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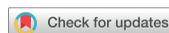
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Exploring the information needs of student entrepreneurs: A meta-narrative synthesis

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ABSTRACT

Drawing upon Wilson's framework on information needs and user studies, this article investigated student entrepreneurs' demographics, characteristics, and their fundamental cognitive, affective, and resource needs. Through a meta-narrative synthesis of 15 empirical studies and other related research, this article developed a non-exhaustive taxonomy of 60 information need topics, which hopefully would lead student entrepreneurs to success through (1) enhancing business knowledge and evidence-based decisions, (2) cultivating affective learning and personal growth, and (3) securing diversified support networks and social capital. Besides library support via comprehensive pathfinders and research guides, this study also brought a fresh look at business research consultations and collection policies. It further identified opportunities for libraries to promote tacit knowledge sharing among student entrepreneurs and collaborate with campus partners to create an inclusive and supportive entrepreneurial culture.

KEYWORDS

Affective needs;
cognitive needs;
information needs;
resource needs;
student entrepreneurs

Introduction

In recent decades, student entrepreneurship has demonstrated great social and economic impact and transformed our society in an unprecedented way (Sieger et al., 2019). According to the PitchBook (2020), from January 2006 to August 2020, the venture capital (VC)-backed entrepreneurs from the top 50 undergraduate programs created 23,866 companies and raised over \$662 billion, and entrepreneurs from the top 25 MBA programs created 9,450 companies and raised \$279 billion. As the number of student ventures grows, there is a rising demand for entrepreneurship education programs and entrepreneurship support structures at universities across the globe (Almalaurea Consortium, 2016). Stanford and MIT, who with their close links to industry and entrepreneurship were once seen as anomalies within the academic system, have become the role models for other universities to emulate (Etzkowitz et al., 2000; Jansen et al., 2015).

Karl Ulrich (2018), the Vice Dean of Entrepreneurship & Innovation at the Wharton School wrote in a Forbes article “the future of entrepreneurship is students.”

Although student entrepreneurs demonstrate great enthusiasm for starting new businesses, they face unique challenges and barriers, compared with the entrepreneurs in business for years. They often have to launch and manage their business on top of a full-time course load; they often have inadequate business experience, tight financial resources, and limited social capital (The OECD & the European Commission, 2014; Venturewell, 2020). Moreover, the stress and anxiety associated with student entrepreneurship have not been paid enough attention as compared to their success stories.

How can libraries help? Previous library literature featured programs and community collaborations that addressed the general information needs of entrepreneurs or small business owners (Feldmann, 2014, Hoppenfeld & Malafi, 2015; Leavitt et al., 2010). Some researchers discussed the specific needs of entrepreneurs in patent research (Cole & Lysiak, 2017), secondary market research (McCauley et al., 2020), and financial literacy (Mross & Reiter, 2019). Franks and Johns (2015) identified the top information requested by entrepreneurs, which include financial assistance, skills development or training, competitor research, business plan writing, and market research. In terms of serving student entrepreneurs' needs, several recent studies discussed libraries' effort in shaping library space and staffing models to support campus efforts in promoting students' entrepreneurial thinking and innovation (Bieraugel, 2019; Edens & Malecki, 2020; Pothier, 2019; Stover et al., 2019). However, there is a lack of library research that focuses on the information needs of student entrepreneurs and especially a lack of study that explores the information needs below the surface and goes deep into users' fundamental cognitive, affective, and resource needs. This meta-narrative synthesis takes a different approach to examine the literature beyond the library field for a deeper understanding of student entrepreneurs: who they are and what they need.

Theoretical frameworks, scope of the study, and the research questions

This study is based on three theoretical frameworks. Wilson's (1981) classic work on information needs study guides us to look into more fundamental physiological, cognitive, and affective human needs and reflect on what needs can be address by information. Maslow's (1970a, 1970b) Expanded Hierarchy of Needs provides a framework to understand fundamental human needs. If Maslow's work focuses on descriptive aspects of human needs and provides answers to what basic human needs are, as educational objectives, Bloom's Taxonomies of Cognitive Domains and Krathwohl's

Taxonomy of Affective Domains provide a normative paradigm for understanding what the needs should be (Anderson & Bloom, 2001; Krathwohl et al., 1964). In the section, we will briefly explain the three theoretical frameworks, the scope of this study, and the research questions.

Wilson's definition of information needs

Wilson (1981) laid out a framework for information needs and user studies. He pointed out that “information” is a perplexing concept and many user studies were not able to get insightful results, partly because the definition of information was not aligned with the purpose of its investigation. The difficulty lies specifically with the distinction between data, information, and knowledge, which is complicated by the distinction between facts, opinions, and advice (Wilson, 2006). For this study, we will investigate students' information needs with a broad definition of information, which includes information, knowledge, opinions, and advice that are sought after by student entrepreneurs.

Wilson (2006) further explained that a more basic confusion about information needs results from the association of two words “information” and “need,” and thus the distinction between information needs as one form of fundamental human needs versus information as one means toward the end of satisfying “fundamental, innate, cognitive, or emotional needs” (Wilson, 2006, p. 665). He argued that human beings search for information to satisfy their fundamental physiological, affective, or cognitive needs, so a more accurate way to describe “information need” is the “information seeking towards the satisfaction of needs.” (Wilson, 2006, P. 664). This study will follow this path to identify the fundamental needs of student entrepreneurs first and then investigate what needs can be satisfied by providing information.

The Maslow's expanded hierarchy of needs

Maslow (1970a, 1970b) expanded the five-stage human need model and recognized the hierarchy of eight categories of human needs: physiological needs, safety needs, love and belongingness needs, esteem needs, cognitive needs, esthetic needs, self-actualization needs, and transcendence needs. The cognitive needs describe the need for knowledge, understanding, curiosity, exploration, and the need for meaning and predictability. The affective needs are embedded in many other need stages:

- The love and belonging needs: the needs for friendship, trust, acceptance, affiliation, and being part of a group

- Esthetic needs: appreciation and search for beauty, balance, form, etc.
- Esteem needs: (i) esteem for oneself such as dignity, achievement, mastery, and independence; and (ii) the desire for reputation or respect from others such as status and prestige
- Self-actualization needs: realizing personal potential, self-fulfillment, seeking personal growth, etc.
- Transcendence needs: the needs motivated by values that transcend beyond the personal self, behaving and relating, as ends rather than means, to oneself, to significant others, to human beings in general

Besides cognitive and affective needs, the safety needs in Maslow's hierarchy, especially the needs of employment, resources, or property, are also important aspects of needs for student entrepreneurs. This study will follow Maslow's human needs theories and study student entrepreneurs' cognitive, affective, and resource needs.

Bloom's taxonomies of cognitive domains and Krathwohl's taxonomy of affective domains

The cognitive domains were first developed as educational goals by Benjamin Bloom and his collaborators in 1956 through the *Taxonomies of Educational Objectives* and later revised to a more dynamic conception system and used for learning, teaching, and assessing purposes (Anderson & Bloom, 2001; Bloom et al., 1956). The revised taxonomy included the cognitive activities related to remembering, understanding, applying, analyzing, evaluating, and creating (Anderson & Bloom, 2001). The revision further developed a separate taxonomy for different types of knowledge used in cognition and the practical definitions are as follows (Iowa State University, n.d.):

- Factual knowledge: The basic elements that one must know to be acquainted with a discipline or solve problems in it, for example, the knowledge of terminology and knowledge of specific details.
- Conceptual knowledge: The interrelationships among the basic elements within a larger structure that enable them to function together, for example, the knowledge of classifications and categories; knowledge of principles and generalizations; the knowledge of theories, models, and structures.
- Procedural knowledge: how-to knowledge or methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.
- Metacognitive knowledge: Knowledge of cognition in general as well as awareness and knowledge of one's own cognition, which can be applied in the instances such as identifying personal strategies for

retaining information, deconstructing one's biases, reflecting on one's progress, or creating a learning portfolio, etc.

The affective domains were first introduced by David Krathwohl in collaboration with Bloom and Masia in 1964 as the second part of the *Taxonomies for Educational Objective*, which emphasized the feeling or emotional aspects of learning objectives such as attitudes, values, beliefs, opinions, interests, and motivation (Krathwohl et al., 1964). The taxonomy is presented in five stages and Ed Nuhfer offered an easy way to understand these stages (as cited in Bruff, 2011):

- Receiving: willingness to pay attention to an idea
- Responding: willingness to react to the idea in some way
- Valuing: willingness to be perceived by others as valuing the idea to some extent
- Organizing: incorporating the value of the idea meaningfully into an existing value system
- Characterizing: acting consistently with the now-internalized value

The scope of the information needs study for student entrepreneurs research

Based on the above theories, we will investigate:

- Student entrepreneurs' cognitive needs and the needs for the development in cognitive domains. We will explore their needs for factual, conceptual, procedural, and metacognitive knowledge involved in venture creation and operation and also student entrepreneurs' needs to understand, analyze, evaluate a situation, and make critical business decisions.
- Student entrepreneurs' affective needs and the needs for the development in affective domains. We will explore their needs for belonging, esteem, self-actualization, and transcendence and also the need for receiving, responding, valuing, organizing, and characterizing aspects of learning and personal growth.
- Student entrepreneurs' resource needs. We will explore their needs for physical resources and support such as acquiring financial resources, intellectual property, human resources, customer relationships, and social capital. We will investigate both tangible and intangible resources and support that students need.

Along with the study of student entrepreneurs' needs, we will explore their cognitive and affective challenges and barriers. Based on the needs

analysis, we will further identify the needs that can be addressed by information resources or library information services.

Research questions

Within the identified scope, the study will answer the following research questions:

1. Who are student entrepreneurs and what distinguishes them from other students and other non-student entrepreneurs? Why do their information needs deserve special attention?
2. What are the fundamental cognitive, affective, and resource needs that drive student entrepreneurs to seek information, knowledge, or advice?
3. What ought to be the cognitive, affective, and resource needs that can lead student entrepreneurs to success?
4. What specific needs and challenges can be addressed by information resources and library information services?

Methodology

To answer the above research questions, we will conduct a meta-narrative evidence synthesis. The goal of meta-narrative synthesis is to make sense of a complex topic. It seeks to “identify and understand as many as possible of the potentially important different research traditions which have a bearing on the topic, and then to synthesize them by means of an over-arching narrative” (Wong et al., 2013, p.6). This article focuses on the empirical studies that provide insights on student entrepreneurs’ cognitive, affective, and resource needs, and also the challenges and barriers.

Since student entrepreneurs’ demographics, needs, challenges, and decision-making patterns have great cultural differences (Bandera et al., 2018; Laskovaia et al., 2017; Sieger et al., 2019), we mainly included the studies that are based on the samples from the United States. One challenge of including eligible studies was that only a small set of empirical studies were available from the United States while a great number of empirical studies were available from foreign countries, which often have a larger sample size. To get a more holistic and rich understanding of student entrepreneurs while at the same time avoid the gravitational pull of studies from foreign countries, we included all the U.S. studies that had been identified and referred to selective studies from other countries when it helped to understand the specific characteristics of student entrepreneurs that were less affected by culture and country backgrounds.

This study included the articles published between 2010 to 2020 to capture the most recent trends and needs. It included scholarly peer-reviewed articles, which provided more solid empirical evidence, and included theses and dissertations, which presented unique value with direct access to original transcripts or excerpts. Besides empirical studies on student entrepreneurs, this study also incorporated reports, white papers, statistics, and related non-empirical research to provide a holistic understanding of the context.

From December 2020 to March 2021, we used the *Library, Information Science and Technology Abstracts*, *Business Source Complete*, *Web of Science*, and *Google Scholar* to identify related empirical studies and conducted iterative searches in the article title and abstract with keywords including student entrepreneurs, student entrepreneurship, entrepreneurial intent AND students, entrepreneurial spirit AND students, student entrepreneur*, student entrepreneurs AND (barriers or challenges), student entrepreneurs AND needs. The following criteria were used to filter the search results:

Included:

- studies published between 2010 to 2020.
- scholarly articles and gray literature such as theses, dissertations, reports, and white papers.
- empirical studies that focus on college student entrepreneurs (both undergraduates and graduate students) and specify their sample size, selection, and methodologies.
- studies with samples from the United States with some exceptions.
- studies that address student entrepreneurs' information, cognitive, affective, or resource needs and the challenges or barriers.
- studies that are written in English.

Excluded:

- magazine articles, trade publications, or newspaper articles.
- studies that focus on entrepreneurship education programs or curriculum development.

The searches identified the following 15 empirical studies (Table 1):

Definition, Demographics, and Characteristics of Student Entrepreneurs

Definition and segmentation of student entrepreneurs

Entrepreneurship literature has adopted the segmentation of nascent, novice, portfolio, and serial entrepreneurs for a long time (Carter et al.,



Table 1. The list of empirical studies on student entrepreneurs.

Study (author/date)	Country	Participant affiliation and university type	Sample frame (participant group)	Research methods	Sample size	Referred as
1 Oh (2017)	USA	Cornell University (R1)	Student entrepreneurs	Semi-structured interviews and survey	35	The Cornell study
2 Blackstone LaunchPad & Techstars (2020) "Student Entrepreneurial Outlook 2020 Survey"	USA	Techstars Network	Student Entrepreneurs	Survey	275	LaunchPad Survey
3 Pramodita Sharma & Dawson (2014) "2013 GUESS National Report USA"	USA	University of Vermont (R2)	Undergraduate Business Students	Survey	94	GUESS Vermont study
4 Benkirane (2019)	USA	Massachusetts Institute of Technology (MIT) (R1)	Student Entrepreneurs	Interviews	12	The MIT study
5 Nguyen (2014)	USA	Worcester Polytechnic Institute (WPI) (R2)	Student Entrepreneurs	Case study and focus groups	24	The WPI study
6 Glover (2017)	USA	University of Southern Mississippi (USM) (R1)	Undergraduate Business Students	Survey	150	The USM study
7 Checovich & Allison (2017) "National Center for Education Statistics Baccalaureate and Beyond (B&B) Longitudinal Study"	USA	Nationwide	Students receiving their Bachelor's degree in 2008 and followed for four years until 2012	Interviews	15,500	NCES B&B study
8 Disi (2018)	USA	Top-rated Business Schools	Social entrepreneurs who had an MBA from top-rated business schools and graduated between 2012-2019	Semi-structured interviews	34	Social entrepreneurs study
9 Ahsan et al. (2018)	USA	San Diego State University (R2)	Entrepreneurship Incubator Student Teams	Interviews and case study	14	The SDSU study

(Continued)

Table 1. (Continued)

10	Allen (2016)	UK	The University of Greenwich	Business Planning and Social Enterprise Challenge Participants	Survey	198	Allen UK study
11	Politis et al. (2012)	Sweden	Chalmers University of Technology, Gothenburg University and Halmstad University	Student Entrepreneurs and Non-student Entrepreneurs	Survey	151 Student entrepreneurs and 174 non-student entrepreneurs	The Sweden study
12	Haring (2018)	Netherlands	Venture Creation Program	Student Entrepreneurs	Interviews and case study	165 interview and 17 longitudinal case study	The Netherlands study
13	Sieger et al. (2019) "2018 Global University Entrepreneurial Spirit Students' Survey" (GUESSS)	Global	3000+ Universities from 54 Countries	University Students	Survey	208,000	GUESSS Global Report
14	Fini et al. (2016) "AlmaLaurea Consortium Student Entrepreneurship Survey"	Italy	64 Italian Universities	University Students	Survey	61,115	The Italy study
15	Wang & Huang (2020)	China	104 Colleges	Student Entrepreneurs	Interviews	138	The China study

***The university type follows the Carnegie Classification of Institutions of Higher Education. R1 Doctoral Universities – Very high research activity; R2: Doctoral Universities – High research activity*

1996; Westhead & Wright, 1998). Nascent entrepreneurs are “individuals who were identified as taking steps to found a new business but who had not yet succeeded in making the transition to new business ownership” (Carter et al., 1996, p. 151). For entrepreneurs who have founded a business, researchers categorized the founders into three categories:

- a. Novice founders are those that have no prior entrepreneurial experience as either a founder, an inheritor, or a purchaser of a business.
- b. Portfolio founders are those that retain their original business and inherit, establish, and/or purchase another business.
- c. Serial founders are those who sell their original business but at a later date inherit, establish, and/or purchase another business (Westhead & Wright, 1998).

Another way to segment student entrepreneurs is to use their psychographic features. The Allen UK study segments student entrepreneurs into three categories: the “dabbler,” who are first-time experimenters with entrepreneurship; the “persistent pursuer,” representing those with previous experience of entrepreneurship, and the “family followers,” with a family history of entrepreneurship. The study further reveals that among their sample ($n = 198$), the percentage of the dabblers, the persistent pursuer, and the family follower is roughly 69%, 14%, and 17% (Allen, 2016).

When studying student entrepreneurs, considering the process of creating a business as a whole, the GUESSS Global Report uses the concept of “intentional entrepreneurs” to indicate the individuals who have formed entrepreneurial intentions but haven’t taken any steps to found a new business, which is different from the “nascent entrepreneurs” who have taken steps in the creation of a new business. The GUESSS report categorized the novice, portfolio, and serial entrepreneurs collectively as active entrepreneurs to denote the entrepreneurs who have completed the founding process and are owning and running their firms (Sieger et al., 2019). In the following sections, we will follow the definition and segmentation from the GUESSS report and distinguish three types of student entrepreneurs: intentional, nascent, and active student entrepreneurs.

The population size of student entrepreneurs

In the United States, there is a lack of national statistics that can provide an accurate estimate of the population size of student entrepreneurs, but some national surveys and studies from universities can collectively provide

a glimpse of the big picture. The *2019 Annual Business Survey (ABS) – Characteristics of Business Owners* indicated that 0.4% of reported business owners in 2018 ($n=4,114,139$) are under 25 and about 5.8% are under 34 (United States Census Bureau, 2019). The NCES B&B study 2008/2012 indicated that 4.08% of students who graduated since 2008 ($n=5,500$) were self-employed in 2012 (National Center for Education Statistics, 2012). The 2016/2017 study shows an increase in student self-employment with 5.02% ($n=29,000$) self-employed within 12 months after completion of the 2015-16 bachelor's degree (National Center for Education Statistics, 2017). These national statistics provide a general reference to the proportion of young entrepreneurs among business owners and the proportion of the self-employed among college graduates.

In terms of the size of intentional and nascent student entrepreneurs, the GUESSS Global Report revealed that 9% of surveyed students ($n=208,000$) intend to be an entrepreneur directly after graduation, and 34.7% plan to be entrepreneurs in five years after graduation (Sieger et al., 2019). The GUESSS Vermont study showed that 6.4% of the sampled business students ($n=94$) intend to start their own business right after graduation, and 30.9% plan to start their businesses five years after graduation (Prמודita Sharma & Dawson, 2014). These survey results are comparable to the study organized by researchers from the New York University, whose research found that eight years after graduation, 47% of MBA alumni of the class of 2000 ($n=153$) and 24% of undergraduate alumni of the class of 2000 ($n=283$) from five U.S. universities² have founded an entrepreneurial organization (Summit Consulting, L.L.C., 2009). A campus-wide survey on entrepreneurship from the University of Wisconsin–Madison received 23,805 responses in 2015-2017, representing 143 majors. The 2017 survey reveals that 173 students were founders of a company and 263 students were planning to start a venture within 24 months (Becker, 2019). The USM study indicated that 32.7% of surveyed undergraduate business students ($n=150$) were intentional student entrepreneurs, who were thinking about or planning to start a business within the next five years, and 16% had started a business (Glover, 2017). According to the PitchBook (2020), from January 2006 to August 2020, the top 50 undergraduate programs produced 26,340 VC-backed founders and the top 25 MBA programs produced 10,286 VC-backed founders.

Gender

Considerable attention has been paid to gender differences in venture creation. Crunchbase reported that the percentage of funded startups with at least one female founder increased from 9% to 17% between 2009 and 2017 (Teare, 2017). A regional study from the Illinois Science & Technology

Coalition tracked the female founders of Illinois' campuses and found among the university-supported startups founded between 2015-2019 ($n = 1,064$), an estimated 33% are founded or co-founded by women (Illinois Science & Technology Coalition, 2020). According to the *Startup and Venture Capital Trends* report from UC-Berkeley, 19% of UC-Berkeley incubated founders are female (Huang, 2018).

The GUESSS Global Report confirmed the gender gap among student entrepreneurs - females are less likely to engage in entrepreneurship than males (Sieger et al., 2019). However, the gap is much smaller (3.5%) when looking at the intentional entrepreneurs for a longer period of five years after graduation (Sieger et al., 2019). The GUESSS report also revealed that the gender gap of active student entrepreneurs from arts and humanities disciplines are much higher (over 23%) than that of perceived male-dominated disciplines such as natural sciences (4.2%), computer sciences/IT (3.4%), and engineering (2.9%). However, the NCES B&B Study 2008/2012 didn't indicate a big gender difference among the self-employed young adults: 50.5% are female and 49.5% are male (Checovich & Allison, 2017).

Age

Considering student entrepreneurs coming from both undergraduate and graduate student groups, the Cornell study provided a general picture of student entrepreneurs' age range. The study showed that 37% of surveyed student startup founders ($n = 35$) are 18-22 years old, 10% are 23-25, 40% are 26-30, and 10% are in the 31-35 age group. In total, 97% are under 35 years old. The study also indicated that over half (56.7%) of the startup founders are undergraduate, 36.7% are graduate students, and 6.6% others (Oh, 2017). The Italy study revealed that 47.2% of the active student entrepreneurs and 63.5% of nascent student entrepreneurs are under 26 at graduation (Fini et al., 2016).

Study areas

A limited number of studies have discussed the studied subject areas of student entrepreneurs. The GUESSS Global Report showed that students who studied in the field of art, design, dramatics, and music have the strongest intention to become entrepreneurs five years after graduation, 44.2% of students respondents in these study areas expressed such intention, followed by the students from business and management (43.6%), engineering (42.5%), economics (37.8%) and computer science/IT (35.4%) (Sieger et al., 2019). When it comes to students who actively engage in

entrepreneurship activities, the proportion of active entrepreneurs is highest among humanities students (20.2%) and the proportion of nascent entrepreneurs is highest among students in art, design, dramatics, and music (50.7%) (Sieger et al., 2019). A small scale ($n=35$), nonrandom Cornell study showed that most of the student startup founders are from the College of Engineering (23.3%), the College of Agriculture and Life Sciences (20%), the College of Arts and Sciences (16.7%) and the Graduate School of Management (13.3%).

Invested industries

Similar to the studied areas, there are not many studies that surveyed student entrepreneurs for their invested industries. The GUESSS Vermont study indicated that over 30% of nascent business student entrepreneurs ($n=16$) would engage in the wholesale and retail business, followed by advertising/marketing/design (18.8%) (Pramodita Sharma & Dawson, 2014). The Cornell study showed that the invested industries of student startups ($n=35$) are very diverse with the highest percentage investing in software (17%) (Oh, 2017).

On a relatively larger scale, the report from UC-Berkeley tracked 320 startups incubated in the University between 2013 to 2017 and found healthcare is dominantly presented, followed by consumer, education, biotechnology, and energy (Huang, 2018). The *Illinois Science & Technology Coalition Report* indicated that the most invested industry by university-supported startups in Illinois between 2015-2019 ($n=1,064$) are biomedical & biotech (21%), software/IT (15%), healthcare and social services (11%), retail & wholesale goods (9%) (The Illinois Science & Technology Coalition, 2020).

Continuation and success rate

Several studies indicated that most active student entrepreneurs tend to continue their businesses after graduation. The Cornell study showed 60% ($n=35$) of startup founders plan to pursue their ventures full-time after graduation. The LaunchPad Survey revealed that 97% of surveyed student entrepreneurs ($n=275$) plan to pursue entrepreneurship at some point in their career and 65% plans to do so right after graduation (Blackstone LaunchPad & Techstars, 2020). According to the estimation from the Director of Northwestern's Garage, which serves 12 colleges and receives about 1,000 unique student visits a month, "only 10% of their students founded firms after graduation" (as cited in Boston University, p.7). The Boston University study also found that although only a small percentage

of intentional or nascent student entrepreneurs launched a business right after graduation, the entrepreneurial experience and mindset allowed student entrepreneurs to take on leading innovation roles in established, high-growth firms like Google, LinkedIn, and Facebook (Boston University, 2017).

According to the *Illinois Science & Technology Coalition's University Entrepreneurship Index*, among 1,064 university-supported startups founded in Illinois from 2014 to 2019, 39.3% are no longer active, 1.3% have been acquired and 54.9% are still active (Illinois Science & Technology Coalition, 2020).

Personality and psychological traits

Numerous studies have explored the personality traits of entrepreneurs. In general, readiness for innovation, proactive personality, generalized self-efficacy, stress tolerance, need for autonomy, and internal locus of control have been reported significant correlations with business creation and venture success (Brandstätter, 2011). For student entrepreneurs, several cross-sectional studies and meta-analyses have shown that students who display certain Big-5 personality traits (i.e., more open to new experiences, more conscientious, more extraverted, and less neurotic) and higher levels of entrepreneurial self-efficacy, internal locus of control, and need for achievement are most likely to enter entrepreneurship after graduating from a university (Kerr et al., 2017).

More specific research on student entrepreneurs' psychological traits discovered that students who are entrepreneurs have a significantly higher Creative Achievement Quotient scale and are more likely to have expertise in architectural design, inventions, scientific inquiry, and theater & film (Shrader & Finkle, 2015). This is in line with Hamidi et al.'s (2008) research, which indicated that high scores on a creativity test are positively correlated with entrepreneurial intent.

Many studies intended to discover what motivates student entrepreneurs. The GUESSS Vermont study found that the most important motives for students to select a particular career path are realizing a dream, followed by having an exciting job, independence, and freedom. "Being your own boss" is the least important reason for choosing a particular career path (Pramodita Sharma & Dawson, 2014). According to the LaunchPad Survey, for students who are currently running a business, 37% selected "creative problem solving" as the most rewarding thing for being a student entrepreneur, 27% selected "impact on societal changes," 20% chose "be my own boss," and 11% selected "work with partners" (Blackstone LaunchPad & Techstars, 2020).

Academic intentions

Khoshimov et al. (2018; 2019) conducted extensive research on student entrepreneurs' academic intentions as compared to their job-seeking peers. They found student entrepreneurs allocate time and efforts to maximize productivity in self-employment; student entrepreneurs attend courses that provide skills that they expect will help their ventures or are aligned with their intrinsic interests rather than generate signals of ability to employers or graduate schools (such as higher GPA). So, student entrepreneurs exhibit higher dispersion in grades as compared to their job-seeking and advanced degree-seeking peers.

The Social Entrepreneurs study indicated that among social entrepreneurs who have an MBA from top-rated business schools and graduated between 2012 and 2019 ($n=34$), 82% (28 individuals) responded that they either had started a social enterprise or had a desire to start a social enterprise before entering business school. Many participants believed that the best way to further their goal of starting or furthering their social enterprise was to obtain an MBA from a top-rated business school (Disi, 2018).

Student entrepreneurs vs. non-student entrepreneurs

The Sweden study compared student entrepreneurs and non-student entrepreneurs and found non-student entrepreneurs are on average 14 years older, have more industry experience, have a higher number of prior startups, manage significantly older firms, employ more people, perform better in sales turnover, and manage firms in more mature markets; comparatively, student entrepreneurs often have a university degree, thus are more educated and most of them intend to enter a new market and offer "next generation" products or services (Politis et al., 2012). The GUESSS Vermont study also indicated that 43.8% of surveyed student entrepreneurs ($n=16$) aspire to bring an entirely new product to market (Pramodita Sharma & Dawson, 2014).

The Sweden study also discovered that student entrepreneurs and non-student entrepreneurs have different resource logic (different ways of reasoning for their acquisition and use of resources): "student entrepreneurs have a significantly higher preference for effectuation as well as bootstrapping as compared with non-student entrepreneurs" (Politis et al., 2012, p. 676). Effectuation means that they seek flexible goals, use less formal business planning, pursue affordable loss, and leverage strategic relationships and contingencies (Fisher, 2012; Politis et al., 2012). Bootstrapping means that they incline to secure the use of resources at relatively low or no cost (Politis et al., 2012).

Cognitive needs, challenges, and barriers

Cognitive needs in the process of launching a new business

Typical activities involved in launching a new venture include business idea development, writing a business plan, product or service development, market and consumer research, industry and competitor research, acquiring customers and their feedback, marketing and promotion, selling products or service, obtaining external funding, registering the company, and applying for patent or trademark (Sieger et al., 2019). Student entrepreneurs perceive acquiring customers and funding as the most challenging aspect of launching a new business (Blackstone LaunchPad & Techstars, 2020). According to the Cornell study, the most frequently cited issues encountered by student startups are “difficulty in selling products or services, team recruitment or management, constant change in business model, operational challenges, funding, and co-founder relationships” (Oh, 2017, p. 110).

Business ideas as the starting point of student entrepreneurs’ new ventures are generated from a plethora of campus-based sources. The Cornell study identified the origins of student entrepreneurs’ business ideas include professional development programs, undergraduate or graduate research, doctoral theses or dissertations, business classes (especially entrepreneurship classes), group work or projects in courses, graduate advisors, and faculty research (Oh, 2017, p. 109). Student entrepreneurs often participate in the business idea or business plan competition, business pitch competition, including a pitch to venture capital firms. The Allen UK study ($n = 198$) shows that the need for idea generation among the persistent pursuers (88%) is higher than the family followers (66%) and the dabblers (58%).

Online research, networking, and looking for funding can be day-to-day activities for early-stage student startups (Oh, 2017, p. 78). Other activities may include meeting with their mentors or advisors; seeking customer insights and industry expert inputs for prototyping, testing, or service design; securing resources and assistance at a very low cost (bootstrapping). It is a non-linear, iterative process for student entrepreneurs to understand the problems that the business is trying to solve, to discover the best market fit and value propositions, and to legitimize their business model (Oh, 2017). As a student entrepreneur expressed in the Cornell study:

It’s an expensive process and it’s money we don’t have... so right now, the immediate goal is to conduct an experiment to... see [if] people are comfortable... if people like it, if people would pay for it or opt to do it ... if that’s a go then the next thing to do would be to do a very low-tech version of the application. (A Cornell student entrepreneur; as cited in Oh, 2017, pp. 80-81)

Hiring, recruiting, building the startup team are described as “continuously arduous” and time-consuming processes (Oh, 2017, pp. 84, 114).

Building a team can be a fluid, dynamic, and adaptive process: members come and go; team sizes grow and shrink. It depends on the phase, needs of the startup, and individual member's skillsets (Oh, 2017, p. 113). Student entrepreneurs often try to understand the optimal size of the team and its composition to maximize team value and productivity. Student entrepreneurs often seek to have team members with varied business or technical skills such as managerial accounting, budgeting, finance, engineering, or programming.

Project and time management tools and decision models are often needed to manage the chaotic and dynamic process of the startup. The Key Performance Indicators (KPI), the Scrum Framework, the Covey's Time Management Matrix, the Objectives and Key Results (OKR) goal-setting mechanisms are often used by student entrepreneurs to concentrate their vision, self-organize, collaborate, communicate, or execute the project (Oh, 2017; Venturewell.org, 2020).

For student entrepreneurs dealing with technology and innovation, the National Science Foundation grant and the SBIR (Small Business Innovation Research) grant are often considered as options to raise their first fund. Writing grant proposals becomes an essential part of fundraising, which can be quite different from preparing a pitch to venture capital firms (Oh, 2017).

Besides product development and prototyping, other essential parts of the early startup activities include designing name, brand, logo, and trademark; crafting marketing messages; building websites and social media channels. As the business develops, it needs designated efforts to maintain its public presence, company profiles, and public relations via press releases, announcements, social media messages, etc. (Oh, 2017).

In terms of challenges for student startups, time management and balancing venture with school work have been repeatedly reported as big challenges and key factors that impede intentional student entrepreneurs become nascent student entrepreneurs (Blackstone LaunchPad & Techstars, 2020; Glover, 2017; Techstars, 2018). Venturewell.org (2020) reported that the biggest challenges faced by their invested student ventures include: 1) intellectual property (concerning university policies on the ownership of intellectual property generated by students); 2) perfecting products; 3) balancing school with the venture; 4) staying focused on crucial goals, especially because "many of the teams have found it difficult to figure out what really matters for market success, causing them to prioritize ambiguous goals that lead nowhere" (Venturewell.org, 2020); 5) getting funding beyond the grant stage and secure major investment to propel a venture forward, which requires clear value proposition, evidence of product-market fit, and an initial, vetted business model; 6) finding the right partners

(including manufacturers, suppliers, or joint technology developers). The alignment between the company and its partners doesn't always exist. Extensive due diligence on partners is necessary, but student entrepreneurs often learned this a hard way (Haring, 2018).

Cognitive needs on business skill, leadership skills, and personal growth

Student entrepreneurs often acquire their business skills by taking entrepreneurship, innovation, or new venture classes offered by the university. According to the Social Entrepreneurs study, the lack of such background is one of the reasons that many student entrepreneurs return to school and pursue an MBA degree (Disi, 2018). Some of the key areas highlighted by the study are leadership and management skills, financial skills, theory and structure to back up prior operational knowledge, innovative business models, and how the market works.

I still thought that I lacked the business skills that I needed for a startup and my background is in engineering and electronic engineering and my previous work before the MBA was in consulting which was a little bit in business but still it was very much geared towards tech, so I lacked some of the skills that I knew a business degree would give me. (A student entrepreneur graduated from New York University MBA program; as cited in Disi, 2018, pp. 138-139)

Having experience is not enough to be called an expert; what is more important is the ability to learn from the experience for self-improvement (Baron & Henry, 2010). So, the knowledge for personal growth and leadership development becomes essential for students' success. According to the LaunchPad Survey, student entrepreneurs ($n=275$) perceive perseverance (89%) as the most important personal quality and skills that lead to entrepreneurial success, followed by communication (76%) and leadership skills (73%).

It helps to have a really clear mission...We really had to keep going and find it within ourselves to keep working and keep hearing all the criticism admitting that they're right and then trying to fix it. (A Cornell student entrepreneur; as cited in Oh, 2017, p. 118)

I think I hear so many people... so many people [say] that many successful startups have failed so many times but they keep pursuing, keep pursuing, and revising, and revising, and finally they became successful... (A Cornell student entrepreneur as cited in Oh, 2017, p. 119)

In a pilot test with 1,300 Harvard Business School alumni via the Entrepreneurial Leader: Self-Assessment Survey, researchers identified eleven dimensions of successful entrepreneurial leadership skills including (1) identification of opportunities; (2) vision and influence; (3) comfort

with uncertainty; (4) assembling and motivating a business team; (5) efficient decision making; (6) building networks; (7) collaboration and team orientation; (8) management of operations; (9) finance and financial management; (10) sales; and (11) preference for established structure (HBS Working Knowledge, 2016). To acquire these skills and capabilities, deliberate practice has been identified as an effective way. Baron and Henry (2010) mentioned that deliberate practice not only contributes to gaining knowledge, specific skills, or the development of a cognitive framework, but also enhances basic cognitive structure for perception, memory, metacognition, and intuition. The enhanced cognitive structure further leads to enhanced capabilities in the identification, creation, and evaluation of business opportunities and augments new venture performance.

Decision logic, cognitive models, and cognitive limitations

The desire and the need for learning cognitive models and decision logic are more explicitly conveyed by graduate student entrepreneurs:

I would have loved to learn like how to put together a logic model, how to put together a social return on investment model. These are all things that I ended up doing after I graduated and that would have been great had I, you know, used the discipline of a class. (A student entrepreneur graduated from MIT MBA program; as cited in Disi, 2018, p. 243)

“We launched the business with that class so that was incredibly helpful, but yeah. I think that it was a good foundation on how to think about problems and how to think through, how to craft a solution that’s really going to hit the pain points of that problem, particularly within the conscience of the social issue. (A student entrepreneur graduated from the University of Chicago MBA program, as cited in Disi, 2018, p. 162)

Causation and effectuation are two distinctive decision logic and cognitive models. Causation logic is based on rational reasoning with pre-identified goals, opportunities, resources, and a logical planning and assessment process. Risk is calculated and controlled; attitudes toward return are guided by the threshold of expected return; time orientation is linear, predictable, and economically driven by the achievement of the target. In contrast, effectuation logic is predominantly tacit, situated, or constructed. Risk is emergent and managed; return is guided by the threshold of affordable loss; time orientation is subjective, event-driven, unpredictable, and is socially constructed, based on the influence of self and others (Dutta & Thornhill, 2014; Laskovaia et al., 2017; Sarasvathy, 2001). Read et al. (2009) refined the concept of effectuation and proposed four effectual principles: means, partnerships, affordable loss, and leverage contingency (p. 573-574). Laskovaia et al. (2017) found new venture performance can

be positively affected by “strategic planning, marketing research, rigorous analyses, and well-formulated goals (all associated with causal reasoning) and by “resource leveraging, experimentation, adaptation, alliance building, and flexibility (all associated with effectual reasoning),” however, expert entrepreneurs engage more heavily in effectuation reasoning especially in “the early stages of business creation” and “focusing on effectual principles results in fewer investment failures” (p. 689).

The “lean start-up” model has gained popularity in recent years, which is aligned with the effectuation decision logic and favors “experimentation over elaborate planning, customer feedback over intuition, and iterative design over traditional ‘big design up front’ development” (Blank, 2013, p. 63). The lean startup model takes many risks out of a new venture creation process by working with the business model canvas framework to figure out how a company creates its value, incorporating a series of hypothesis testing through the customer development process and taking an agile development approach to eliminate wasted time and resources by developing the product iteratively and incrementally (Allen, 2016; Blank, 2013).

Other cognitive models and approaches such as design thinking, agile strategy, and rapid experimentation have also gained attention through recent publications (Bland, et al., 2020; Fernando, 2019; Lewrick, Link & Leifer, 2020). Besides, being aware of cognitive limitations and flawed thought processes such as the concepts of “the ladder of inference, leaps of abstraction, human biases (such as confirmation bias and groupthink), and the difference between system 1 and system 2 decision process are equally important for sound business judgments (Kahneman, 2011; Senge, 2006). Introducing student entrepreneurs to different cognitive models, decision logic, and cognitive limitations will pave the way for better business decisions and venture success.

Affective needs, challenges, and barriers

The needs for belonging, acceptance, and gaining legitimacy

Shepherd and Haynie (2009) found that entrepreneurs need to balance the sense of distinctiveness with the feelings of belonging to preserve their psychological well-being. Psychological well-being is characterized by feelings of satisfaction, happiness, or “optimal psychological functioning and experience” (Ryan & Deci, 2001, p.142). The unsatisfied need to belong may lead to the dark side of entrepreneurship such as isolation, loneliness, high level of chronic stress, and in some instances, at-risk personal and family relationship (Shepherd & Haynie, 2009). Drawing upon the social identity theory, Hahn (2019) explored three realms of value creation that

potentially defines entrepreneurs' social identity and contributes to their psychological well-being:

- *Firm value creation (sense of belonging and social identity as an entrepreneur)*. The financially rewarding business and good venture performance contribute to the positive psychological state of entrepreneurs. Since an entrepreneur's identity is often intertwined with the identity of the business, good firm performance often reinforces entrepreneurs' self-efficacy and self-worth; while poor venture performance is often perceived as a threat to entrepreneurs' own identity (Stephan, 2018).
- *The value creation for a community of customers (sense of belonging to a community)*. The positive psychological state comes from entrepreneurs' feeling of making a difference for their community or giving something unique to their community. Positive feedback or acceptance from customers often boosts entrepreneurs' well-being; while conflicts with customers often constitute a stressor.
- *Value creation for the society (sense of belonging to the society)*. The motivation of changing society and making the world a better place is diffused among student entrepreneurs (Sieger et al., 2019). Entrepreneurs often feel a sense of achievement by offering unique solutions to societal issues, or contributing to sustainable practices, or promoting the public good. Creating value for society can satisfy entrepreneurs' perception of social esteem and the need for belonging.

Hahn (2019) found that compared to firm value creation and societal value creation, the value creation for a community of customers has a more direct and significant positive effect on student entrepreneurs' psychological well-being. The entrepreneurial culture of a university and its social support has a great impact on student entrepreneurs' psychological well-being as well.

Gaining legitimacy is what student entrepreneurs strive to achieve in the venture creation process. Gaining legitimacy is both a cognitive need to understand and validate the existence of the business and an affective need to seek approval and acceptance (Jones & Hill, 2017). The Netherlands study showed that ongoing development of the social network is crucial for gaining legitimacy and "successful student entrepreneurs distinguish themselves of the rest by keeping on adding valuable connections to their network, having no fear in asking for help and profiting of the goodwill in the business worlds towards student entrepreneurs" (Haring, 2018, p. 68).

The needs for esteem, self-actualization, and transcendence

Student entrepreneurs consider “realizing a dream,” “creative problem solving,” and “having an impact on societal changes” as main motives for pursuing entrepreneurship (Pramodita Sharma & Dawson, 2014; LaunchPad and Techstars Network, 2020). The esteem needs are one of the reasons that drive students to enter entrepreneurship. Although student entrepreneurs perfectly recognize the high risk of entrepreneurship, they perceive the high risk as a high return that leads to financial independence and freedom. They seek respect from others especially their peers and believe developing a profitable business and gaining autonomy distinguishes themselves from their peers, in which case, they can even become a role model (Criaco et al., 2017; Hahn, 2019; Walter & Dohse, 2012)

The need for self-actualization and transcendence is another reason that drives students to enter entrepreneurship. The MIT study revealed that in many cases, student entrepreneurs see entrepreneurship as “a thrill to be living a meaningful life,” which reflects their sense of distinctiveness (feeling unique, special, and different from what others have contributed; having a legacy and being remembered by other people or history) and see challenges as an essential part of growth and freedom (the capacity to create one’s context; controlling of one’s destiny). Besides, students also demonstrated their transcendent purpose beyond oneself such as having a real impact on other people’s lives or contributing to a collective effort that makes things better over time (Benkirane, 2019). Social recognition, especially peer recognition, is particularly important for student entrepreneurs and is likely to be translated into self-esteem and a more positive psychological state (Bergmann et al., 2016; Hahn, 2019).

The need for the development of affective domains

The development of affective domains is equally important as that of cognitive domains. Positive attitudes toward learning new knowledge (receiving, responding, valuing, organizing, and characterizing) can enhance creativity, opportunity recognition, acquisition of critical resources, and also influence student entrepreneurs’ perception of risk and preferences (Ahsan, et al., 2018; Krathwohl et al., 1964). In the SDSU study, Ahsan et al. (2018) found that student entrepreneurs experiencing positive affect are more likely to evaluate situations positively, increase efforts to acquire advice from mentors and utilize acquired knowledge and advice. They often look beyond what is immediately required and focus their attention on broader activities; they tend to have better relationships, and more frequent and longer interactions with their mentors (Ahsan et al., 2018). The positive attitudes of founders lead them to experiment and be more creative in accumulating resources

and enacting further activities necessary to develop their ventures (such as utilizing crowdfunding to raise capital, leveraging network connections to make sales, or assembling a team) (Ahsan et al., 2018).

In contrast, student entrepreneurs who display negative affective states “experienced a challenging time in accumulating resources and difficulty in forming and retaining their team” (Ahsan et al., 2018, p. 95). They display a greater tendency to focus their efforts on tasks that require immediate attention. Unfortunately, focusing in great detail on threat events or processing random information distracts them from their goals, constrains their ability to make strategic decisions, and often delays venture progress (Ahsan et al., 2018).

The SDSU study also indicated that student entrepreneurs’ affective state “influences the choices they make, how much effort they exert, and how persistently they pursue their goals in the face of challenges and setbacks... [It] not only impacts the progress of the ventures but also influences the ability of student founders to self-evaluate their performance and take the necessary corrective actions” (Ahsan et al., 2018, p. 95).

Affective challenges from stress, anxiety, fear of uncertainty, and exhaustion

Stress, anxiety, exhaustion, and the fear of uncertainty are common emotional challenges experienced by entrepreneurs, particularly student entrepreneurs (Benkirane, 2019; Oh, 2017; Stephan, 2018). The LaunchPad Survey revealed that facing the coronavirus situation and potential economic downturn, anxiety, and fear of the unknown becomes a dominant (52%) emotional obstacle of student entrepreneurs ($n=275$), followed by the concern over team morale and mental health (43%) (Blackstone LaunchPad & Techstars, 2020). The MIT study cited several cases that student entrepreneurs expressed their anxiety, fear, and exhaustion, resulting from the uncertainty of the market, time pressure, high work demands, or high expectations from themselves.

The start-up I had did decent but not stellar and I just felt like it was so much work and energy that’s consumed. emotional and mental torture because every day you have to wake up and just motivate yourself and figure out your to-do list. I guess you kind of grow a callus from hearing no or whatever and that makes you stronger. But at the same time, it’s exhausting. (A MIT student entrepreneur; as cited in Benkirane, 2019, p. 54)

The most exhausting part of the uncertainty is not knowing if you’re in the right direction. I think like being afraid that you’re just wasting a tremendous amount of time. And never before I felt the time was so valuable but now I literally feel that my hours are worth so much. ... And I think this is also a little bit exhausting... If I’m not spending my time properly, I’m probably doing something wrong...

It's like I'm constantly underperforming but I'm underperforming myself. (A MIT student entrepreneur; as cited in Benkirane, 2019, p. 55)

The MIT study is not alone. The Cornell study has similar findings:

The biggest thing is that things aren't moving fast enough... the first thing I wake up [is this]; the last thing before I go to sleep... is this. Everything I'm doing you know is... coming back to this... it's a very mental thing. (A Cornell student entrepreneur; as cited in Oh, 2017, p. 88)

If...I can't sell \$100,000 of software, I would consider myself a failure. You know, if I can't live off this business, within you know a year of graduating... I'm a failure... If I can't pay my employees, I'm a failure. Like, it's that's kind of the way I see it. (A Cornell student entrepreneur; as cited in Oh, 2017, p. 89)

The Cornell study also disclosed an instance in which a student entrepreneur experienced “a mental breakdown, not knowing what to do nor how to do it. He lost direction, had imperfect information on which to make important decisions, and his anxiety became increasingly overwhelming” (Oh, 2017).

Antecedents of entrepreneurs' psychological or emotional well-being

Stephan (2018) extensively reviewed the literature about entrepreneurs' mental health and well-being and found the positive and negative antecedents in the following categories (Table 2):

It is apparent that the affective needs or psychological well-being of entrepreneurs are not standalone; they are interconnected with cognitive needs and available support and resources within a larger personal, interpersonal, and social context. Social relationships are an important source of mental well-being. Entrepreneurs who are lonely and socially isolated are more likely to develop burnout (Fernet et al., 2016). Social support can mitigate other stressors and negative experiences, and work-related social support buffers the effect of exhaustion on job satisfaction (Tetrick et al., 2000). Oosterbeek et al. (2008) explored the characteristics and skills essential for successful student entrepreneurs and developed ten student entrepreneurial competencies, which include seven personal traits (the need of achievement, need of autonomy, the need for power, social orientation, self-efficacy, endurance, and risk-taking propensity) and three entrepreneurial skills (market awareness, creativity, and flexibility).

Resource needs, challenges, and barriers

The need of financial resources and funding

Initial funding is often the most important and most valued resource, but it has been identified as one of the major challenges for student

Table 2. Positive and negative antecedents for entrepreneurs’ psychological well-being.

	Positive Antecedent Examples	Negative Antecedent Examples
Work Characteristics	Autonomy; time flexibility; skill utilization; significance and meaningfulness of the work; interesting, varied, and coherent work; the opportunity for feedback and learning; recovering process from stress	Higher work demands (with some exceptions for new entrepreneurs who perceive high demands as a signal of the business doing well); role stress; long/intense working hour
Personality Traits and Values	Self-efficacy; optimism; emotional intelligence; internal locus of control; risk tolerance; innovativeness; three of the Big 5 traits (agreeableness, extraversion, and conscientiousness); problem-focused and proactive style for coping challenging situations; business skills; stress management skills; self-management skills; intrinsic motivations; health maintenance behavior	High levels of optimism and improvisational behavior (in some cases); neuroticism; vulnerabilities; fear of failure; low or deficient business and entrepreneurial skills; past business failures; high opportunity cost; extrinsic motivation
Firm and Financial Characteristics	Income and related financial rewards; subjectively perceived firm success; leading larger firms	Financial problems; low income; job loss or job insecurity; poor venture performance (perceived as a threat to entrepreneurs’ self-image and even their identity)
Social Resources and Stressors	Social support from others at work and from their family; work-family enrichment; positive feedback from customers	Work-family conflict; conflicts with customers and employees
Context	Objective measures of economic growth and business climate; supportive societal context	Economic recession; low customer demand; strong market competition (increased role stress); lack of societal esteem for entrepreneurs (in certain culture); poor physical working environments

entrepreneurs (Allen, 2016; Blackstone LaunchPad & Techstars, 2020; Disi, 2018; Oh, 2017). 71% of student entrepreneurs ($n=275$) from the LaunchPad Survey considered funding as one of the most important resources for entrepreneurial success; however, they ranked fundraising as the most challenging aspect of launching a business and the lack of funding as the biggest impediment for continuing to run the business after graduation (Blackstone LaunchPad & Techstars, 2020). Facing the disruption from the coronavirus situation and potential economic downturn, 62% of surveyed students considered lack of fundraising or capital option and unexpected changes to cash flow as the biggest obstacles (Blackstone LaunchPad & Techstars, 2020). 63% of student entrepreneurs ($n=35$) from the Cornell study considered financing as their top concern (Oh, 2017). The Allen UK study indicated that the need for financial planning is greater with the Dabblers (the first-timers), and less for persistent pursuers and family followers (Allen, 2016).

The Cornell study laid out the main funding sources of student entrepreneurs, which include business competition awards, on-campus funding grants, federal seed grants, angel investors, and venture capital firms (Oh, 2017). The GUESSS Vermont study indicated that although student entrepreneurs expect to receive advice, ideas, materials, and network support from their parents, they expect least to get financial support from their parents (Pramodita Sharma & Dawson, 2014). The financial support that students can get from college and universities often comes in different forms. Some universities provide direct seed grants or funding for student entrepreneurs; some universities offer services to introduce students to investors; some offer free office space, prototyping, testing, or free legal consultation services for students (Fjeld, 2016; Oh, 2017; University of Rochester, 2019). The support from universities has great disparity across institutions, often depending on if the university has an entrepreneurial focus and the resources available (Disi, 2018; Oh, 2017; University of Rochester, 2019).

The need of acquiring and diversifying customers

Acquiring customers is another challenging aspect of launching a business (Blackstone LaunchPad & Techstars, 2020; Oh, 2017). 47% of student entrepreneurs ($n=35$) from the Cornell study considered finding customers as their top concern (Oh, 2017). The Netherlands study followed up with 17 student startups and discovered in certain cases, student startups are too embedded into an existing network and customer relations. Because a large part of the revenue is dependent on one or two clients, business disruption occurs when clients do not extend their contracts (Haring, 2018). The early success of student ventures often starts with securing major funding or acquiring major customers. The success bolsters students' confidence and self-efficacy and also gains legitimacy for the existence of the business. However, to sustain the business, student entrepreneurs need continuous effort to diversify their customer base (Haring, 2018).

The need of social networks with varied strong and weak ties

Social networks are crucial for student ventures. Social networks play an important role in helping student entrepreneurs gain motivation, test their ideas, recognize opportunities, access resources to launch or grow their businesses (The OECD and the European Commission, 2014). 84% of student entrepreneurs ($n=275$) from the LaunchPad Survey considered mentorship as one of the most important resources for entrepreneurial success and 72% considered a supportive network as one of the most

important resources (Blackstone LaunchPad & Techstars, 2020). The Allen UK study indicated that the need for mentoring is significantly higher for persistent pursuers (91.67%) than family followers (77.78%) and dabblers (57.81%) (Allen, 2016).

Student entrepreneurs often seek support from “strong ties,” with whom they have strong emotional attachments or close relationships and as the startup evolves, they have to develop the relationship with “weak ties” or unknown parties to get access to new customers, investors, or suppliers. This is often a challenge for student entrepreneurs (Haring, 2018). The Netherlands study showed that startups with varied strong and weak ties have significantly better performance than the firms that have homogeneous networks. The study explained that there are multiple paths to success, while “there is a likely path to failure when the student entrepreneur is unable to diversify his network and sticks to a homogenized network over time... [thus unable] to acquire the resources critical to an organization’s success” (Haring, 2018, p. 70).

Some universities offer extended services to student entrepreneurs and help them establish their social networks with industry experts, advisors, mentors, partners, or investors. The Cornell study indicated that more than 50% of student entrepreneurs found “institutional support was beneficial in finding capital investment, opening doors to meetings with industry experts or customers, access to scientists, and lending legitimacy to early startups” (Oh, 2017, p. 121-122). Social Entrepreneurs study showed that one important reason that student entrepreneurs chose top-rated MBA programs was because they offer “access to networks, relationships, resources, or mentors that they would not be able to get elsewhere” (Disi, 2018, p. 142).

The objective of applying to business school in the first place was to kind of incubate that idea, get a network, maybe get some co-founders, get some investors, and then re-launch the business post-business school. (A student entrepreneur graduated from the Northwestern University MBA program; as cited in Disi, 2018, p. 144)

The relationships and the network, and they’ve already paid off like ten-folds... the people, mentors, advisors, connections, those sorts of things. I met my co-founder of the social enterprise I’m doing now at business school so, so the networks and the connections is number one. (A student entrepreneur graduated from the University of Pennsylvania; as cited in Disi, 2018, p.144)

Special attention needs to be given to student entrepreneurs’ relationships with their mentors. The SDSU study closely examined the impact of student entrepreneurs’ affective states on their mentor relationships. The study found that mentors help student entrepreneurs develop their entrepreneurial identity. Student entrepreneurs who received extensive mentoring support, who were open to mentor feedback, and who practiced critical

self-evaluation were able to successfully navigate the highs and lows associated with entrepreneurial activities and successfully launch their ventures. However, students who lacked adequate mentoring support were ill-prepared to manage the highs and lows and “failed to develop different role identities needed to move their ventures forward” (Ahsan, et al., 2018, pp. 97, 96).

In some cases, student entrepreneurs experience challenges in developing relationships with quality mentors and generally rely on friends and quasi-mentors from their personal networks; in other cases, students get distracted by other commitments and do not benefit from their mentor relationships. These challenges prevent student entrepreneurs from getting the support needed to “make significant progress on their ventures beyond initial testing and prototyping” (Ahsan et al., 2018, p. 90).

The need of other support

Besides the need for access to funding, customers, and social networks, student entrepreneurs have other resource needs. The China study identified 20 types of support needs and grouped them into three categories: a. core support needs (financial support, psychological counseling, entrepreneurial guidance, entrepreneurial replication, failure attribution, entrepreneurial policies, and resource connections). b. secondary support needs (occupational guidance, entrepreneurial team, technical support, re-entrepreneurship support, office space, and entrepreneurship platform). c. marginal support needs (entrepreneurial climate, entrepreneurship training, business support, entrepreneurship competitions, enterprise brand optimization, credit transfer, family support, and time support) (Wang & Huang, 2020). Wang and Huang (2020) also conducted cross-stage analysis and found support needs vary from stage to stage. They called for special attention to the needs in the failure stage for psychological counseling and assistance in analyzing the causes of the failure. Besides these needs areas, there are some existing resources and services available for business to find mentors and get help in legal compliance, scale-up or accelerating business, access to funding, technology and innovation, patent and trademark, export, government procurement, workforce development, etc. (The University of Maine, 2020).

A discussion on information needs of student entrepreneurs and its implication on library information services

We have analyzed student entrepreneurs’ cognitive needs in three aspects: (1) the cognitive needs in the process of launching a new business; (2)

business skills, leadership skills, and personal growth; and (3) decision logic, cognitive models, and cognitive limitations. We've found student entrepreneurs' affective needs for (1) belonging, acceptance, and gaining legitimacy; (2) esteem, self-actualization, and transcendence; (3) developing affective domains; and (4) dealing with stress, anxiety, fear of uncertainty, and exhaustion. We've identified the resource needs for (1) financial resources and funding; (2) acquiring and diversifying customers; (3) developing social networks with varied strong and weak ties; and (4) various other support needs. Since these fundamental needs are often woven into each other, a holistic approach is necessary to address these needs.

What needs can be addressed by information resources and library information services? By examining student entrepreneurs' diverse cognitive, affective, and resource needs, we have identified potential information needs on 60 topics (see Appendix). This information need taxonomy is an open and engaging topic system that allows adaptive changes based on resources available; it intends to follow a time sequence and a logical order, but some subcategories are highlighted to make them more visible. The taxonomy and other research findings cast light on the potential improvement of library information services for student entrepreneurs in the following areas:

- **Library guides.** A comprehensive information and resource guide that provides access to databases, books, videos, podcasts, websites, programs, agencies, and influencers in the identified information need areas will lead student entrepreneurs to success through three pathways: enhancing business knowledge and evidence-based decisions; cultivating affective learning and personal growth; and securing diversified support networks and social capital. Considering the needs of bootstrapping and making the loss affordable, the information services can focus on aggregating low-cost or free resources and encourage students to use academic and public library systems. Librarians can also highlight related university and regional resources to make the information support more localized and relevant.
- **Research consultations.** The current practice of business research consultation often follows causation logic with special emphasis on strategic planning, market research, industry and competitor analysis. It is helpful for business librarians to realize that in the early stage of business creation, students probably need to adopt an effectuation logic and focus on experimentation over detailed planning, so the information requests may come in at different stages of the iterative process of business concept and business model development and product or service design.

- **Collection policies.** This research reveals that cognitive domains and affective domains both play a vital role in student entrepreneurs' success. Library collection policies need to both reflect students' typical needs in the cognitive areas such as business skills, leadership skills, and decision-making, but also their needs for affective learning, personal growth, psychological well-being, establishing personal values and beliefs, and finding answers to their big questions about meaning and purposes.
- **Workshops or events.** Information needs can be addressed not only through explicit knowledge sharing in the forms of books, guides, or fixed media but also through tacit knowledge sharing. So, libraries can consider bringing student entrepreneurs together to share their lessons and challenges and help create a campus culture of acceptance and inclusion, and cultivate a sense of belonging. Libraries can also seek collaboration with other campus partners to cohost workshops or events that address the identified information needs.
- **Campus collaboration and partnerships.** Since value creation for customers, community, and society is closely tied to student entrepreneur's social identity and their sense of self-esteem and self-actualization, libraries seek help student entrepreneurs in these areas can collaborate with campus partners such as the entrepreneurship center, innovation center, or center for civic engagement & social impact to create opportunities for student entrepreneurs to engage with experienced entrepreneurs, mentors, or community, participate in existing campus initiatives, experiential learning programs, or support campus strategic planning and decisions in this regard.

Several studies mentioned the barriers that student entrepreneurs often encounter, which prevent them from meeting their information needs. Students may not be aware of resources available on campus, or sometimes, certain stigma and misconceptions such as “university may take partial ownership of the venture,” or “the entrepreneurial resources are only related to business school,” or “prototyping center is only available to mechanical engineering major” prevent students from taking advantage of campus resources and pursue their business ideas (Boston University, 2017; Nguyen, 2014). As novice entrepreneurs, students may search less extensively in their unfamiliar domains and may present the limitations of bounded rationality in their decision process (Cooper et al., 1995). To better serve student entrepreneurs, it would be helpful to be aware of these potential barriers and collaborate with campus partners to promote an inclusive and supportive entrepreneurial culture on campus.

Conclusion

Applying Wilson's view toward information needs and user studies, this article extensively explored student entrepreneurs' demographics and characteristics and investigated their fundamental cognitive, affective, and resource needs and corresponding challenges and barriers.

We have identified student entrepreneurs' various cognitive needs in the process of launching a new business such as writing business plans and participating in business idea competition; their cognitive needs for improving business skills, leadership skills, and personal growth; and the needs of decision logic and cognitive models for making strategic decisions and mitigating venture risk. We have identified student entrepreneurs' affective needs for belonging, acceptance, and gaining legitimacy; their needs for esteem, self-actualization, and transcendence; the needs for developing affective domains and emotional intelligence; and the needs for coping with stress, anxiety, fear of uncertainty, and exhaustion. We've identified their resource needs for financial resources and funding, acquiring and diversifying customers, developing social networks with varied strong and weak ties, and various other support needs.

The article further analyzed what needs can be addressed by information and its implication on library information services for student entrepreneurs. The research effort yields a non-exhaustive taxonomy of 60 topics on related information needs which will potentially lead student entrepreneurs to success by enhancing business knowledge and evidence-based decisions; cultivating affective learning and personal growth; and securing diversified support networks and social capital. Beyond creating comprehensive library guides and information pathfinders to address student entrepreneurs' information needs, this research also brings some fresh ways to look at business research consultations and collection policies. It also identified some opportunities for libraries to promote tacit knowledge sharing among student entrepreneurs and collaborate with campus partners to create an inclusive and supportive entrepreneurial culture on campus.

Notes

1. *n*: indicates the sample size and is used consistently to represent the sample size throughout the paper.
2. The five participant U.S. universities were three private universities in the Northeast with enrolment between 8,000 and 40,000 students, and two large public research universities located in the South and Southwest. The five universities have chosen to remain anonymous.

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Appendix. Student entrepreneurs' information need taxonomy (topic examples)

Table A1. Student entrepreneurs' information need taxonomy (topic examples).

A. Succeed with Business Knowledge and Evidence-based Decisions (Topics for Cognitive Needs)	B. Succeed with Affective Learning and Personal Growth (Topics with both Cognitive and Affective Needs)	C. Succeed with Diversified Support Networks and Social Capital (Topics for Resource Needs)
1. Generate Business Ideas and Identify Business Opportunities	1. Grow with Entrepreneurial Mindsets and Meta-qualities	1. Build Professional Support Networks and Social Capital
2. Ensure a Viable Business Model and Powerful Value Proposition	2. Recognize Interconnections and Become a System Thinker	2. Find Business Mentors and Advisors
3. Optimize Effectuation and Plan with An Agile Strategy	3. Develop Futuristic Thinking and Prepare for Future Disruptions	3. Find Legal and Compliance Assistance
4. Adopt Lean Startup Principles	4. Overcome Cognitive Barriers and Limitations	4. Find Scale-up and Acceleration Assistance
5. Participate in a Business Competition	5. Acquire Affective Skills and Emotional Intelligence	5. Find Business Support Agencies
6. Tell Your Story and Pitch the Ideas	6. Establish Personal Values and Beliefs	6. Find Financing and Funding Support
7. Understand Consumers and Test the Market	7. Ask Big Questions about Meanings and Purposes	7. Find Technology and Innovation Support
8. Study the Industry and Competitors	8. Make Ethical Decisions	8. Find Patent and Trademark Support
9. Perform a Benchmark Analysis	9. Increase Productivity and Build a Learning Organization	9. Find Global Market and Export Assistance
10. Step into a New Industry	10. Manage Time Wisely and Balance Work, School, and Life	10. Find Government Procurement Support
11. Write a Purposeful Business Plan	11. Improve Communication Skills	11. Find Workforce Development Support
12. Connect with Diversified Customers	12. Ignite Passion and Motivation	12. Find Free Online Textbooks, Courses, and Workshops
13. Secure Grants and Funding Opportunities	13. Enhance Leadership Skills	13. Check University and Local Support and Resources
14. Craft a Winning Grant Proposal	14. Practise Negotiation Skills	
15. Create New Products or Services	15. Foster Creativity and Innovation	
16. Handle Legal Issues (Registration, Permit, Licensing, IP)	16. Cultivate Social Entrepreneurial Spirit	
17. Apply Business Decision Models and Analytical Tools	17. Take Care of Personal Well-being and Relationships	
18. Make Efficient, Evidence-based Decisions	18. Cope with Stress, Exhaustion, and Adjust Expectations	
19. Manage Daily Operations and Financials	19. Deal with Anxiety, Uncertainty, and Fear of Unknown	
20. Recruit a Team and Manage Human Resources	20. Displace Inertia and Change Habits	
21. Control Risk and Make the Loss Affordable	21. Strengthen Resilience and Perseverance	
22. Conduct Due Diligence and Background Check	22. Stay on Top of Trends, New Research, and Evidence	
23. Drive Sales and Build Brands and Publicity		
24. Doing Business Online		
25. Tap into Social Entrepreneurship		