role in shaping entrepreneurial intention? A cross-country comparative analysis. *Journal of Small Business and Enterprise Development*, *23*(3), 790–811.

Tversky, A., & Fox, C. R. (1995). Weighing risk and uncertainty. *Psychological review*, *102*(2), 269.

Tversky, A., & Kahneman, D. 1974. Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157): 1124-1131.

Tyszka, T., Cieślik, J., Domurat, A., & Macko, A. (2011). Motivation, self-efficacy, and risk attitudes among entrepreneurs during transition to a market economy. *The Journal of Socio-Economics*, *40*(2), 124-131.

Ulvenblad, P., Berggren, E., & Winborg, J. (2013). The role of entrepreneurship education and start-up experience for handling communication and liability of newness. *International Journal of Entrepreneurial Behavior & Research*.

United States Small Business Administration. https://www.sba.gov/advocacy/small-business-facts-and-infographics

U.S. Department of Labor, Bureau of Labor Statistics (2016). Entrepreneurship and the U.S. Economy. https://www.bls.gov/bdm/entrepreneurship/bdm_chart3.htm.

U.S. Economic Development Administration (2023). https://www.eda.gov/sites/default/files/2023-07/EDA_Brochure_2023.pdf.

Utsch, A., & Rauch, A. (2000). Innovativeness and initiative as mediators between achievement orientation and venture performance. *European journal of work and organizational psychology*, *9*(1), 45–62.

Vandello, J. A., & Cohen, D. (1999). Patterns of individualism and collectivism across the United States. *Journal of personality and social psychology*, *77*(2), 279.

Van Gelderen, M., Brand, M., Van Praag, M., Bodewes, W., Poutsma, E., & Van Gils, A. (2008). Explaining entrepreneurial intentions by means of the theory of planned behaviour. *Career development international*, *13*(6), 538-559.

Vega, A., Brown, D., & Chiasson, M. (2012). Open innovation and SMEs: Exploring policy and the scope for improvements in university-based public programmes through a multidisciplinary lens. *International Journal of Entrepreneurial Behavior & Research*, *18*(4), 457-476.

Vieider, F. M., Chmura, T., Fisher, T., Kusakawa, T., Martinsson, P., Mattison Thompson, F., & Sunday, A. (2015). Within-versus between-country differences in risk attitudes: implications for cultural comparisons. *Theory and Decision*, *78*, 209–218.

Volmar, E., & Eisenhardt, K. M. (2020). Case study research: A state-of-the-art perspective. In the *Oxford research encyclopedia of business and management*.

Von Graevenitz, G., Harhoff, D., & Weber, R. (2010). The effects of entrepreneurship education. *Journal of Economic behavior & organization*, *76*(1), 90-112.

Wagner, J. (2006). Nascent entrepreneurs. In *The life cycle of entrepreneurial ventures* (pp. 15–37). Boston, MA: Springer US.

Weber, E. U., & Ancker, J. S. *The Precautionary Principle*.

Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making*, *15*(4), 263-290.

Weber, E. U., & Hsee, C. K. (1999). Models and mosaics: Investigating cross-cultural differences in risk perception and risk preference. *Psychonomic Bulletin & Review*, *6*(4), 611-617.

Weber, E. U., & Hsee, C. 1998. Cross-cultural differences in risk perception, but cross-cultural similarities in attitudes towards perceived risk. *Management Science*, 44(9): 1205-1217.

Westhead, P., Ucbasaran, D., & Wright, M. (2005). Experience and cognition: Do novice, serial, and portfolio entrepreneurs differ?. *International Small Business Journal*, *23*(1), 72–98.

Wise, S., & Valliere, D. (2014). The impact of management experience on the performance of start-ups within accelerators. *The Journal of Private Equity*, 9-19.

Xu, H., & Ruef, M. (2004). The myth of the risk-tolerant entrepreneur. *Strategic organization*, *2*(4), 331-355.

Yang, X., Sun, S. L., & Zhao, X. (2019). Search and execution: examining the entrepreneurial cognitions behind the lean startup model. *Small Business Economics*, *52*(3), 667–679.

Yin, R. K. (2017). *Case study research and applications: Design and methods*. Sage Publications.

York, J. L., & Danes, J. E. (2014). Customer development, innovation, and decision-making biases in the lean startup. *Journal of small Business strategy*, *24*(2), 21–40.

York, J., Metcalf, L., & Katona, T. (2016). University Accelerators: Entrepreneurial Launchpads or Unsustainable Fads?. In the *United States Association for Small Business and Entrepreneurship. Conference Proceedings* (p. DG1). United States Association for Small Business and Entrepreneurship.

Yu, S. (2016). How do accelerators impact the performance of high-technology ventures? *Forthcoming, Management Science*.

Zellweger, T. M., & Zenger, T. R. (2022). Entrepreneurs as Scientists: A Pragmatist Alternative to the Creation-Discovery Debate. *Academy of Management Review*, (ja).

Zhao, H., & Seibert, S. E. (2006). The big five personality dimensions and entrepreneurial status: A meta-analytical review. *Journal of Applied Psychology*, *91*(2), 259.

Zhao, H., Seibert, S. E., & Lumpkin, G. T. (2010). The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, *36*(2), 381–404.

Zimmer, C. (1986). Entrepreneurship through social networks. *The art and science of entrepreneurship. Ballinger, Cambridge, MA*, *3*, 23.

APPENDIX A: IRB Approval History

e-PROTOCOL

PROTOCOL
Unified IRB Form
University of Hawai'i

Protocol # 2018-00388
Date Printed: 08/30/2021

Protocol Title: Impact of entrepreneurial education on locus of control, risk tolerance and underlying personality traits

Protocol Type: Unified IRB Form

Date Submitted: 04/07/2019

Important Note: This Print View may not reflect all comments and contingencies for approval. Please check the comments section of the online protocol. Questions that appear to not have been answered may not have been required for this submission. Please see the system application for more details.

05/07/2018	NEW FORM RESUBMITTED	Y	
05/09/2018	NEW FORM PANEL ASSIGNED		
06/13/2018	NEW FORM PANEL MANAGER REVIEW		
06/13/2018	NEW FORM APPROVED	Y	Y
04/07/2019	AMENDMENT 1 FORM CREATED		
04/07/2019	AMENDMENT 1 FORM SUBMITTED	Y	
04/17/2019	AMENDMENT 1 FORM PANEL MANAGER REVIEW		
04/18/2019	AMENDMENT 1 FORM APPROVED	Y	Y

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APPENDIX B: Informed Consent

Dear Launchpad Participants:

Peter Rowan requests that you complete an Entrepreneur Study. The study is separated into 3 parts. Please read the below description and consent and click on the link below to participate in the study.

University of Hawai‘i
Consent to Participate in a Research Project
Peter Rowan, Principal Investigator
Project Title: Entrepreneur Attitudes Survey

Aloha! My name is Peter Rowan and you are invited to take part in a research study. I am the Executive Director of the Pacific Asian Center for Entrepreneurship. I am doing this research project in connection with our entrepreneurial education programs at PACE.

What am I being asked to do?
If you participate in this project, you will be asked to fill out a survey.

Taking part in this study is your choice.
Your participation in this project is completely voluntary. You may stop participating at any time. If you stop being in the study, there will be no penalty or loss to you. Your choice to participate or not participate will not affect your participation in any UH programs.

Why is this study being done?
The purpose of the study is to evaluate the effectiveness of the educational programs provided by PACE. I am asking you to participate because you are involved in one of our programs.

What will happen if I decide to take part in this study?
The survey will consist of 3 sections with multiple choice questions. It will take approximately 20 minutes. There are no right or wrong answers in this survey. The survey is accessed on a website to which I will provide you a link.

What are the risks and benefits of taking part in this study?
I believe there is little risk to you for participating in this research project. You can also stop taking the survey or you can withdraw from the project altogether.

There will be no direct benefit to you for participating in this survey. The results of this project may help improve PACE educational programs to benefit future students.

Confidentiality and Privacy:

I will not ask you for any personal information, such as your name or address. Please do not include any personal information in your survey responses. Your survey answers will be sent to a link at Wufoo.com where data will be stored in a password protected electronic format. Your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. Only I will have access to the information. Other agencies that have legal permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study.

Questions: If you have questions at any time about the study or the procedures, you may contact Peter Rowan, Executive Director, Pacific Asian Center for Entrepreneurship at 808-956-5368 or pdrowan@Hawaii.edu. You may contact the UH Human Studies Program at 808.956.5007 or uhirb@Hawaii.edu to discuss problems, concerns and questions, obtain information, or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit http://go.Hawaii.edu/jRd for more information on your rights as a research participant.

To Access the Survey: Please go to the following web page:

ENTREPRENEUR STUDY PART 1

Going to the first page of the survey implies your consent to participate in this study. Completing Part I will automatically take you to Part II. Part II will automatically take you to Part III. Please complete all 3 Parts.

Please print or save a copy of this page for your reference.

APPENDIX C: Survey Instruments

Survey Part I: DOSPERT

Domain-Specific Risk-taking

Weber, Blais, Betz (2002), *Journal of Behavioral Decision Making*

Risk-taking Scale

For each of the following statements, please indicate your likelihood **of engaging in each activity or behavior. Provide a rating from** 1 to 5**, using the following scale:**

1	2	3	4	5
Very unlikely	**Unlikely**	**Not sure**	**Likely**	**Very likely**

1.	Admitting that your tastes are different from those of your friends. (S)	_____
2.	Going camping in the wilderness, beyond the civilization of a campground. (R)	_____
3.	Betting a day's income at the horse races. (G)	_____
4.	Buying an illegal drug for your own use. (H)	_____
5.	Cheating on an exam. (E)	_____
6.	Chasing a tornado or hurricane by car to take dramatic photos. (R)	_____
7.	Investing 10% of your annual income in a moderate growth mutual fund. (I)	_____
8.	Consuming five or more servings of alcohol in a single evening. (H)	_____
9.	Cheating by a significant amount on your income tax return. (E)	_____
10.	Disagreeing with your father on a major issue. (S)	_____
11.	Betting a day's income at a high stake poker game. (G)	_____
12.	Having an affair with a married man or woman. (E)	_____
13.	Forging somebody's signature. (E)	_____
14.	Passing off somebody else's work as your own. (E)	_____
15.	Going on a vacation in a third-world country without prearranged travel and hotel accommodations. (R)	_____
16.	Arguing with a friend about an issue on which he or she has a very different opinion. (S)	_____
17.	Going down a ski run that is beyond your ability or closed. (R)	_____
18.	Investing 5% of your annual income in a very speculative stock. (I)	_____
19.	Approaching your boss to ask for a raise. (S)	_____
20.	Illegally copying a piece of software. (E)	_____
21.	Going whitewater rafting during rapid water flows in the spring. (R)	_____
22.	Betting a day's income on the outcome of a sporting event (e.g., baseball, soccer, or football). (G)	_____
23.	Telling a friend if his or her significant other has made a pass at you. (S)	_____
24.	Investing 5% of your annual income in a conservative stock. (I)	_____
25.	Shoplifting a small item (e.g., a lipstick or a pen). (E)	_____
26.	Wearing provocative or unconventional clothes on occasion. (S)	_____
27.	Engaging in unprotected sex. (H)	_____
28.	Stealing an additional TV cable connection off the one you pay for. (E)	_____
29.	Not wearing a seatbelt when being a passenger in the front seat. (H)	_____
30.	Investing 10% of your annual income in government bonds (treasury bills). (I)	_____
31.	Periodically engaging in a dangerous sport (e.g., mountain climbing or sky diving). (R)	_____
32.	Not wearing a helmet when riding a motorcycle. (H)	_____

33. Gambling a week's income at a casino. (G) _____
34. Taking a job that you enjoy over one that is prestigious but less enjoyable. (S) _____
35. Defending an unpopular issue that you believe in at a social occasion. (S) _____
36. Exposing yourself to the sun without using sunscreen. (H) _____
37. Trying out bungee jumping at least once. (R) _____
38. Piloting your own small plane, if you could. (R) _____
39. Walking home alone at night in a somewhat unsafe area of town. (H) _____
40. Regularly eating high cholesterol foods. (H) _____
41.

Note. E = Ethical, F = Financial, H/S = Health/Safety, R = Recreational, and S = Social.

Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. ***Journal of behavioral decision making***, *15*(4), 263-290.

Survey Part II: Rotter's Locus of Control Scale

For each question select the statement that you agree with the most

1. a. Children get into trouble because their patents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy with them.
2. a. Many of the unhappy things in people's lives are partly due to bad luck.
   b. People's misfortunes result from the mistakes they make.
3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.
4. a. In the long run people get the respect they deserve in this world
   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries
5. a. The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
6. a. Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.
7. a. No matter how hard you try some people just don't like you.
   b. People who can't get others to like them don't understand how to get along with others.
8. a. Heredity plays the major role in determining one's personality
   b. It is one's experiences in life which determine what they're like.
9. a. I have often found that what is going to happen will happen.
   b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
    b. Many times exam questions tend to be so unrelated to course work that studying in really useless.
11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
    b. Getting a good job depends mainly on being in the right place at the right time.
12. a. The average citizen can have an influence in government decisions.
    b. This world is run by the few people in power, and there is not much the little guy can do about it.
13. a. When I make plans, I am almost certain that I can make them work.
    b. It is not always wise to plan too far ahead because many things turn out to- be a matter of good or bad fortune anyhow.
14. a. There are certain people who are just no good.
    b. There is some good in everybody.
15. a. In my case getting what I want has little or nothing to do with luck.
    b. Many times we might just as well decide what to do by flipping a coin.
16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
    b. Getting people to do the right thing depends upon ability. Luck has little or nothing to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
    b. By taking an active part in political and social affairs the people can control world events.
18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
    b. There really is no such thing as "luck."
19. a. One should always be willing to admit mistakes.
    b. It is usually best to cover up one's mistakes.
20. a. It is hard to know whether or not a person really likes you.
    b. How many friends you have depends upon how nice a person you are.
21. a. In the long run the bad things that happen to us are balanced by the good ones.
    b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
22. a. With enough effort we can wipe out political corruption.
    b. It is difficult for people to have much control over the things politicians do in office.
23. a. Sometimes I can't understand how teachers arrive at the grades they give.
    b. There is a direct connection between how hard 1 study and the grades I get.
24. a. A good leader expects people to decide for themselves what they should do.
    b. A good leader makes it clear to everybody what their jobs are.
25. a. Many times I feel that I have little influence over the things that happen to me.
    b. It is impossible for me to believe that chance or luck plays an important role in my life.
26. a. People are lonely because they don't try to be friendly.
    b. There's not much use in trying too hard to please people, if they like you, they like you.
27. a. There is too much emphasis on athletics in high school.
    b. Team sports are an excellent way to build character.
28. a. What happens to me is my own doing.
    b. Sometimes I feel that I don't have enough control over the direction my life is taking.
29. a. Most of the time I can't understand why politicians behave the way they do.
    b. In the long run the people are responsible for bad government on a national as well as on a local level.

Score one point for each of the following:

2. a, 3.b, 4.b, 5.b, 6.a, 7.a, 9.a, 10.b, 11.b, 12.b, 13.b, 15.b, 16.a, 17.a, 18.a, 20.a, 21. a, 22.b, 23.a, 25.a, 26.b, 28.b, 29.a.

A high score = External Locus of Control

A low score = Internal Locus of Control

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological monographs: General and applied*, *80*(1), 1.

Survey Part III: Big Five Personality Scale

How Accurately Can You Describe Yourself?

Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Indicate for each statement whether it is 1. Very Inaccurate, 2. Moderately Inaccurate, 3. Neither Accurate Nor Inaccurate, 4. Moderately Accurate, or 5. Very Accurate as a description of you.

		Very Inaccurate	Moderately Inaccurate	Neither Accurate Nor Inaccurate	Moderately Accurate	Very Accurate
1.	Am the life of the party.	O	O	O	O	O
2.	Feel little concern for others.	O	O	O	O	O
3.	Am always prepared.	O	O	O	O	O
4.	Get stressed out easily.	O	O	O	O	O
5.	Have a rich vocabulary.	O	O	O	O	O
6.	Don't talk a lot.	O	O	O	O	O
7.	Am interested in people.	O	O	O	O	O
8.	Leave my belongings around.	O	O	O	O	O
9.	Am relaxed most of the time.	O	O	O	O	O
10.	Have difficulty understanding abstract ideas.	O	O	O	O	O
11.	Feel comfortable around people.	O	O	O	O	O
12.	Insult people.	O	O	O	O	O
13.	Pay attention to details.	O	O	O	O	O
14.	Worry about things.	O	O	O	O	O
15.	Have a vivid imagination.	O	O	O	O	O
16.	Keep in the background.	O	O	O	O	O
17.	Sympathize with others' feelings.	O	O	O	O	O

18.	Make a mess of things.	O	O	O	O	O
19.	Seldom feel blue.	O	O	O	O	O
20.	Am not interested in abstract ideas.	O	O	O	O	O
21.	Start conversations.	O	O	O	O	O
22.	Am not interested in other people's problems.	O	O	O	O	O
23.	Get chores done right away.	O	O	O	O	O
24.	Am easily disturbed.	O	O	O	O	O
25.	Have excellent ideas.	O	O	O	O	O
26.	Have little to say.	O	O	O	O	O
27.	Have a soft heart.	O	O	O	O	O
28.	Often forget to put things back in their proper place.	O	O	O	O	O
29.	Get upset easily.	O	O	O	O	O
30.	Do not have a good imagination.	O	O	O	O	O
31.	Talk to a lot of different people at parties.	O	O	O	O	O
32.	Am not really interested in others.	O	O	O	O	O
33.	Like order.	O	O	O	O	O
34.	Change my mood a lot.	O	O	O	O	O
35.	Am quick to understand things.	O	O	O	O	O
36.	Don't like to draw attention to myself.	O	O	O	O	O
37.	Take time out for others.	O	O	O	O	O
38.	Shirk my duties.	O	O	O	O	O
39.	Have frequent mood swings.	O	O	O	O	O
40.	Use difficult words.	O	O	O	O	O
41.	Don't mind being the center of attention.	O	O	O	O	O
42.	Feel others' emotions.	O	O	O	O	O
43.	Follow a schedule.	O	O	O	O	O
44.	Get irritated easily.	O	O	O	O	O
45.	Spend time reflecting on things.	O	O	O	O	O
46.	Am quiet around strangers.	O	O	O	O	O

47.	Make people feel at ease.	O	O	O	O	O
48.	Am exacting in my work.	O	O	O	O	O
49.	Often feel blue.	O	O	O	O	O
50.	Am full of ideas.	O	O	O	O	O

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological assessment*, 4(1), 26.