Effects Of Dysfunctional Career Beliefs And University's Environment And Support System On University Students' Entrepreneurial Intention

By Jay Bhargav Vyas (Thesis)

Submitted to:

The School of Graduate Studies

in partial fulfillment of the requirements for the degree of

Master of Science in Management (Operations Management Specialization)

Faculty of Business Administration

Memorial University of Newfoundland

October 2025

St. John's, Newfoundland and Labrador

Abstract

This thesis investigates the effect of dysfunctional career beliefs (DCB) and a university's environment and support system (ESS) on entrepreneurial intentions (EI) among students at Memorial University of Newfoundland. The analysis is divided into two components: a cross-sectional study investigating how DCB influence EI and their effect on the relationship between ESS and EI; and a longitudinal study assessing ESS's impact on EI and its antecedents over time. The study is grounded in the Theory of Planned Behavior, a well-established psychological theory that predicts human behavior, and employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze data, with longitudinal data spanning 2020 to 2024, capturing changes in ESS influence amid economic fluctuations. Findings reveal that students with high decision-criticality DCB tend to perceive entrepreneurship more favorably, indicating that such beliefs may frame entrepreneurship as a purposeful career choice. DCB in professional help also shapes ESS effectiveness, underscoring mentorship's role in university support systems. The longitudinal analysis shows that ESS's influence on EI varies with economic conditions but consistently supports ATB and PBC. This research advances the understanding of how psychological barriers and support systems intersect to shape entrepreneurial paths in higher education. It discusses practical implications for universities, career counselors, and policymakers, such as the need for adaptable ESS frameworks, targeted interventions for dysfunctional beliefs, and expanded mentorship networks. These recommendations are based on the findings of this study and can be directly applied to improve entrepreneurial education. Future research directions include further exploration of DCBs, cross-cultural studies, and developing ESS models resilient to economic fluctuations.

Keywords- Entrepreneurial Intention, Dysfunctional Career Beliefs, Theory of Planned Behavior, University Support

General Summary

This thesis investigates the impact of dysfunctional career beliefs (DCB) and university's environment and support system (ESS) on students' entrepreneurial intentions (EI) at Memorial University of Newfoundland. Using the Theory of Planned Behavior, it analyzes how ESS impacts EI by enhancing attitude towards behavior (ATB), perceived behavioral control (PBC), and subjective social norms (SSN). The study further explores how specific beliefs—such as those in professional help, chance, or fate—moderate ESS's effects on these antecedents.

Through cross-sectional and longitudinal analyses using partial least square structural equation modeling (PLS-SEM), findings reveal that DCB regarding the criticality of the decision unexpectedly boosts positive ATB and that professional help beliefs strengthen SSN, emphasizing mentorship's role in ESS. This research highlights the complex relationships between psychological beliefs and ESS in shaping entrepreneurial pathways, offering recommendations for universities, career counselors, and policymakers to refine ESS frameworks and address dysfunctional beliefs to nurture entrepreneurship.

Acknowledgment

I want to express my sincere gratitude to Dr. Carlos Bazan for his invaluable supervision throughout my thesis. His guidance has been instrumental in enabling me to carry out this research smoothly and effectively. I am also grateful to Memorial University of Newfoundland for their support in preparing this thesis and for allowing me to share my ideas and insights. Special thanks to the Ethics Committee and the students who participated in this study; their cooperation was essential in bringing this research to fruition. This project was supported by funding from the SSHRC Insight Development Program for the initiative "Quantitative Entrepreneurship Research Informed by Gender Studies" (FOAPAL #215649405002000). Their generous support was instrumental in enabling this research. This study acknowledges the use of OpenAI's ChatGPT for language refinement.

Table of Contents

List of Tables

List of Figures

1. Background

In recent decades, entrepreneurship has acquired increasing attention as an important driver of economic growth, job creation, and innovation. In an era of rapidly advancing technology where traditional employment models face disruption, entrepreneurial ventures offer more employment opportunities and assist in addressing economic challenges. Universities, as the center of knowledge generation and skills development, contribute immensely to this by fostering entrepreneurial aspiration among students through their incubation services, access to financial resources, mentorship programs, and more. (Bazan, Shaikh, et al., 2019; R. Trivedi, 2016).

The importance of cultivating EI among university students has been underscored by several studies, which emphasize the entrepreneurial ventures often emerge from education and conducive environments (Liñán & Fayolle, 2015). While entrepreneurship education provides students with the knowledge and skills to pursue these ventures, universities' environment and support system (ESS) provides students with access to mentorship programs, incubators, and financial resources, further bolstering students' EI.

However, psychological factors such as dysfunctional career beliefs (DCB), which refer to the maladaptive thoughts or myths that students possess regarding the career decision-making process (Gati et al., 1996), might play an essential role in determining the extent to which students engage in these support systems. Furthermore, certain DCB such as the irrational belief regarding the criticality of the decision, i.e., believing that deciding on a career is a once-in-a-lifetime deal, could negatively impact the students' attitude towards entrepreneurship as this career entails significant risk and uncertainty.

Integrating psychological and environmental factors is important to understanding the dynamics that impact EI among university students. By researching the interplay between the university's ESS and the students' individual DCB and how it impacts students' EI, this study aims to fill an existing research gap in the field of entrepreneurship.

This study investigates how these DCB shape or inhibit EI, students' responsiveness to the ESS and how these DCB influence the effectiveness of ESS in shaping students' EI. The following research questions are posed to guide this study:

1) What are the prevalent dysfunctional career beliefs among university students, and how do they impact the antecedents to EI?

2) How do dysfunctional career beliefs moderate the influence of a university's ESS on students' EI?

3) How have the effects of Memorial University's ESS on students' EI changed over time, specifically in 2020, 2022, and 2024?

Therefore, this study seeks to deepen our understanding of the complex interactions between university ESS and psychological barriers in fostering entrepreneurial intentions. Doing so aims to inform the design of more responsive ESS that account for individual psychological differences, enhancing universities' effect on entrepreneurial outcomes.

2. Introduction

Entrepreneurship has emerged as a pivotal catalyst for innovation, economic growth, and the generation of employment opportunities, especially in the context of today's rapidly evolving technological landscape and global economic uncertainty (Oluwaseun Peter Oyeyemi et al., 2024). As contemporary society increasingly looks towards entrepreneurs to drive economic progress, universities have emerged as critical contributors in promoting entrepreneurial activities by establishing a robust environment and support system (ESS). A university's ESS refers to the group of different support mechanisms established to assist and promote entrepreneurial activities and innovation within and around the campus (Bazan, 2022). Universities play a crucial role in promoting new venture creation by establishing robust ESS – services like entrepreneurship education, mentorship programs, financial resources, and business incubators (Bazan, Shaikh, et al., 2019; Pittaway & Cope, 2007; Rideout & Gray, 2013). These university programs increase awareness as well as provide students with the resources and skills necessary to create new ventures, thereby motivating them to follow an entrepreneurial career (Liñán & Fayolle, 2015). Entrepreneurial traits such as risk-taking often originate during the early stages and are affected by various factors such as family, parent' entrepreneurial experience, and education (Krueger, 2007; Nabi et al., 2017). Peterman & Kennedy (2003) observed that participation in "youth enterprise training" significantly impacts ATB and EI. Research indicates that university courses significantly impact entrepreneurial self-efficacy (Cox, 1996; R. K. Mitchell et al., 2000) and personality traits (Krueger, 2007). Being exposed to entrepreneurship education as well as university support systems can enhance students' self-efficacy, opportunity recognition, as well as access to resources necessary for new venture creation (Fayolle & Gailly, 2015; Liñán & Fayolle, 2015). As such, while the early exposure to entrepreneurial environment, parents' entrepreneurial

experience, university's ESS can further shape students' EI and attitude toward entrepreneurship. As such, it is important to focus on entrepreneurial training at the university level.

The universities act as key promoters of the entrepreneurial ecosystem by bridging the gap between the knowledge gained through academia and practical venture creation (Guerrero & Urbano, 2014). The ESS initiatives, such as technology transfer offices and incubators, equip the university students with tools and opportunities to convert their ideas into viable ventures, thereby contributing to the regional economic development (Lerner, 2004). The university-based support systems help students overcome the perceived barriers to entrepreneurship, thereby facilitating the transformation of students' EI into actions (Debackere & Veugelers, 2005; Lüthje & Franke, 2003).

The Theory of Planned Behavior (TPB) (Ajzen, 1991) provides a comprehensive framework for understanding entrepreneurial intentions (EI). It posits that entrepreneurial intentions are influenced by three primary motivational antecedents: attitude towards behavior (ATB), which pertains to how desirable entrepreneurship as a career is; perceived behavior control (PBC), which is related to the self-perception of the capability to create new venture, and subjective social norms (SSN), which is the perceived social pressure an individual feels from their friends and family towards performing or not performing entrepreneurial behavior. Prior research has found that a university's ESS can positively impact the students' EI by increasing the levels of the antecedents to EI (Bazan, 2022). ESS initiatives, such as entrepreneurship education, have been shown to boost EI by improving entrepreneurial self-efficacy and risk tolerance (Nabi et al., 2017). Universities with a robust ESS actively contribute towards the development of regional entrepreneurship activities through the commercialization of university knowledge via student-owned spinoff companies (Bazan, Shaikh, et al., 2019). Over the years, Memorial University has played an active role in promoting entrepreneurship among the students through its numerous initiatives, which

have shown to have a positive impact on students' EI indirectly by impacting the antecedents to EI (Bazan, 2022; Bazan, Shaikh, et al., 2019).

While research in the field of entrepreneurship has consistently evinced that a university's ESS can have a significant impact on the formation of EI by enhancing the antecedents to EI, the role of psychological factors that obstruct this process remains underexplored (Franke & Lüthje, 2004; Shirokova et al., 2016). One of the most prominent barriers individuals perceive towards career decision-making is dysfunctional career beliefs (DCB), which refer to the maladaptive thoughts or myths that students possess regarding the career decision-making process (Gati et al., 1996). These DCB are often linked to career indecisiveness and dissatisfaction with the career choices made (Hechtlinger et al., 2019; Sidiropoulou-Dimakakou et al., 2012).

Career decision-making is a cognitively demanding process that often entails gathering information, self-reflection, and a good amount of planning (Kautonen et al., 2013). However, individuals may avoid or delay their career decision-making process if they possess faulty assumptions regarding the roles of external factors such as fate, leading to a sub-optimal career choice (Gati et al., 2013; Xu & Tracey, 2014). Research has also demonstrated that cultural differences in DCB could also impact how students perceive and engage with their career choices with American students, for example, ranking DCB as one of the most significant hindrances towards the career decision-making process (Mau, 2001).

One of the specific types of DCB that will be studied in this research is the belief about the role of chance or fate in determining the career trajectory, which aligns with an external locus of control (Hechtlinger et al., 2019). Individuals possessing such DCB may feel incapable of influencing their career trajectory and, as such, reduce their engagement in the career decision-making process (Xu, 2022). On the contrary, individuals who possess an internal locus of control and believe in

their ability to influence their career trajectory are more likely to participate in activities that would help them achieve their career goals and make adaptive career choices (Gadassi et al., 2012). DCB regarding the criticality of career decisions are detrimental as well because individuals may perceive career decisions as final, once-in-a-life events leading to feeling heightened anxiety and decision paralysis (Hechtlinger et al., 2019; Thompson, 1976). Such beliefs are especially dysfunctional in the modern labor market with numerous career transitions where career adaptability is becoming increasingly important (Pryor & Bright, 2014).

Additional DCB comprise myths about the role of professional help in career decision-making. Some individuals believe that career assessment tests and career counselors can provide them with their best-suited career choice, which often results in disappointment when they realize that career decision-making often entails significantly more personal engagement and exploration than they previously thought (Lent & Brown, 2013). Over-reliance on their significant others is another common dysfunctional belief, wherein individuals place excessive emphasis on the ability of the significant people in their lives, such as their family and friends, to know which career path is best suited for them and such, end up making career decisions that often do not align with their skills and strengths (Gati & Levin, 2014; Lipshits-Braziler et al., 2016). Finally, gender stereotypes are detrimental to outlining career expectations, as individuals may limit their career choices based on traditional gender roles (Gadassi & Gati, 2009; Gottfredson, 1981). These beliefs could hinder individuals from exploring careers that are better suited to their skills and interests, thus limiting their ability to choose the optimal career (Hechtlinger et al., 2019).

Given the detrimental consequences of DCB on the career decision-making process, this study explores how the DCB affect students' ATB and how the DCB moderate the relationship between a university's ESS and students' ATB and SSN as well as the impact of SSN on ATB and PBC of

the students. While studies have investigated the positive influence of ESS on the antecedents of EI (Bazan, 2022; Nabi et al., 2017; Rauch & Hulsink, 2015), there has been a limited focus on the role of psychological barriers such as the DCB (Kakouris et al., 2023). These beliefs could prevent students from taking advantage of resources such as mentorship programs and the entrepreneurial support provided by the university. DCB could pose a severe challenge to the effectiveness of a university's ESS in helping students realize their entrepreneurial potential and in increasing the desirability of entrepreneurship as a career. A recent study demonstrated the presence of a moderate inverse relationship between DCB and EI (Tampouri et al., 2023).

The prevalence of DCB among the university students, as documented by Yaghi & Alabed (2021), underscores the need for addressing these beliefs to enhance the effectiveness of the ESS programs and to understand how these beliefs impact the university students' EI.

In psychology and entrepreneurship, data is often collected through surveys that measure constructs – latent variables that cannot be directly observed – by collecting the responses from the participants based on their degree of agreement with each questionnaire item on a Likert Scale. The complexity arises when deciding how to treat this data. Should this data be treated as metric to be able to perform advanced statistical analyses such as covariance-based Structural Equation Modelling, or should this data be treated as ordinal non-metric and stick to analyses that are appropriate for ordinal variables? Likert scales typically measure the level of agreement that the respondents feel regarding a questionnaire item. The argument that the Likert scales should be treated as categorical instead of metric is rooted in their ordinal nature because the distance between the categories "disagree" and "strongly disagree" may not necessarily be the same as the distance between "neutral" and "disagree." However, many researchers posit that if the Likert scales have five or more categories, they can be treated as metric variables as with a sufficient

number of categories, the Likert scales can measure the responses at an approximately metric level of measurement, thereby justifying the application of parametric tests (Carifio & Perla, 2008). As such, researchers have used optimal scaling using techniques such as Gifi methods (Gifi, 1990) to assign metric scores to ordinal data to be able to use statistical analyses that entail assumptions for the data being metric while maintaining the ordinal nature of the variables (Mair, 2018).

Longitudinal analyses are crucial to understanding the stability of entrepreneurial intentions over time and how the impact of university education and support has changed on the antecedents of EI and EI. Several studies have recommended that longitudinal analyses should be conducted to grasp an understanding of these dynamic constructs. These studies offer insights into how exposure to the university's ESS can shape students' EI over time and, as such, offer us a peek into the temporal changes in these constructs and the relationships between them, which cross-sectional studies lack. Using longitudinal data, Botezat et al. (2022) measured the stability of students' EI during the COVID-19 pandemic. Gurel et al. (2021) conducted two waves of data collection to investigate whether higher education has the same impact on the EI of men and women, explicitly considering the risk-taking propensity. A similar study was conducted by Joensuu-Salo (2020), wherein they measured the variations in the EI of the same students pursuing higher education during their first and fourth years of study. Pérez-López et al. (2019) performed a longitudinal study to investigate the degree of decidedness of university students to embark on an entrepreneurial career. Nabi et al. (2018) conducted a similar longitudinal study in a British university wherein they analyzed whether entrepreneurship education among students in the first year of their higher education impacts their EI. Roxas (2014) measured the direct and indirect impact of the knowledge gained through entrepreneurship education on the antecedents of EI among the students at a university in

the Philippines. Rakićević et al. (2022) used longitudinal data to investigate how university education and environment affected the entrepreneurial readiness among the students.

The majority of the studies have applied longitudinal analysis to investigate the impact of entrepreneurship education over time. However, very few longitudinal studies in entrepreneurship literature have performed longitudinal studies to understand the change in the impact of ESS – entrepreneurship education as well as the university initiatives such as incubators, mentorship programs, access to financial resources, etc. - on EI and this research aims to fill that gap.

As such, this study aims to study the DCB university students possess in an attempt to understand which misconceptions regarding career decision-making they possess, how they impact their entrepreneurial intentions, and how these DCB influence the impact of the university's environment and support system on students' EI. Table 1 lists the abbreviations of the constructs studied in this research along with their full forms.

In conclusion, this study aims to contribute to the literature on new venture creation by investigating the moderating effects of certain DCB that university students possess on the relationship between ESS and EI and to understand how specific DCB could impact EI by influencing the antecedents to EI. By incorporating a longitudinal approach, this study also sheds light on the impact of ESS on the antecedents to EI as well as how the levels of the antecedents of EI and EI have changed over time among the students at Memorial University of Newfoundland, Canada, from the year 2020 to 2024, offering valuable insights into the dynamic nature of entrepreneurial intentions.

Table 1. Abbreviations of the constructs studied with their full forms

Abbreviation	Full form
EI	Entrepreneurial intention
ATB	Attitude towards behavior
PBC	Perceived behavior control
SSN	Subjective social norms
ESS	Environment and support system
ET	Entrepreneurial training
SS	Startup support
EM	Entrepreneurial milieu
DCB	Dysfunctional career beliefs
P	Dysfunctional career beliefs regarding the role of professional help
C	Dysfunctional career beliefs regarding the role of the criticality of decision
CF	Dysfunctional career beliefs regarding change or fate
G	Dysfunctional career beliefs regarding the role of gender stereotypes
SO	Dysfunctional career beliefs regarding the role of significant others

3. Literature review

3.1 Career decision making

Career decision-making, which involves choosing an educational or a professional path, is regarded as a pivotal component of career advancement (Osipow, 1999). This process often entails significant cognitive effort and planning (Kautonen et al., 2013), and individuals often face significant obstacles such as lack of information, unpreparedness, and faulty information (Gati et al., 1996; Xu, 2022). Since individuals encounter numerous career decisions throughout their lives, these career decisions affect them and also impact their families.

The career decision-making process can be challenging due to the complexity of the factors involved. As such, career decision-making remains to be a prominent topic in the field of career counseling and vocational psychology (Kulcsár et al., 2020; Xu, 2022). In their proposed taxonomy of career decision-making difficulties (CDD), Gati et al. (1996) attributed the CDD prior to starting the career decision-making process to a *lack of readiness* due to *lack of motivation, indecisiveness, dysfunctional myths,* and *lack of knowledge of the process.*

Research consistently shows that dysfunctional career beliefs (DCB), or maladaptive thoughts about careers and decision-making, significantly affect career decision-making and are among the most common sources of difficulty (Sidiropoulou-Dimakakou et al., 2012). Dysfunctional beliefs, such as overreliance on external factors like fate, often contribute to career indecisiveness, impeding the decision-making process. Gati et al. (2013), using the Career Decision-Making Difficulties Questionnaire (CDDQ), found that DCB were among the most prominent CDD. Furthermore, Mau (2001) identified cultural differences in CDD between Taiwanese and American

students, noting that American students particularly struggled with dysfunctional beliefs, which they ranked as the most significant challenge among all CDD.

3.2 Dysfunctional career beliefs

Dysfunctional career beliefs (DCB) are the beliefs individuals possess regarding the approach to career decision-making and career selection that hinder the career decision-making process due to their unfavorable outcomes (Hechtlinger et al., 2019). These beliefs could cause an individual to avoid the decision-making process or transfer this responsibility to their significant others, thereby resulting in an unfavorable career choice (Sidiropoulou-Dimakakou et al., 2012). Certain beliefs, expectations, and attitudes have been linked to positive career decision-making outcomes, whereas others have been associated with detrimental and undesirable consequences such as avoiding the career decision-making process, starting it but failing to complete it, or making suboptimal career choices (Conklin et al., 2013; Creed et al., 2009; Gati et al., 1996; Hechtlinger et al., 2019).

Research has shown that people who have an external locus of control – individuals who believe that external factors such as fate or other people control their life events, are vulnerable to being influenced by DCB and experience difficulty in selecting their careers (Kırdök & Harman, 2018).

Studies have associated DCB with various adverse outcomes in the career decision-making process. Tampouri et al. (2023) studied the impact of dysfunctional career beliefs and sources of self-efficacy on EI and found that dysfunctional beliefs concerning the role of significant others in career decision-making negatively affected EI. Similarly, Xu & Tracey (2014) underscore an essential aspect of DCB, wherein individuals persistently and compulsively seek an optimal career choice, believing that a perfect decision exists.

The prevalence of DCB among university students has been widely documented. In their research, Yaghi & Alabed (2021) found that DCB had a significant CDD amongst working and non-working university students. They also found that age and gender were the only two demographic constructs correlated with the CDD constructs. Furthermore, Sidiropoulou-Dimakakou et al. (2012) found that students with a higher level of self-efficacy exhibit lower levels of DCB and CDD.

The relationship between DCB and personality traits has also been explored. Pečjak et al. (2019) investigated how the students' personality styles related to their career decision-making and analyzed their relationships with CDD, such as internal and external conflicts, lack of information, and DCB. Their study found that students with the panic decision-making style reported the highest level of DCB. Furthermore, they reported a gender difference in the level of DCB as well; boys possessed lower levels of DCB as compared to girls.

Locus of control has also been investigated as a potential factor of DCB. Kırdök & Harman (2018) investigated the level of CDD among high school students with different locus of control and found that the locus of control did not affect the DCB. However, Xu & Tracey (2014) analyzed the role of ambiguity tolerance (comfort with uncertainty) in career decision-making among college students and found that students with higher levels of ambiguity tolerance reported lesser DCB.

Gati et al. (2013) examined the impact of a 5-day workshop aimed at helping veterans transition to civilian life on their career decision-making difficulties. They found that DCB cannot be alleviated by providing additional information but rather might need an intervention to alter the information processing style.

Xu (2022) conducted a study to explore how DCB impede career decision-making by using the model developed by Hechtlinger et al. (2019). Moreover, they examined the longitudinal

predictions of DCB for career decidedness, career commitment, and significant satisfaction amongst the students of a Midwestern university in the United States. Their study used ambiguity aversion as a general mechanism that students used to endorse the DCB. They hypothesized that it mediates the relationship between DCB and career decidedness, commitment, and significant satisfaction.

Various tools have been developed to measure DCB. Widely used instruments include the Career Beliefs Inventory (Krumboltz, 1994), the Career Thoughts Inventory (Sampson et al., 2013), the Career Myths Scale (Stead & Watson, 1993), and the Career Decision Difficulties Questionnaire (Gati et al., 1996). The Dysfunctional Career Decision-Making Beliefs Questionnaire (DCBQ) (Hechtlinger et al., 2019) was recently developed, and it measures DCB regarding the role of significant others, the role of professional help, the role of chance or fate, the criticality of the decision, and gender. They posit that DCB is a multidimensional construct as individuals who possess certain DCB do not necessarily possess other DCB. As such, there is a need for a research instrument that measures the different dimensions of DCB. In this study, the DCBQ has been used to investigate the DCB among students. Based on the explanations provided by Hechtlinger et al. (2019). The following text will explain the DCB regarding different factors. The specific types of DCB considered in the study are explained next.

DCB regarding the ***role of chance or fate*** pertains to how strongly individuals believe that their career path is majorly decided by chance or fate and, as such, do not invest enough time and energy into the career decision-making process (Hechtlinger et al., 2019). Contemporary theories of vocational behavior acknowledge the significance of chance events in career development, especially in the modern world, owing to the increasingly dynamic nature of different careers. For instance, the chaos theory of careers (Bright et al., 2005), planned happenstance theory (K. E.

Mitchell et al., 1999), and career adaptability (Savickas, 1997) all underscore the value of being open to unanticipated opportunities and remaining actively engaged in career development as a lifelong process. However, individuals tend to exhibit a reduced sense of personal agency in the career decision-making process if they firmly believe in the role of chance or fate. This DCB aligns with an external locus of control as the individuals believe that external factors control their career trajectory rather than their actions. It has been observed that adaptive career behaviors and successful career decision-making can be associated with individuals who firmly believe in their ability to control their career outcomes and, as such, possess an internal locus of control (Gadassi et al., 2012).

DCB regarding the ***criticality of the decision*** pertains to how strongly individuals believe that the career decision is a once-in-a-lifetime event. Hence, they must be extremely cautious while making that decision (Hechtlinger et al., 2019). This belief aligns with the concept of singularity and finality introduced by Thompson (1976). Career decisions are essential, and it is generally adaptive to invest efforts in the career decision-making process (Gadassi et al., 2012); however, treating these decisions as a once-in-a-lifetime event can be dysfunctional (Hechtlinger et al., 2019), especially given the dynamic nature of the contemporary labor market wherein individuals often undergo several career transitions during their lifetime (Pryor & Bright, 2014; Savickas, 1997). Such DCB could lead to individuals feeling a heightened sense of anxiety and potentially experiencing decision paralysis and, as such, may avoid making the decisions altogether. Moreover, the pressure caused by such DCB could exacerbate the fear of failure, which has been found to have detrimental effects on decision-making and self-efficacy (Creed et al., 2009).

DCB regarding the ***role of professional help*** relates to the extent to which the individuals believe that a career counselor can provide them with the appropriate guidance they need to make the

optimum career choice (Hechtlinger et al., 2019). Some individuals believe that career assessments could uncover a single, perfect career option for them as such, hold unrealistic expectations from psychological assessments (Thompson, 1976; Tinsley & Bradley, 1986). Research in career counseling continues to explore this DCB where individuals believe that career counselors possess this "magical" ability to accurately solve their career selection dilemma and outline the best career path for them (Gati, Amir, & Landman, 2010). Such unreasonable career expectations can result in disappointment when individuals realize that career decision-making entails more active involvement than what they initially thought (Lent & Brown, 2013)Furthermore, these misconceptions could restrict a person's willingness to participate in the career exploration process or develop their own decision-making abilities due to their overreliance on external sources of guidance.

DCB regarding the ***role of significant others*** refers to how strongly individuals feel that the significant people in their lives, such as their family and friends, know their skills and aptitudes better than they do. Hence, they would know which career path they should choose better than they can (Hechtlinger et al., 2019). This dependence of individuals on obtaining input from others could lead to placing undue importance on their advice. While seeking guidance from significant people is standard advice in decision-making and could provide valuable insights (Gati & Levin, 2012; Harren, 1979), an over-reliance on external opinions could be maladaptive. Studies show that this reliance on external opinions could lead to lower self-efficacy and a career selection that does not align with their interests and abilities (Gadassi et al., 2012; Lipshits-Braziler et al., 2016). Furthermore, research has shown that career choices made to satisfy others' expectations could lead to greater career indecision and higher dissatisfaction later in life as individuals may struggle

with a reduced sense of personal agency in the decision-making process (Koydemir & Demir, 2008; Leong & Chervinko, 1996).

DCB regarding the ***role of gender stereotypes*** pertains to how strongly individuals believe that their gender limits the number of desirable career options (Hechtlinger et al., 2019). Right from their childhood, both boys and girls start classifying different occupations based on gender, and as they grow, they show a proclivity towards pursuing occupations that align more with their gender (Gottfredson, 1981). These perceptions towards careers based on gender persist till young adulthood (Gadassi & Gati, 2009) and individuals often restrict their preferred career choices based on these misconceptions and perceived barriers (Hechtlinger et al., 2019). Such DCB could prove to be detrimental to selecting an ideal career choice as individuals may not consider exploring specific careers due to their misconceptions and, as such, could potentially select a sub-optimal career choice (Hechtlinger et al., 2019).

3.3 University's environment and support system

A university's environment and support system (ESS) is a term used to describe the group of different support mechanisms established to assist and promote entrepreneurial activities and innovation within and around the campus (Bazan, 2022). An ESS aims to ensure a university environment conducive to entrepreneurial endeavors. The two main approaches that universities take to promote EI of students are by providing entrepreneurial education and by establishing an ESS that promotes students' positive attitude toward entrepreneurship and impacts the self-perception of their ability to launch a new venture (Bazan, 2022; R. Trivedi, 2016). In their study, Bazan, Shaikh, et al. (2019) and Bazan (2022) found evidence that ESS consists of three distinct dimensions of Entrepreneurial Training (ET), Startup Support (SS), and Entrepreneurial Milieu (EM)

Previous research has shown that the entrepreneurial support provided by the university in the form of technology transfer offices, university incubator programs, and financial assistance could help promote entrepreneurial activities among the students (Lerner, 2004; Saeed et al., 2015). An entrepreneurial university plays a significant role as an enabler of an entrepreneurial ecosystem (Guerrero & Urbano, 2014).

For instance, Debackere & Veugelers (2005) investigated the evolution of university-based technology transfer mechanisms and underscored the importance of universities in fostering an entrepreneurial mindset. They concluded that universities enhance students' EI and contribute to job creation and economic growth. Lüthje & Franke (2003) similarly found that both contextual factors, such as perceived barriers and support systems, directly influence students' EI.

Building on this, Franke & Lüthje (2004) compared the impacts of three universities' environmental factors on students' EI and found that the university as a specific environmental factor significantly impacts students' EI. Similarly, Shirokova et al. (2016) studied how environmental factors such as the university environment and uncertainty avoidance impact the transition from EI to entrepreneurial actions amongst university students and found that the university environment positively moderates the relationship between EI and the scope of start-up activities.

Further, Mustafa et al. (2016) hypothesized that the students' perceptions of the education, business concept development, and business development support offered by their university positively impacted their EI and found that only the concept development support had a significant impact. Similar results were observed when Saeed et al. (2015) investigated perceived university support's role in forming EI among students. They posited that perceived educational support, concept development support, and business development support positively impact entrepreneurial self-

efficacy, which in turn aids in forming higher levels of EI among students. They concluded that the perceived educational support affected entrepreneurial self-efficacy to the greatest extent, followed by concept and business development support.

Trivedi (2017) performed a comparative study of the impact of ESS on the EI of university students in India, Malaysia, and Singapore, finding that ESS has a significant indirect effect on EI through PBC. Additionally, Zollo et al. (2017) carried out a study to analyze the behavioral and contextual factors that affect the entrepreneurial universities' ability to influence students' EI. Their study found that the students' perception of the university environment significantly affects their EI and ATB.

Several studies have reinforced the positive impact of the university's environment, either directly or indirectly (García-Rodríguez et al., 2017; Lim, 2018; Lopez & Alvarez, 2019; Soria-Barreto et al., 2017; Tognazzo et al., 2017). In their research investigating the effects of the university environment, entrepreneurial environment, and perceived risk of entrepreneurship, both direct and indirect, via the three antecedents of EI (ATB, PBC, and SSN), Laguía González et al. (2019) analyzed the data gathered from Spanish universities as part of the GUESS project (Global University Entrepreneurial Spirit Students' Survey) and found that the university environment was the precursor with the most significant impact on EI.

Interestingly, not all research points to the same conclusions. Akinwale et al. (2019) found that the university environment had a positive but insignificant effect on the EI of students in an Arabian university, indicating that contextual differences could affect ESS.

In a different context, Liu et al. (2022) combined the TPB with person-environment fit theory to examine the indirect influence of perceived university support on the EI of students from a

university in China through ATB, SSN, and entrepreneurial self-efficacy. They found a significant effect of perceived university support on SSN and ATB, which is more substantial for students with a higher need for autonomy. Anjum et al. (2023) collected data from the business students of nine universities in India and found that perceived university support significantly moderates the relationship between ATB and EI.

Recent research highlights the significant role that a university's ESS plays in shaping students' EI. Studies consistently underscore the positive impact of entrepreneurship education on EI (Fan et al., 2024; Galvão et al., 2024; Khalil et al., 2024; Liu et al., 2025). This effect is often mediated by factors such as ESE (Fan et al., 2024; Z. Liu et al., 2025; Shen et al., 2025), entrepreneurial attitude (Fan et al., 2024; Song & Lu, 2024), and individual entrepreneurial orientation (Khalil et al., 2024).

Beyond formal education, extracurricular entrepreneurship activities (Overwien et al., 2024), entrepreneurship competitions (Shen et al., 2025), and training programs (Dong et al., 2024), have also been found to enhance EI by positively impacting PBC and self-efficacy. Curriculum design (Razi-ur-Rahim et al., 2024) and perceived institutional support (Galvão et al., 2024) have been found to contribute to entrepreneurial aspirations. However, findings suggest that the influence of entrepreneurship education on EI is not always straightforward. For example, Ghouse et al. (2024) did not find a direct effect of entrepreneurship education on EI among rural students, but self-efficacy and entrepreneurial skills were found to have a significant positive effect on EI. Furthermore, Song & Lu (2024) found that entrepreneurial fear of failure mediates the effect of university entrepreneurship support on EI, emphasizing the psychological dimensions of entrepreneurship.

Additionally, social and contextual factors have also been examined. Nguyen & Nguyen (2024) observed that social norms mediate the relationship between entrepreneurship education and entrepreneurial passion, whereas Fan et al. (2024) found that entrepreneurial social support moderates the relationship between entrepreneurship education and EI.

Most of the studies in the literature have investigated the effect of the ESS of a university on the students' ATB and PBC. While analyzing the impact of ESS on students' EI, very few have focused on the impact of ESS on SSN (Bazan, 2022). This study builds upon the model developed by Bazan et al. (2019); they assessed how Memorial University's ESS impacts the antecedents of students' EI.

3.4 Theory of planned behavior

New venture creation is a process wherein the gains are constantly evaluated against the risks before an individual decides to embark on that journey. Several factors affect a person's choices in choosing an entrepreneurial path, such as the identification of a potential market need, the possibility of securing necessary resources, the availability of mentors, etc. Hence, choosing to start a career in entrepreneurship is a planned behavior. Psychology has evinced that intentions have proven to be the best predictors of planned behavior (Krueger et al., 2000) Hence, entrepreneurial intentions have been a significant focus of research in studying new venture creation.

The theory of planned behavior developed by Ajzen (1991) has been extensively used in research to assess and predict human behavior. According to TPB, intentions are precursors to behavior. The intentions are affected by three motivational antecedents: ATB, PBC, and SSN. ATB measures how favorable or unfavorable an individual perceives a behavior (Ferri et al., 2018). In our study,

we use ATB in an entrepreneurial context, and as such, it measures the degree to which an individual considers entrepreneurial behavior to be a desirable career path. PBC relates to an individual's perception of their capability to start a new venture which has been found to significantly predict EI (Kolvereid & Isaksen, 2006). SSN relates to an individual's social pressure towards executing or not executing specific behavior, i.e., new venture creation.

A significant number of studies have used the Theory of Planned Behavior (TPB) (Ajzen, 1991) to assess the influence of various factors on the three antecedents to the Entrepreneurial Intentions (EI), namely, attitude toward behavior (ATB), perceived behavioral control (PBC), and subjective social norms (SSN). The impact of entrepreneurship-specific education on the antecedents of students' EI has been researched extensively in literature (Baubonienė et al., 2018; Boldureanu et al., 2020; Figueiredo Belchior & Lyons, 2022; Packham et al., 2010).

TPB has been used extensively to study the formation of EI across various contexts. Liñán & Chen (2009) validated a model based on TPB across students in Spain and Taiwan, underlining the importance of ATB and PBC as significant determinants of EI. In a similar manner, Iakovleva et al. (2011) implemented TPB to study the cross-country differences in EI, emphasizing the universality of TPB's constructs in predicting EI across different cultural settings.

Furthermore, the research on TPB's role in entrepreneurial education and self-efficacy on EI has practical implications. For instance, Fayolle & Gailly (2015) found that entrepreneurial education programs can be designed to influence students' antecedents to EI, with these interventions indirectly impacting EI through their effect on ATB and PBC. Similarly, Krueger et al. (2000) applied TPB to study the impact of entrepreneurship education on the antecedents of EI among students, highlighting the practical strategies that can be employed to increase perceptions of

feasibility (PBC) and desirability (ATB) in fostering entrepreneurial behavior. These practical implications make the research findings more engaging and relevant.

3.5 Quantitative methods used for analyzing complex factor structures

This section reviews the latest analytical techniques for multivariate analysis in psychology and cognitive sciences. This section focuses on understanding the techniques researchers use to evaluate complex relationships, such as the mediation effects among different factors, and how they handle missing data in their analysis. Models are conceptualized to explain different phenomena and are often grounded in theory. Model comparisons are often performed to assess which model represents the concept or a theory the best. Two approaches are usually undertaken to perform model comparisons; the first approach is an explanation, wherein we evaluate which of the competing models best fit the observed data, and the second approach focuses on assessing which competing model can best predict out-of-sample data (P. N. Sharma et al., 2023).

First-generation statistical techniques that are used to test hypothesized relationships between factors of interest, such as multiple regression, logistic regression, and analysis of variance, require a simple model structure, the variables need to be observable, and the variables need to be measured without any errors (Hair et al., 2021). However, in assessing human behavior, the majority of research requires measuring latent variables that cannot be directly observed, such as ATB, PBC, SSN, and EI. The research often focuses on multiple variables of interest, resulting in a complex model structure. As such, first-generation statistical techniques cannot be used in such scenarios.

In light of these limitations of the first-generation techniques, the structural equation modeling approach has often been employed to effectively model and study complex relationships between

latent variables of interest. The structural equation modeling approach can analyze the relationships between multiple multi-indicator independent variables and multiple multi-indicator dependent variables. The two primary approaches to evaluate complex relationships in a structural equation model are covariance-based structural equation modeling (CB-SEM) and partial least square structural equation modeling (PLS-SEM). CB-SEM treats the latent variables as common factors that explain the variance associated with their indicators. In contrast, PLS-SEM involves combining the indicators associated with the variables in a linear manner to form composite variables, which are assumed to be the comprehensive representations of the constructs being measured (Hair et al., 2021).

Researchers have recently begun focusing on the PLS-SEM approach over CB-SEM. The application of CB-SEM requires performing two complex steps, whereas PLS-SEM performs the analysis in a single step (Manley et al., 2021). Furthermore, the CB-SEM requires adherence to strict assumptions before performing the analysis, such as the requirement for the data to be distributed normally, whereas PLS-SEM is capable of handling non-normal data (Hair et al., 2021).

PLS-SEM is very effective when an exploratory approach is required to research theories that have not been developed much, and the focus lies on making out-of-sample predictions (Manley et al., 2021). The development of theory in entrepreneurship is still in its early stages, and most of the research in this field requires concepts from other disciplines, such as sociology, psychology, anthropology, etc. (Kuratko et al., 2015). Our research integrates the fields of entrepreneurship and psychology, and research outcomes could have important policy implications. Hence, PLS-SEM is a suitable approach for the current study.

Recent work by Manley et al. (2021) presented new PLS-SEM analysis techniques wherein they specified several reasons for utilizing PLS-SEM over other statistical methods, which include the

ability to perform analysis when the sample size is small or the data is not normally distributed, performing exploratory research in fields that lack theory development and is advantageous when the predictive ability of the model is the primary statistical objective.

PLS-SEM is a two-step process wherein the measurement model evaluation is conducted first, followed by a structural model assessment. The measurement model evaluation stage, also known as confirmatory composite analysis (CCA), involves evaluating the reliability and validity of the measurement model. Once the model meets the recommended criteria for the measurement model evaluation phase, we can move on to the structural model assessment phase. In this phase, the multicollinearity between the independent variable constructs is evaluated, the effect size and statistical significance of the path coefficients are evaluated, and the out-of-sample predictive validity is determined (Manley et al., 2021). Once these two phases are completed, the researcher can report the findings.

CB-SEM is an explanation-based approach that focuses on the goodness-of-fit indices (Hair et al., 2017) whereas PLS-SEM is a "causal-predictive" approach developed to perform explanatory as well as prediction-oriented analysis of models (P. N. Sharma et al., 2023).

Liengaard et al. (2021) developed a cross-validated predictive ability test (CVPAT) for comparing theoretically grounded models by evaluating an overall model-level statistical inference test. Sharma et al. (2023) built upon their work and extended the CVPAT framework's capabilities to enable predictive benchmarking and compare the predictive accuracy of the models at the construct level, which is essential for focusing on the outcomes of key variables of interest. Methods used for performing SEM with ordinal variables are discussed further in the Methodology section of this study.

This study contributes to entrepreneurship research by conducting a longitudinal analysis of the impact of a university's environment and support system (ESS) on students' entrepreneurial intentions (EI). It also tracks changes in key constructs - including EI, attitude towards behavior (ATB), perceived behavior control (PBC), and subjective social norms (SSN) over the years 2020, 2022, and 2024. Furthermore, this study makes a significant contribution by evaluating the impact of dysfunctional career beliefs (DCB) among university students on the antecedents of EI as well as their moderating effect on the relationship between a university's ESS and the antecedents of EI.

4. Hypotheses development

This study builds upon the models developed by Bazan et al. (2019) and Bazan (2022) wherein they studied the effect of Memorial University of Newfoundland's ESS on the antecedents to EI of university students. In their work, they posited the hypothesis that ESS consists of three distinct dimensions of Entrepreneurial Training (ET), Startup Support (SS), and Entrepreneurial Milieu (EM) and found conclusive evidence to support their hypothesis. The hypothesis H0 is stated as follows to confirm this in the current study:

H0: ET, SS, and EM are three distinct dimensions of ESS.

Extensive research has found that the motivational antecedents of EI, ATB, and PBC are significantly affected by different situational and contextual factors, such as career anchors (Lee & Wong, 2004) and role models (Krueger et al., 2000). A university's ESS may have an exogenous indirect impact on the students' EI by affecting the students' motivational antecedents to EI, such as ATB and PBC (Fishbein & Ajzen, 2011). A university can impact students' EI by providing entrepreneurship-specific education (Boldureanu et al., 2020; Packham et al., 2010), through entrepreneurial initiatives (Baubonienė et al., 2018), spin-off initiatives (Markuerkiaga et al., 2016), and by providing mentor support and networking opportunities (Bazan, Shaikh, et al., 2019).

Bazan, Shaikh, et al. (2019) and Bazan, Datta, et al. (2019) investigated the role played by Memorial University's ESS on the antecedents of EI. Their results supported the idea that ESS impacts ATB and PBC, significantly impacting EI. Bazan (2022) studied the impact of Memorial University's SSN and found evidence to support their hypothesis that a university's ESS can

impact students' perceptions regarding the opinions of the significant people in their lives regarding their embarkment upon the entrepreneurial path.

Thus, several studies support that a university's ESS can shape students' EI differently. Hence, the hypotheses H1, H2, and H3 were posited as:

H1: Memorial University's ESS positively affects the ATB of students.

H2: Memorial University's ESS has a positive effect on the PBC of students.

H3: Memorial University's ESS has a positive effect on the SSN of students.

Hypotheses H4, H5, and H6 are derived from the TPB, wherein it is postulated that the antecedents of EI positively affect EI. The ATB construct measures the degree to which an individual shows like / dislike towards a behavior, and other exogenous factors can alter the attitude (Ajzen, 1991). Indeed, a person's attitude towards a behaviour depends upon the feelings of favorableness or unfavorableness for the behaviour, and ATB is one of the most significant constructs in explaining EI (R. Trivedi, 2016)Hence, hypothesis H1 indicates that students who have a more favorable attitude towards entrepreneurship would also have higher levels of EI.

The SSN construct measures an individual's perceptions regarding how significant people, such as parents, spouses, and peers, think about a specific planned behavior (Ajzen, 1991), i.e., entrepreneurial behavior in this study. Fundamentally, it refers to the social pressure an individual experiences for executing or refraining from executing specific behavior (Bazan, Shaikh, et al., 2019). The research regarding the impact of SSN on EI has been inconsistent thus far, as many studies have reported that SSN is not a strong predictor of EI (Krueger et al., 2000), whereas other studies have indicated that SSN has a weak but significant impact on EI (Kautonen et al., 2013; Lüthje & Franke, 2003). Hypothesis H5 suggests that for students who value the opinions of the

significant people in their lives, the EI would be more robust when they feel encouraged to pursue entrepreneurial behavior (Bazan, Shaikh, et al., 2019).

The construct PBC refers to how easy or difficult individuals perceive the execution of a behavior to be (Ajzen, 1991). This construct deals with the feasibility of embarking on the entrepreneurial journey. Several factors affect the feasibility of starting a new venture, both internal, i.e., believing the individual possesses the ability to execute the behavior, and external factors, such as availability of opportunity for new venture creation and accessibility to the funds required (Trivedi, 2016). Hence, if an individual believes that they can quickly obtain funding and believes that they can start a new venture, their EI would be high as well. In the entrepreneurship literature, PBC is a strong indicator of EI (Souitaris et al., 2007; Van Gelderen et al., 2008). Hypothesis H6 implies that students who possess a higher level of PBC would have higher levels of EI.

H4: ATB has a positive effect on the EI of students.

H5: SSN has a positive effect on the EI of students.

H6:PBC has a positive effect on the EI of students.

Prior studies suggest that although SSN has a weak impact on EI, it has a strong influence on the other antecedents of EI, PBC, and ATB (Bazan, 2022; Liñán & Santos, 2007). From the social capital perspective, many researchers posit that values transmitted by significant people would enhance ATB and PBC (Cooper, 1993; Liñán & Santos, 2007; Mathews & Moser, 1995). In their study, Liñán & Santos (2007) explain the subjective norms to be a specific type of social capital and suggest that they have a causal effect on ATB and PBC (Liñán & Chen, 2009). As such, hypotheses H7 and H8 posit that SSN impacts ATB and PBC positively.

H7: SSN has a positive effect on the ATB of students.

H8: SSN has a positive effect on the PBC of students.

Gender stereotypes are assumptions about individuals' expected behavior based on gender (Ellemers, 2018). From early childhood, individuals are taught the societal expectations of men and women through different social interactions with significant people, such as their parents (Kollmayer et al., 2018). As such, as they navigate through life, individuals feel reluctance and anxiety towards not conforming to stereotypical behavior. Women are stereotyped as caring, kind, and helpful, whereas men are often stereotyped as strong, aggressive, and independent (Hentschel et al., 2019). Due to these established stereotypes, individuals often limit their career choices based on their perceived barriers and misconceptions, leading them to make a less-than-optimal career choice (Hechtlinger et al., 2019). DCB regarding the role of gender stereotypes pertains to how strongly individuals believe that their gender limits the number of desirable career options.

Entrepreneurship has traditionally been viewed as a masculine profession. Entrepreneurship research has shown that gender stereotypes impact all three antecedents of EI. If women who have been exposed to gendered stereotypes decide to embark upon their entrepreneurial career, they experience stereotype threat wherein they feel anxiety about their actions being judged as a result of the negative stereotypes (Nadal, 2017). As such, they might develop a negative outlook toward the stereotyped careers and lose interest in them (Fogliati & Bussey, 2013), hence hypothesis H9 posits that DCB regarding the role of gender stereotypes hurts the ATB among female students. Furthermore, due to the existing gender stereotypes, women could feel that they are not capable enough to become entrepreneurs (Baron et al., 2001). Hence, hypothesis H10 states that DCB regarding the role of gender stereotypes negatively impacts PBC among female students.

H9: DCB regarding the role of gender stereotypes negatively impacts ATB among female students.

H10: DCB regarding the role of gender stereotypes negatively impacts PBC among female students.

DCB regarding the role of chance or fate pertains to how strongly individuals believe that their career path is majorly decided by chance or fate and, as such, do not invest enough time and energy into the career decision-making process (Hechtlinger et al., 2019). The students who strongly believe in the role of chance or fate might not feel the need to participate in the entrepreneurial workshops, networking events, mentorship programs, etc, offered by the university as their career choice would be decided by fate anyway (K. E. Mitchell et al., 1999). As such, the entrepreneurial initiatives taken by the university may not be able to impact the students' ATB. Hence, hypothesis H11 is posited as follows:

H11: The impact of ESS on ATB is lower for students who possess higher levels of DCB regarding the role of chance or fate in career decision-making.

The DCB regarding the role of significant others refers to how strongly individuals feel that the significant people in their lives, such as their family and friends, know their skills and aptitude better than them, and hence, they would know which career path they should choose better than they can (Hechtlinger et al., 2019). The DCB regarding the role of significant others could positively influence the impact of SSN on PBC. The students might try to align their goals with the expectations of their significant others. If significant others believe that entrepreneurship would be a viable career alternative for them, then these beliefs might bolster the students' confidence in pursuing an entrepreneurial career. Research has shown that social support from significant people

can enhance one's perceived behavior control by providing validation and reducing uncertainty (Arenius & Minniti, 2005; Schmutzler et al., 2019). Hence, the DCB regarding significant others is generally considered maladaptive for an individual, but it could positively impact the PBC of students.

Similarly, students who possess DCB regarding significant others might feel more inclined towards an entrepreneurial career if the significant people in their lives perceive entrepreneurship as a good career alternative. Research has shown that perceived social approval from significant people in lives can impact attitudes significantly (Liñán & Chen, 2009a). Hence, the hypotheses H12 and H13 are formulated as follows:

H12: The impact of SSN on PBC is higher for students who possess higher levels of DCB regarding the role of significant others in career decision-making.

H13: The impact of SSN on ATB is higher for students who possess higher levels of DCB regarding the role of significant others in career decision-making.

The DCB regarding the role of professional help pertains to the extent to which the individuals believe that a career counselor can provide them with the appropriate guidance they need to make the optimum career choice (Hechtlinger et al., 2019). The students who possess DCB regarding the role of professional help often believe that career counselors, career assessments, or the university's ESS can provide them with the best-suited career they need to pursue. Suppose the university's ESS fails to provide them with the exact action steps to embark on their entrepreneurial journey. In that case, they might lose faith in ESS's ability to help them in the entrepreneurial path. Research has shown that organizational climate has a positive impact on the SSN of the organization's members (Bock et al., 2005; Tohidinia & Mosakhani, 2010) if the students who

possess DCB regarding professional help do not trust ESS's ability to help them, they might not perceive a robust social expectation to pursue entrepreneurship. Furthermore, the university's ESS can positively impact the opinions of students' families regarding entrepreneurship as a career choice and thereby bolster their support for the students' new venture creation activities. However, if the students hold unrealistic expectations regarding the role of ESS and career counselors to guide them on the entrepreneurial path and their expectations are not met, they could feel dissatisfied. When they convey this dissatisfaction to their family members, it may negatively affect the family members' opinions regarding entrepreneurship. In this manner, the DCB regarding the role of professional help can decrease the positive impact of ESS on students' SSNs. Hence, the following hypothesis is formulated:

H14: The impact of ESS on SSN is lower for students who possess higher levels of DCB regarding the role of professional help in career decision-making.

The DCB regarding the criticality of the decision pertains to how strongly individuals believe that the career decision is a once-in-a-lifetime event, and hence, they must be extremely cautious while making that decision (Hechtlinger et al., 2019). The students who possess career myths treating the career decision as a very crucial choice are often prone to heightened anxiety and stress during the career decision-making process (Lipshits-Braziler, Gati, & Tatar, 2016). The inherent risk and uncertainty in undertaking an entrepreneurial endeavor might exacerbate these feelings and lead the students to perceive entrepreneurship as an undesirable career. While outlining the developments in the Chaos theory of Careers, Pryor & Bright (2014) highlight the importance of being adaptable to career versatility and the ability to embrace change in the contemporary world due to the dynamic nature of the careers. The students who possess heightened rigid beliefs regarding career decisions might not consider the inherent uncertainty in entrepreneurship as

desirable and thus might develop a negative attitude towards entrepreneurship. Hence, the hypothesis H15 is stated as follows:

H15: DCB regarding the criticality of decision negatively impacts ATB.

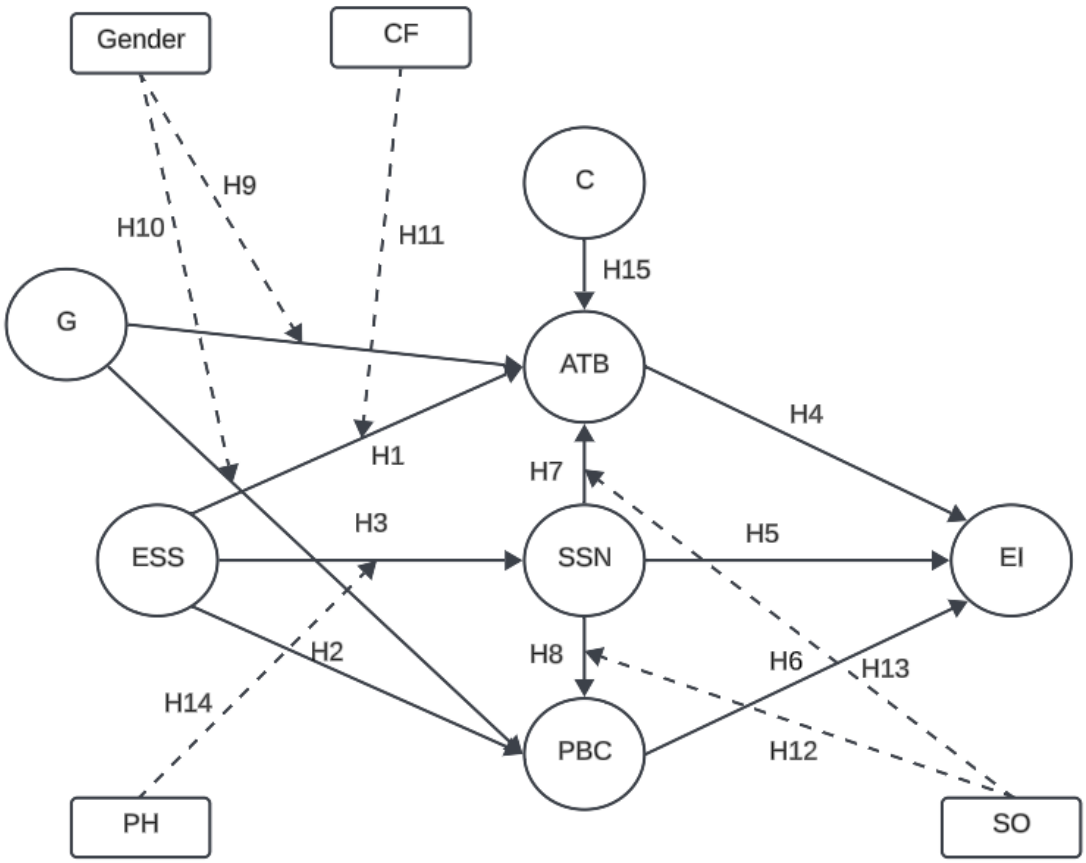

Fig. 1 Conceptual model and hypothesized relationships

5. Methodology

5.1 Data collection

A cross-sectional survey was developed to test the hypotheses, and data collection was conducted from May 23, 2024, to August 18, 2024. The structured questionnaire was distributed through an anonymous online survey hosted on the Qualtrics platform. Validated questionnaire items were used to conduct the study (Bazan, Datta, et al., 2019; Hechtlinger et al., 2019; Liñán & Chen, 2009a; R. Trivedi, 2016; R. H. Trivedi, 2017).

Data was collected from the students at Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada. Before submitting the survey for ethics approval, the questionnaire was presented to one academic and six non-participating students to check for the any issues with the questionnaire content, such as questionnaire items being redundant / too wordy, etc. The research proposal was then submitted to the Interdisciplinary Committee on Ethics in Human Research at Memorial university to ensure compliance with the ethics policies. The students were informed about the purpose of research, instructions to answer the questions, and the anonymity of the survey in the recruitment letter as well as on the informed consent page which appeared when they click the link to initiate the survey.

5.2 Measures

All the constructs were measured using a seven-level Likert scale. The respondents were asked to indicate their level of agreement with the items on a scale of 1-7, where 1 indicates "I completely disagree" and 7 indicates "I completely agree".

Attitude toward behavior – This construct was measured using a previously validated instrument, the Entrepreneurial Intention Questionnaire (EIQ) developed by Liñán & Chen (2009). The scale

items measured how desirable the respondents found an entrepreneurial career to be. An example of a scale item is “A career as an entrepreneur is attractive to me.”

Perceived behavior control – This construct was measured using a previously validated instrument, the Entrepreneurial Intention Questionnaire (EIQ) developed Liñán & Chen (2009)The scale items measured how capable the respondents felt of undertaking an entrepreneurial endeavor. An example of a scale item is “Starting a business and keeping it viable would be easy for me.”

Subjective social norms – This construct was measured using a previously validated instrument, the Entrepreneurial Intention Questionnaire (EIQ), developed Liñán & Chen (2009). The scale items measured the respondents’ perceived social pressure to undertake or refrain from undertaking an entrepreneurial career. An example of a scale item is “My immediate family values the entrepreneurial career more than any other career.”

Entrepreneurial intention – This construct was measured using a previously validated instrument, the Entrepreneurial Intention Questionnaire (EIQ), developed Liñán & Chen (2009). The scale items measured the students' intention to pursue an entrepreneurial career. An example of a scale item is “My professional goal is to be an entrepreneur.”

University’s environment & support system – This construct was measured using a previously validated instrument (Bazan, 2022; Bazan, Datta, et al., 2019; R. Trivedi, 2016; R. H. Trivedi, 2017)The scale items measure whether the students believe that Memorial University provides sufficient support and resources and implements sufficient initiatives to foster entrepreneurship in students. An example of a scale item is, “Memorial University creates awareness of entrepreneurship as a possible career choice.”

Dysfunctional career beliefs – The DCB that students possess were measured by using the dysfunctional career beliefs questionnaire (DCBQ) developed by Hechtlinger et al. (2019). The DCB regarding the criticality of the decision, the role of chance or fate, and the role of professional help were measured using three items each. In contrast, the DCB regarding the role of significant others and the role of gender stereotypes were measured using two items each.

Several items from the DCBQ were altered based on feedback that they were excessively wordy, and a few items attempted to measure multiple concepts simultaneously and, as such, had to be altered. For example, a scale item measuring the DCB regarding the role of significant others, "Meaningful people in my life (such as My family and friends) know me better than I know myself, and so will know what career is best for me" was altered to be "My family and peers know me better than I know myself". Another scale item measuring the role of SO, "Important people in my life (such as family and friends) know what career I should choose," was too similar to the item "My family and friends know which career I should choose better than I do" and as such, was removed from the instrument.

5.3 Demographics

Post data screening, the sample consisted of 404 responses. Out of the 404 responses, there were 227 females and 177 males. The majority of the respondents were aged 18-25 years (69.3%), followed by 26-33 years (16.9%), 34-39 years (7.1%), and 40 plus years (5.2%). The majority of the respondents were undergraduate students (67.8%), while 29% of the respondents were graduate students. Out of all the students who indicated their department of study, the most significant number of responses were from students in the Faculty of Business Administration (25.2%), Faculty of Engineering and Applied Science (25%), Faculty of Science (20.5%), and Faculty of Humanities and Social Sciences (16.6%). It is worth noting that out of the respondents, 52.2% of

students were from Newfoundland and Labrador, 39.1% of respondents were international students, and 6.7% of students were from a different Canadian province.

5.4 SEM with ordinal variables

Historically, the majority of the SEM approaches have focused on linear relationships between latent variables; however, when the structural relationship between the latent variables is nonlinear, the endogenous variables possess a non-normal distribution (Vegelius & Jin, 2021). Exogenous variables are those that are not affected by any variables in the model. In contrast, endogenous variables are those that are affected by the exogenous variables. Non-linear Structural Equation Modeling (NSEM) allows for the specification and analysis of non-linear relationships between the observed and latent variables or among the latent variables, such as interaction effects. In psychology and social sciences, it is pretty standard to encounter non-linear relationships between variables.

Klein & Moosbrugger (2000) developed a latent moderated structural equations (LMS) approach for assessing a general interaction model that uses a finite mixture of normal distributions. This approach provides a maximum-likelihood (ML) estimation of model parameters using the expectation-maximization (EM) algorithm. Klein & Muthén (2007) developed a quasi-maximum likelihood estimation method to test and estimate multiple nonlinear effects simultaneously. The majority of the approaches developed to analyze NSEM have focused on models with continuous indicators (Vegelius & Jin, 2021).

Rizopoulos & Moustaki (2008) considered a generalized latent variable framework with metric and categorical responses to include the nonlinear effects and the covariate effects and estimated

the model parameters while utilizing full maximum likelihood based on a hybrid integration-maximization algorithm.

The seminr R package

As we saw in the previous section, PLS-SEM has been gaining more popularity recently for being able to estimate complex factor models while being less restrictive on the required sample size and normality assumptions, particularly in fields such as marketing, social sciences, and management where data rarely follows a normal distribution. The seminr package (Ray et al., 2024) provides the users with the ability to specify and estimate complex Structural Equation Models using PLS-SEM or CB-SEM approaches.

Unlike other software packages such as SmartPLS (Ringle et al., 2024), the seminr package (Ray et al., 2024) allows seamless integration with other R packages and flexibility in the R programming language, enabling customization to suit user preferences. The seminr package allows users to specify models with reflective and formative constructs. Like other PLS-SEM software that are available at a cost, this open-source package also comprises bootstrapping methods to estimate the significance of path coefficient estimates and assess the robustness of the model. The bootstrapping approach is used to determine the standard errors and confidence intervals by resampling the original data (Davison & Hinkley, 1997).

Researchers have begun the adaptation of the seminr package to conduct their analysis using PLS-SEM. In the field of business, management, and accounting, the seminr package has been used to evaluate models with the outcome variables of interest were behavioral intention to adopt Fintech (Setiawan et al., 2024), economic satisfaction (Berenguer-Contri et al., 2024), and career adaptability (Y. Sharma et al., 2024). Attygalle et al. (2023) used the seminr package to evaluate

their model, analyzing the factors influencing the success of software startups in Sri Lanka using PLS-SEM. There have been very few applications of the seminr package in entrepreneurship to date.

Longitudinal analysis with PLS path modeling

Entrepreneurship is a nascent field of research wherein the longitudinal analysis approach is critical as it facilitates a deeper understanding of the entrepreneurial constructs, especially considering their dynamic nature over time. The entrepreneurial process involves constructs that change over time, such as entrepreneurial intentions, firm growth, and innovation (Davidsson, 2016; Delmar et al., 2003). Methodologies such as longitudinal analysis that account for variation over time should be used to evaluate these temporal changes effectively. Longitudinal studies facilitate researchers in analyzing the evolution of test variables over time, evaluate causal relationships, and assess the effect of factors that change over time. For example, longitudinal data is vital for understanding the transformation of entrepreneurial intentions into entrepreneurial behavior (Kautonen et al., 2013) and how new venture growth patterns surface over time (Delmar et al., 2003). Understanding these time-dependent phenomena allows researchers to investigate the mechanisms behind these entrepreneurial processes better.

To evaluate models that consist of latent variables that are measured through observed indicators, the Structural Equation Modeling approach, as the first-generation techniques such as regression analysis, cannot be used in this scenario (Hair et al., 2014). The researchers then have the option to choose between CB-SEM and variance-based SEM, with PLS path modeling being the most preferred approach (Roemer, 2016).

In longitudinal entrepreneurship studies, researchers can employ the use of PLS-SEM to determine the change in the levels of latent constructs as well as the change in the relationships between latent constructs over some time (Roemer, 2016). Through the implementation of longitudinal PLS-SEM, the researchers can capture the structural relationships as well as the temporal dynamics of the various entrepreneurial processes (Roemer, 2016).

Dijkhuizen et al. (2018) performed a two-wave longitudinal study with a PLS path modeling approach wherein they analyzed whether positive well-being among entrepreneurs at time 1 predicted subjective entrepreneurial success at time 2. Choongo (2017) performed a longitudinal analysis along with PLS path modeling to study the impact of corporate social responsibility on firm performance by conducting two surveys among 153 entrepreneurs. In their longitudinal study, Roxas (2014) measured the changes in entrepreneurial knowledge gained from an entrepreneurial education program on students' perceptions of desirability and self-efficacy in engaging in entrepreneurial behavior, as well as the impact of those changes on students' EI post-completion of their program. They used PLS-SEM to specify and evaluate the measurement and structural models.

It was observed that few studies adopt the PLS path modeling approach in their longitudinal analysis.

5.5 Rationale for Method Selection

PLS-SEM is preferred over other analytical methods for this study as it supports exploratory research where theory, such as entrepreneurship, is still developing. Its ability to handle latent constructs aligns well with measuring ATB, PBC, SSN, and ESS components that are not directly observable but can be inferred through validated scales. Additionally, PLS-SEM's one-step estimation process allows for more efficient analysis of complex models compared to CB-SEM, which entails a multiple-stage approach and requires larger sample sizes (Manley et al., 2021). The Gifi method of optimal scaling was also utilized, enabling the conversion of ordinal Likert scale data into metric form to maintain validity in the PLS-SEM analysis (Carifio & Perla, 2008; Mair, 2018).

Data screening followed protocols outlined by Bazan (2022), resulting in a final dataset of 404 responses after addressing missing values. Little's MCAR test confirmed data randomness, imputing missing values using the Expectation-Maximization (EM) algorithm in IBM SPSS Statistics (version 29). Next, outliers were identified via Mahalanobis distance and removed to improve model fit and robustness.

5.6 Data analysis steps

PLS-SEM was performed based on the guidelines of Hair et al. (2021) using RStudio, and the longitudinal analysis was performed based on the guidelines from Roemer (2016) using SmartPLS (Ringle et al., 2024).

1. Measurement Model Evaluation: The first step involved assessing the measurement model to confirm the reliability and validity of the constructs in this study. Indicator reliability was assessed by examining factor loadings, with values above 0.708 deemed acceptable for retaining, and item Composite reliability (CR) and Cronbach's alpha were calculated for evaluating internal consistency, targeting values above 0.7. Convergent validity was assessed through Average Variance Extracted (AVE) scores, aiming for values above 0.5, to demonstrate that constructs captured sufficient variance from their indicators. Discriminant validity was assessed using the Fornell-Larcker criterion, ensuring that each construct was more closely related to its indicators than other constructs' indicators. Items that did not meet these thresholds were reviewed and removed as needed.

2. Structural Model Assessment: After confirming the measurement model's reliability and validity, the structural model was evaluated to test the hypothesized relationships. This included calculating path coefficients for the different effects and using bootstrapping (with 5,000 resamples) to assess the statistical significance of each path. Path coefficients represent the strength and direction of relationships between constructs, while bootstrapping provides confidence intervals and p-values, establishing statistical significance. Variance Inflation Factor (VIF) values were also examined to check for multicollinearity, ensuring no exogenous variables showed excessive correlation (VIF < 5). Additionally, the model's explanatory power was investigated

using R^2 values for each endogenous variable, indicating the proportion of variance explained by the model.

3. Predictive power assessment: The Q^2 predictive relevance metric was calculated for each model to determine its out-of-sample predictive accuracy, with values above zero indicating adequate predictive capability.

4. Longitudinal Analysis: To explore temporal changes in the ESS's impact on EI, a longitudinal PLS-SEM analysis was conducted across three points (2020, 2022, and 2024). For each time point, separate models were developed to observe changes in path coefficients, allowing for an evaluation of how ESS influences EI antecedents (ATB, PBC, SSN) over time. Cross-sectional samples from each year were tested for consistency, with specific attention to the stability of relationships and any significant variations between time points.

By performing a comprehensive analysis, the study ensures a robust examination of both the immediate and evolving impacts of ESS on EI, accounting for moderating effects and temporal changes. This multi-step approach bolsters the study's validity and offers a detailed framework for replication in similar research contexts.

6. Data analysis

Quantitative research in the field of entrepreneurship often involves the use of surveys that measure latent constructs via Likert scales. The data collected via Likert scales is often analyzed using SEM methodology, which provides the ability to model complex relationships between latent variables. There has been a debate about whether the Likert scale should be considered categorical or metric. Likert scales typically measure the level of agreement that the respondents feel regarding a questionnaire item. The argument that the Likert scales should be treated as categorical instead of metric is rooted in their ordinal nature because the distance between the categories "disagree" and "strongly disagree" may not necessarily be the same as the distance between "neutral" and "disagree". However, many researchers posit that if the Likert scales have five or more categories, they can be treated as metric variables as with a sufficient number of categories, the Likert scales can measure the responses at an approximately metric level of measurement, thereby justifying the application of parametric tests (Carifio & Perla, 2008). How the indicators measured with Likert scales are treated is crucial. Treating them as categorical variables entails using estimation techniques such as weighted least squares estimation, whereas treating them as continuous variables entails using estimation techniques such as maximum likelihood estimation (Rhemtulla et al., 2012). The choice of appropriate estimation is crucial as it affects the goodness of fit indices for the tested model.

A different perception about the Likert scale levels is that they are not ad hoc characteristics of the variable they represent. However, the levels depend on the interaction between the data and the model being tested (Mair, 2018). This perception of scale levels belongs to the world of Optimal Scaling (OS), which is defined as a data analysis technique wherein numerical values are assigned to the observation categories in a manner that maximizes the relationship between the observations

and the model being tested while respecting the measurement character of the data (Young, 1981). This study will use the OS modeling framework called Gifi (Gifi, 1990). While performing optimal scaling for ordinal variables, the order of the transformed scores is required to follow the order of the original scores. Additionally, the transformed scores must be equidistant (Mair, 2018). The following explanation of the Gifi method for optimal scaling is based on the work of Mair (2018, pp. 234-235). The number of dimensions has to be specified before performing the transformation; let the number of dimensions be p. Let S be an n × m matrix containing the observed scores, and $\mathbf{s_j}$ represents the column vector for the variable *j,* with c_j representing the number of categories for the variable j. The indicator matrix $\mathbf{I_j}$ of dimension $n \times k_j$ is defined for each variable and these indicators are combined to form a super matrix $\mathbf{I = (I_1 \mid \ldots \mid I_m)}$ (Mair, 2018)**.** Each variable is assigned to a matrix $\mathbf{Y_j}$ of dimensions $k_j \times p$ which contains the *category quantifications.* Another component that we need is the matrix **X** of dimension $n \times p$ which contains the *object scores* (Mair, 2018). Hence, in this process, each category of variable *j* is assigned an optimally scaled category quantification, and each observation is assigned an object score in p-dimensional space. The loss function established in the Gifi method is as follows:

$$\boldsymbol{\sigma(X, Y_1, \ldots, Y_m) = \sum_{j=1}^{m} tr\left(X - I_j Y_j\right)'\left(X - I_j Y_j\right).}$$ (Mair, 2018)

The equation represents a general loss function whose right-hand side portion is a *sum-of-squares (SS)* expression which is minimized by using an *Alternating Least Square (ALS)* algorithm. The analysis has been conducted per the guidelines of Hair et al. (2021).

6.1 Data screening

The data screening procedure was adopted from Bazan (2022). A total of 607 responses were collected with an average completion rate of 80.23%. There were 163 rows that were missing more than 5 entries (>10%) which were removed. Out of the remaining rows, 153 rows were missing 5 entries, 200 rows were missing 4 entries, 73 rows were missing 3 entries, 17 rows were missing 2 entries, and 1 row was missing 1 entry. Two responses were such that they were completed in a very short duration of time (175 seconds and 206 seconds) and the respondent had selected the same response for every question. As such, they were considered to be unengaged in the survey and their responses were deleted. The survey was designed in such a way that the questionnaire items pertaining to the dysfunctional career beliefs regarding the role of gender stereotypes were assigned to participants based on their gender selection. These survey items were not designed for participants who wished to not disclose their gender and who selected options other than male or female. Hence, the responses where the gender options of male or female were not selected had to be removed as those missing responses cannot be imputed. There were three rows where gender was specified as “non-binary”, and one row specified gender as “gender-fluid”. There were two responses where they had mentioned “prefer not to say” and as such did not specify their gender. Hence, six rows were further removed. In the resultant dataset, there are 436 rows left with 8.35% missing values. Little’s Missing Completely At Random (MCAR) test was performed on this dataset which resulted in the following values for the test statistics: $\chi^2 = 19504.409$, DF = 19535, Sig = 0.560. Since the p-value is greater than 0.05 we can conclude that the test failed to reject the null hypothesis that the data is missing values completely at random. The missing values were then imputed using the Expectation Maximization (EM) algorithm.

Subsequently, optimal scaling was performed using the Gifi package (v0.4-0; Mair et al., 2022) in RStudio. Firstly, we compare the loss function values for fitting the data using the linear transformation and monotone step function (as is needed to fit variables while considering their ordinal nature). The loss function obtained by linear fit was 0.799, which converged in 10 iterations, and the loss function obtained by the monotone step function fit was 0.793, which converged in 16 iterations. Hence, the loss function value improved by 0.75%.

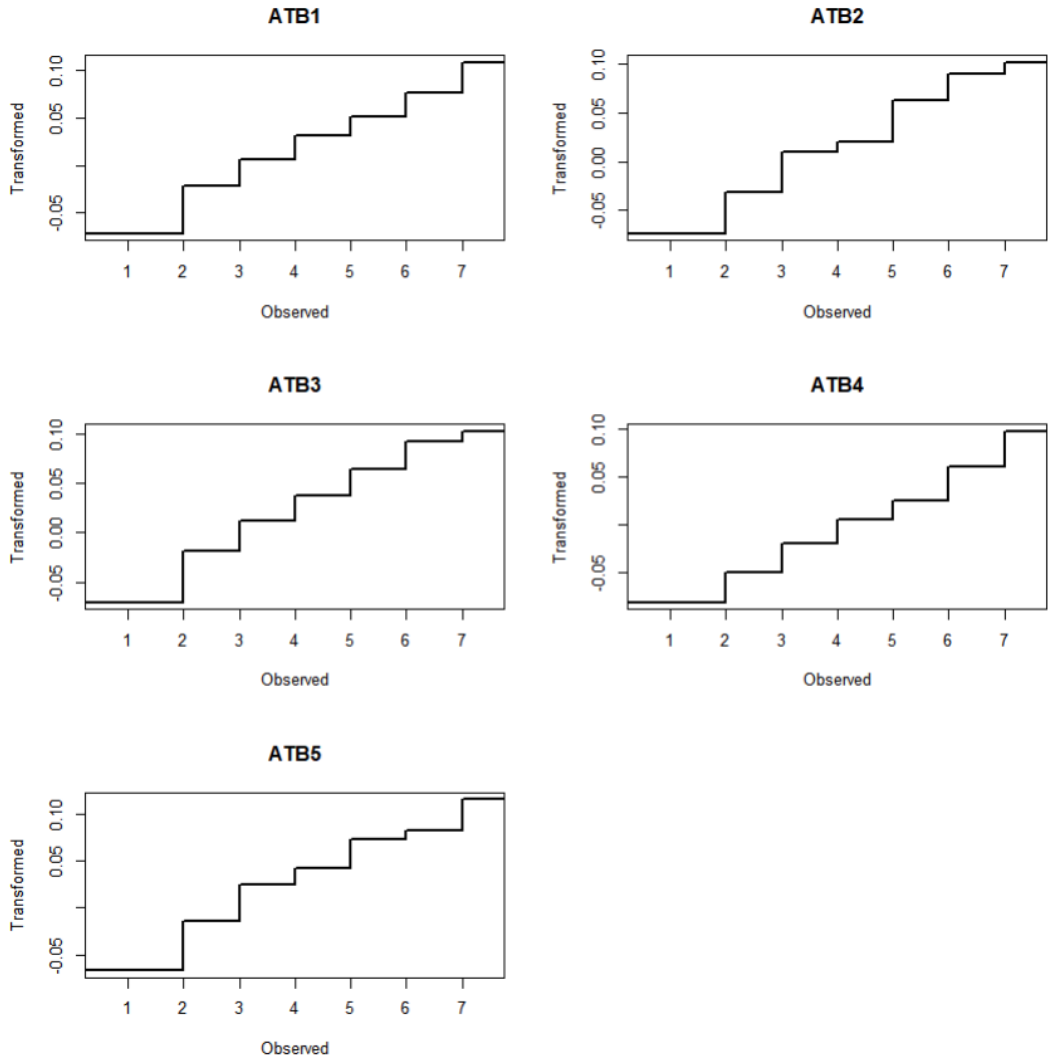

Fig. 2 Princals transformations for ATB construct.

After optimal scaling, the object scores were replaced with the new category scores. Subsequently, 32 outliers were removed based on the Mahalanobis distance (Aguinis et al., 2013; Bazan, 2022) resulting in an optimally scaled dataset with 404 rows.

Partial least square – structural equation modeling (PLS-SEM) was then used to analyze data. To conduct PLS-SEM, the seminr package (v2.3.3; Ray et al., 2024) was used in RStudio.

1. Loading and cleaning data
2. Specifying measurement models
3. Specifying the structural model
4. Estimating, bootstrapping, and summarizing the model.

6.2 Measurement model analysis

In this section, the reliability and the validity of the measurement models will be assessed based on the guidelines from Hair et al. (2021) and Bazan (2022). This study first assessed the measurement models as a preliminary step in evaluating the PLS-SEM process. Although the study includes both second-order and first-order models, the evaluating higher models follows the same criteria as any PLS-SEM analysis (Bazan, 2022). However, assessing the second-order construct requires considering the evaluation criteria for two types of measurement models: those for the first-order components (SS, ET, and EM) and the measurement model for the second-order construct as a whole, which is defined by the relationships between the second-order construct and its first-order components (Bazan, 2022; Sarstedt et al., 2019).

There are four steps in the process of measurement model evaluation. *1) Indicator reliability:* In this section, we inspect how much variance of each indicator is explained by the construct it measures. It is recommended that the indicator loadings be greater than 0.708 since that means

that the construct explains more than 50% of the variance in the indicator (Hair et al., 2021). The indicators with indicator loadings below 0.4 should be removed, and those with loadings between 0.4 and 0.708 should be removed if they improve the internal consistency of the construct (Hair et al., 2021). There are two indicators with loadings under 0.4, SSN5 (0.232) and SSN6 (0.061); hence, they have been removed from the study. The following indicator loading values are between 0.4 and 0.708: SSN3 (0.614), SSN4 (0.573), CF1 (0.492), CF2 (0.65), C3 (0.45), and PH2 (0.653).

2) Internal consistency reliability: Internal consistency reliability assesses the correlation among the indicators measuring the same construct. The reliability values between 0.60 and 0.70 are considered "acceptable in exploratory research", the values between 0.70 and 0.90 are considered to be "satisfactory to good," and the values greater than 0.90 can be considered as problematic as they indicate that the indicators are redundant (Hair et al., 2021). The internal consistency values for the constructs whose indicators' loading values are less than 0.708 are SSN (Cronbach's α = 0.568, ρ_c = 0.703), CF (Cronbach's α = 0.519, ρ_c = 0.721), C (Cronbach's α = 0.506, ρ_c = 0.744), and PH (Cronbach's α = 0.67, ρ_c = 0.821).

After removing the indicators with loadings under 0.708, the following construct internal consistency reliability values were obtained: SSN (Cronbach's α = 0.752, ρ_c = 0.889), CF (Cronbach's α = 0.382, ρ_c = 0.751), C (Cronbach's α = 0.589, ρ_c = 0.828), and PH (Cronbach's α = 0.756, ρ_c = 0.891).

Hence, we observed that the internal consistency reliability of SSN, C, and PH increased after removing the indicators with loading values less than 0.708. In contrast, the internal consistency of CF was reduced after removing the indicators, with loading values of less than 0.708. Hence, all the indicators with loading values less than 0.708 were removed except for CF1 and CF2.

EI's internal consistency reliability values are very high, indicating a possibility of redundant indicators. Upon closer inspection, EI1 (" *I am ready to do what it takes to be an entrepreneur"*) and EI3 (" *I will make every effort to start and run my own business"*) sound pretty similar. The indicators EI4 (" *I am determined to start my business in the future*") and EI5 (" *I am seriously thinking about starting my own business."*) sound similar as well. Upon removing the indicators EI1 and EI4, the Cronbach's α for the EI construct reduced from 0.944 to 0.925.

The construct possessing the internal consistency reliability values between 0.6 and 0.7 is SO (Cronbach's $\alpha = 0.6$, $\rho_c = 0.832$). These values are lower. However, they could be considered acceptable in exploratory research (Hair et al., 2021). The Cronbach's α values for CF (0.519) and C (0.589) are very low. However, Cronbach's α is considered to be a very conservative metric for measuring internal consistency reliability and is often treated as the lower bound value for the same, whereas ρ_c is often treated as the upper bound value (Hair et al., 2021). The value of ρ_c for CF is 0.721, and as an additional metric, ρ_a was found to be 0.605. Based on these two additional metrics, CF's internal consistency reliability could be considered acceptable in our research. Similarly, C's corresponding ρc and ρa values were 0.828 and 0.707, respectively. As such, C could be considered to have acceptable internal consistency reliability (Hair et al., 2021).

3) Convergent validity: The convergent validity of a construct can be defined as the amount by which the construct converges to explain the variance in its indicators and is measured by the metric Average Variance Extracted, which should possess values greater than 0.5 (Hair et al., 2021). In our study, the AVE values for all the constructs except CF (0.475) are greater than 0.5.

Table 2. Indicator loadings

Construct	Indicator	Indicator loading	Indicator Reliability	Cronbach's α	ρ_c	AVE
ATB	ATB1	0.912	0.831	0.918	0.939	0.755
	ATB2	0.829	0.688			
	ATB3	0.883	0.779			
	ATB4	0.885	0.784			
	ATB5	0.831	0.691			
SSN	SSN1	0.895	0.802	0.752	0.89	0.801
	SSN2	0.895	0.801			
PBC	PBC1	0.824	0.679	0.875	0.909	0.666
	PBC2	0.809	0.654			
	PBC3	0.843	0.71			
	PBC4	0.787	0.619			
	PBC5	0.818	0.669			
EI	EI2	0.921	0.848	0.925	0.952	0.869
	EI3	0.939	0.882			
	EI5	0.938	0.88			
ESS	SS	0.941	0.886	0.931	0.956	0.878
	ET	0.927	0.859			
	EM	0.943	0.888			
CF	CF1	0.492	0.242	0.519	0.721	0.475
	CF2	0.65	0.423			
	CF3	0.872	0.76			
C	C1	0.872	0.76	0.589	0.828	0.707
	C2	0.808	0.653			
SO	SO1	0.836	0.699	0.6	0.833	0.714
	SO2	0.854	0.73			
PH	PH1	0.882	0.778	0.756	0.891	`0.803
	PH3	0.91	0.828			
G	G1	0.966	0.934	0.747	0.871	0.774
	G2	0.783	0.614			
SS	SS1	0.709	0.503	0.848	0.891	0.622
	SS2	0.863	0.745			
	SS3	0.778	0.606			
	SS4	0.813	0.661			
	SS5	0.771	0.594			
ET	ET1	0.86	0.74	0.877	0.909	0.667
	ET2	0.751	0.564			
	ET3	0.791	0.625			
	ET4	0.845	0.714			
	ET5	0.832	0.692			
EM	EM1	0.811	0.657	0.868	0.904	0.654
	EM2	0.849	0.72			
	EM3	0.82	0.673			
	EM4	0.785	0.616			
	EM5	0.777	0.603			

4) Discriminant validity:

The discriminant validity of a construct assesses the extent to which the construct is empirically distinct compared to other constructs in the structural model. Recent research has shown that the Fornell-Larcker criterion that has been used to assess the discriminant validity of constructs often fails to identify discriminant validity problems reliably and, hence, should be avoided (Hair et al., 2021; Radomir & Moisescu, 2019). As an alternative, Hair et al. (2021) recommend using the heterotrait–monotrait (HTMT) ratio to assess the discriminant validity of the constructs. The threshold value of 0.85 is used to identify the discriminant validity issues (Henseler et al., 2015). The only HTMT ratio value found to exceed 0.85 was for the constructs of ATB and EI (0.920). It is worth noting that EI and ATB essentially measure similar concepts as both constructs assess how desirable individuals find the idea of pursuing an entrepreneurial career to be (Bazan, 2022).

Table 3. Heterotrait-Monotrait ratio

	G	Gender	CF	PH	SSN	SO	PBC	ATB	C	EI
G										
Gender	0.021									
ESS	0.228	0.084								
CF	0.391	0.121								
PH	0.301	0.158	0.548							
SSN	0.265	0.213	0.415	0.4						
SO	0.289	0.037	0.78	0.581	0.394					
PBC	0.175	0.177	0.294	0.362	0.651	0.244				
ATB	0.159	0.199	0.234	0.186	0.664	0.153	0.674			
C	0.36	0.235	0.394	0.349	0.41	0.339	0.33	0.328		
EI	0.207	0.187	0.273	0.264	0.662	0.221	0.771	0.92	0.337	
SS	0.251	0.111	0.335	0.504	0.383	0.323	0.389	0.18	0.29	0.3
ET	0.211	0.099	0.214	0.432	0.246	0.175	0.276	0.129	0.283	0.195
EM	0.185	0.038	0.233	0.507	0.332	0.201	0.371	0.171	0.257	0.233

The CF construct has exhibited a slightly lesser value of AVE (0.475) than the recommended threshold of 0.5 but has demonstrated adequate discriminant validity and acceptable internal consistency reliability. As such, the decision was made to retain the construct. Hence, we can conclude that the measurement model is reliable and proceed with evaluating the structural model.

6.3 Structural model analysis

1) Collinearity assessment: The Variance Inflation Factor (VIF) values were used to assess the structural model's collinearity. The highest VIF value was found to be 1.880, which is below the recommended threshold (VIF = 5).

2) Analyzing the significance and relevance of structural model relationships:

Direct effects

The path coefficient estimates closer to -1 indicate a strong negative effect whereas the path coefficient estimates closer to +1 indicate a strong positive effect (Hair et al., 2021). Considering the original path coefficient estimates, it can be seen that SSN has a strong positive impact on ATB (0.518) and PBC (0.457) but a weak positive effect on EI (0.034). The effect of C on ATB is weak (0.094). ATB and PBC both have a strong positive impact on EI where the impact of ATB (0.663) is greater than that of PBC (0.264). ESS has a small positive effect on PBC (0.185) and SSN (0.203), and a small negative impact on ATB (-0.02). SO has small negative effects on ATB (-0.043) and PBC (-0.015).

Table 4. Path coefficients

	Original Est.	Bootstrap Mean	Bootstrap SD	T Stat.	2.5% CI	97.5% CI
G -> PBC	0.017	0.021	0.044	0.397	-0.065	0.107
G -> ATB	0.014	0.014	0.045	0.305	-0.073	0.102
Gender -> PBC	0.068	0.068	0.042	1.611	-0.016	0.149
Gender -> ATB	0.073	0.071	0.044	1.668	-0.015	0.158
G*Gender -> PBC	-0.037	-0.036	0.044	-0.832	-0.120	0.052
G*Gender -> ATB	0.023	0.025	0.040	0.571	-0.053	0.104
ESS -> SSN	0.203	0.207	0.053	3.839	0.103	0.308
ESS -> PBC	0.185	0.188	0.048	3.879	0.094	0.281
ESS -> ATB	-0.020	-0.018	0.050	-0.408	-0.118	0.077
ESS -> EI	0.043	0.043	0.029	1.480	-0.013	0.099
CF -> ATB	0.060	0.069	0.048	1.245	-0.027	0.161
ESS*CF -> ATB	0.057	0.055	0.043	1.334	-0.031	0.137
PH -> SSN	0.205	0.204	0.056	3.694	0.095	0.313
ESS*PH -> SSN	-0.038	-0.037	0.034	-1.091	-0.104	0.032
SSN -> PBC	0.457	0.455	0.043	10.673	0.369	0.538
SSN -> ATB	0.518	0.515	0.043	12.184	0.432	0.597
SSN -> EI	0.034	0.033	0.030	1.118	-0.026	0.091
SO -> PBC	-0.015	-0.009	0.053	-0.284	-0.111	0.097
SO -> ATB	-0.043	-0.039	0.066	-0.648	-0.168	0.087
SSN*SO -> PBC	-0.077	-0.074	0.040	-1.913	-0.155	0.004
SSN*SO -> ATB	-0.016	-0.007	0.045	-0.359	-0.098	0.080
PBC -> EI	0.264	0.264	0.037	7.053	0.190	0.338
ATB -> EI	0.663	0.663	0.032	20.417	0.598	0.728
C -> ATB	0.094	0.097	0.043	2.196	0.012	0.180

For evaluating the statistical significance of the relationships at the level of significance of 5%, the t-values should be greater than 1.960 (Hair et al., 2021). Upon closer inspection of the T. Stat column we can see that the relationships between C and ATB (t = 2.196), ATB and EI (t = 20.417), PBC and EI (t = 7.053), SSN and ATB (t = 12.184), SSN and PBC (t = 10.673), ESS and SSN (t = 3.839), PH and SSN (t = 3.694), and ESS and PBC (t = 3.879) are statistically significant.

The relationship between SSN and EI (t = 1.118) is not statistically significant. Furthermore, the relationships between G and PBC (t = 0.397), G and ATB (t = 0.305), Gender and PBC (t = 1.611),

Gender and ATB (t = 1.668), ESS and ATB (t = -0.416), ESS and EI (t = 1.480), CF and ATB (t = 1.245), SO and PBC (t = -0.284), and SO and ATB (t = -0.648) are not statistically significant.

Next, we examine the total effects of the exogenous constructs on the outcome variable (EI). Out of all the driver constructs, ESS has the most substantial total effect on EI (0.179), followed by PH (0.102), C (0.062), Gender (0.067), CF (0.040), SO (-0.032), and G (0.014). Out of these, only ESS, PH, and C had statistically significant total effects on EI.

Now, we evaluate the model's explanatory power by considering the R^2 values of the endogenous constructs. We observed that the R^2 values for EI (0.780) were substantial, the corresponding values for PBC (0.332) and ATB (0.329) were weak, and the R^2 values for SSN (0.124) were not satisfactory (Hair et al., 2021).

Table 5. Total path effects

	Original Est.	Bootstrap Mean	Bootstrap SD	T Stat.	2.5% CI	97.5% CI
G -> PBC	0.017	0.021	0.044	0.397	-0.065	0.107
G -> ATB	0.014	0.014	0.045	0.305	-0.073	0.102
G -> EI	0.014	0.015	0.037	0.372	-0.054	0.087
Gender -> PBC	0.068	0.068	0.042	1.611	-0.016	0.149
Gender -> ATB	0.073	0.071	0.044	1.668	-0.015	0.158
Gender -> EI	0.067	0.065	0.036	1.867	-0.004	0.137
G*Gender -> PBC	-0.037	-0.036	0.044	-0.832	-0.120	0.052
G*Gender -> ATB	0.023	0.025	0.040	0.571	-0.053	0.104
G*Gender -> EI	0.006	0.007	0.035	0.162	-0.060	0.075
ESS -> SSN	0.203	0.207	0.053	3.839	0.103	0.308
ESS -> PBC	0.278	0.283	0.049	5.640	0.185	0.376
ESS -> ATB	0.085	0.088	0.054	1.574	-0.021	0.192
ESS -> EI	0.179	0.183	0.050	3.558	0.083	0.279
CF -> ATB	0.060	0.069	0.048	1.245	-0.027	0.161
CF -> EI	0.040	0.046	0.032	1.235	-0.018	0.108
ESS*CF -> ATB	0.057	0.055	0.043	1.334	-0.031	0.137
ESS*CF -> EI	0.038	0.037	0.029	1.321	-0.021	0.092
PH -> SSN	0.205	0.204	0.056	3.694	0.095	0.313
PH -> PBC	0.094	0.093	0.027	3.460	0.042	0.148
PH -> ATB	0.106	0.105	0.029	3.626	0.049	0.164
PH -> EI	0.102	0.101	0.029	3.542	0.046	0.160
ESS*PH -> SSN	-0.038	-0.037	0.034	-1.091	-0.104	0.032
ESS*PH -> PBC	-0.017	-0.017	0.016	-1.086	-0.048	0.014
ESS*PH -> ATB	-0.019	-0.019	0.018	-1.084	-0.056	0.016
ESS*PH -> EI	-0.019	-0.019	0.017	-1.087	-0.053	0.016
SSN -> PBC	0.457	0.455	0.043	10.673	0.369	0.538
SSN -> ATB	0.518	0.515	0.043	12.184	0.432	0.597
SSN -> EI	0.498	0.495	0.042	11.721	0.409	0.576
SO -> PBC	-0.015	-0.009	0.053	-0.284	-0.111	0.097
SO -> ATB	-0.043	-0.039	0.066	-0.648	-0.168	0.087
SO -> EI	-0.032	-0.028	0.052	-0.618	-0.131	0.073
SSN*SO -> PBC	-0.077	-0.074	0.040	-1.913	-0.155	0.004
SSN*SO -> ATB	-0.016	-0.007	0.045	-0.359	-0.098	0.080
SSN*SO -> EI	-0.031	-0.024	0.036	-0.855	-0.098	0.047
PBC -> EI	0.264	0.264	0.037	7.053	0.190	0.338
ATB -> EI	0.663	0.663	0.032	20.417	0.598	0.728
C -> ATB	0.094	0.097	0.043	2.196	0.012	0.180
C -> EI	0.062	0.065	0.028	2.191	0.008	0.121

Table 6. R^2 values

	PBC	ATB	SSN	EI
R^2	0.332	0.329	0.124	0.780
AdjR^2	0.320	0.312	0.118	0.777
G	0.017	0.014	NA	NA
Gender	0.068	0.073	NA	NA
G*Gender	-0.037	0.023	NA	NA
ESS	0.185	-0.020	0.203	0.043
CF	NA	0.060	NA	NA
ESS*CF	NA	0.057	NA	NA
PH	NA	NA	0.205	NA
ESS*PH	NA	NA	-0.038	NA
SSN	0.457	0.518	NA	0.034
SO	-0.015	-0.043	NA	NA
SSN*SO	-0.077	-0.016	NA	NA
PBC	NA	NA	NA	0.264
ATB	NA	NA	NA	0.663
C	NA	0.094	NA	NA

6.4 Mediation effects

The total indirect effect from ESS to EI is 0.136. The table 8 shows that the specific indirect effects of the paths ESS-SSN-EI and ESS-ATB-EI are not statistically significant. The specific indirect effects for the paths ESS-PBC-EI (t = 3.198), SSN-PBC-EI (t = 5.862), SSN-ATB-EI (t = 10.581), ESS-SSN-ATB-EI (t = 3.551), and ESS-SSN-PBC-EI (t = 3.178) were found to be statistically significant.

Table 7. Total indirect effects

	G	Gender	G*Gender	ESS	CF	ESS*CF	PH	ESS*PH	SSN	SO	SSN*SO	PBC	ATB	C	EI
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.014
Gender	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.067
G*Gender	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.005
ESS	0	0	0	0	0	0	0	0	0	0	0	0.093	0.105	0	0.141
CF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.039
ESS*CF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.037
PH	0	0	0	0	0	0	0	0	0	0	0	0.094	0.107	0	0.105
ESS*PH	0	0	0	0	0	0	0	0	0	0	0	-0.017	-0.019	0	-0.019
SSN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.467
SO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.032
SSN*SO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.032
PBC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ATB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.062
EI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 8. Indirect path coefficient estimates, bootstrap mean, bootstrap standard deviation, and statistical significance

	Original Est.	Bootstrap Mean	Bootstrap SD	T Stat.	2.5% CI	97.5% CI
ESS-ATB-EI	-0.013	-0.012	0.033	-0.407	-0.079	0.051
ESS-SSN-EI	0.007	0.007	0.007	1.042	-0.006	0.021
ESS-PBC-EI	0.049	0.050	0.015	3.198	0.023	0.081
SSN-PBC-EI	0.121	0.120	0.021	5.862	0.082	0.163
SSN-ATB-EI	0.344	0.342	0.032	10.581	0.279	0.407
ESS-SSN-ATB-EI	0.070	0.071	0.020	3.551	0.034	0.111
ESS-SSN-PBC-EI	0.024	0.025	0.008	3.178	0.011	0.041

As we saw earlier, the direct effect of ESS on EI with t = 1.480 and the confidence interval [-0.013, 0.099], as well as the direct effect of SSN on EI with t = 1.414 and the confidence interval [-0.016, 0.099] are not statistically significant. For the paths ESS-ATB-EI and ESS-SSN-EI, the indirect effects were insignificant, and as such, there is no mediation effect in these paths. Considering the ESS driver construct, the direct effect of ESS on EI is not statistically significant. However, the indirect effects were statistically significant for the paths ESS-PBC-EI, ESS-SSN-ATB-EI, and ESS-SSN-PBC-EI, and as such, there is full mediation. The indirect effects for the paths SSN-PBC-EI and SSN-ATB-EI are statistically significant, and the direct effect of SSN on EI is not statistically significant; as such, there is full mediation in this case as well (Hair et al., 2021).

6.5 Moderation effects

Moderation effects are tested when there is a situation in which the researcher believes that the direction and strength of the relationship between two variables are affected by the presence of another variable. In this study, the following moderation effects are studied: the moderating effect of gender on the relationships between G and PBC as well as between G and ATB, the moderating effect of SO on the relationships between SSN and PBC as well as between SSN and ATB, the

moderating effect of PH on the relationship between ESS and SSN, and the moderating effect of CF on the relationship between ESS and ATB.

Out of the three main approaches used to analyze the moderation effects in PLS path models: the product indicator approach, the orthogonalizing approach, and the two-stage approach; the two-stage approach has been shown to possess better parameter recovery and statistical power (Becker et al., 2018; Hair et al., 2021). Hence, the two-stage approach is used in this study to model the interaction terms. During stage 1 of the two-stage approach, the primary effect model without the interaction term is estimated to obtain the latent scores for each variable, and in stage 2, the latent variable score for the moderating variable and the exogenous variable are multiplied to create the interaction term (Hair et al., 2021).

The f^2 effect sizes of the interaction effects help to ascertain how much of the variance in an endogenous construct can be explained by the moderating variable, and f^2 values of 0.005, 0.01, and 0.025 suggest the presence of small, medium, and large effect sizes respectively for interaction effects (Hair et al., 2021). Table 9 shows the f^2 effect sizes for the different constructs. We can observe that the moderating effects of Gender on the relationships between G and PBC (0.002) and G and ATB (0.001) are negligible. The moderating effect of CF on the relationship between ESS and ATB (0.005) can be considered a small effect, and the moderating effect of SO on the relationship between SSN and PBC can be considered a medium effect.

Table 9. f^2 effect sizes

	G	Gender	G*Gender	ESS	CF	ESS*CF	PH	ESS*PH	SSN	SO	SSN*SO	PBC	ATB	C	EI
G	0	0	0	0	0	0	0	0	0	0	0	NA	NA	0	0
Gender	0	0	0	0	0	0	0	0	0	0	0	NA	NA	0	0
G*Gender	0	0	0	0	0	0	0	0	0	0	0	0.002	0.001	0	0
ESS	0	0	0	0	0	0	0	0	NA	0	0	0.045	NA	0	0.007
CF	0	0	0	0	0	0	0	0	0	0	0	0	NA	0	0
ESS*CF	0	0	0	0	0	0	0	0	0	0	0	0	0.005	0	0
PH	0	0	0	0	0	0	0	0	NA	0	0	0	0	0	0
ESS*PH	0	0	0	0	0	0	0	0	0.002	0	0	0	0	0	0
SSN	0	0	0	0	0	0	0	0	0	0	0	NA	NA	0	0.004
SO	0	0	0	0	0	0	0	0	0	0	0	NA	NA	0	0
SSN*SO	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0
PBC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.167
ATB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.075
C	0	0	0	0	0	0	0	0	0	0	0	0	0.011	0	0
EI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1) Moderating effect of CF on the relationship between ESS and ATB

Fig 2 shows the moderating effect of CF on the relationship between ESS and ATB. At lower levels of CF, the relationship between ATB and ESS is negative, but at higher levels of CF, the relationship between ESS and ATB is positive. However, the interaction effect is not statistically significant (t = 1.334).

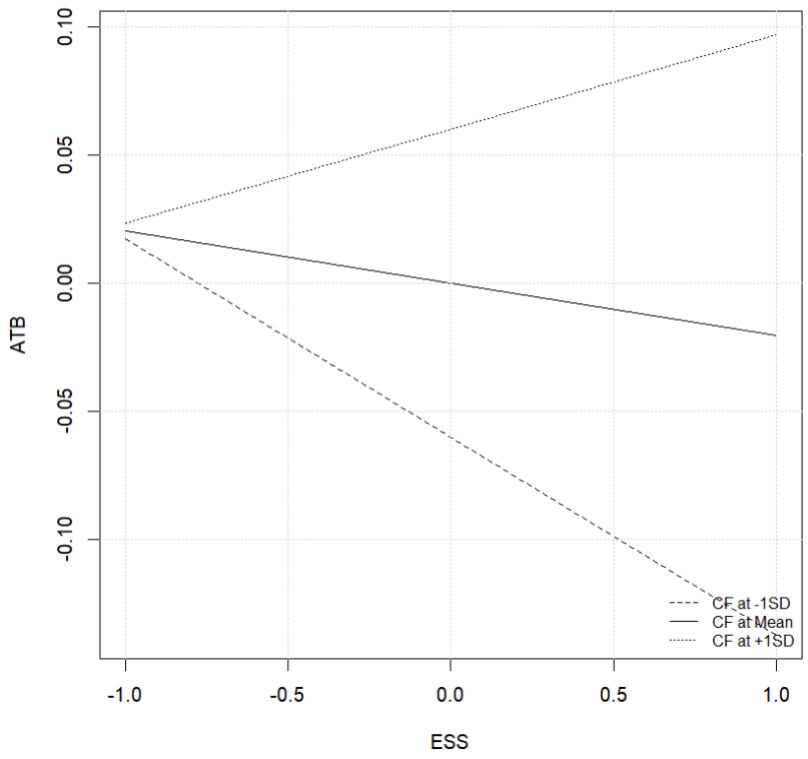

Fig. 3 Slope analysis of the interaction effect ESS*CF on ATB

2) Moderating effect of PH on the relationship between ESS and SSN

Fig 3 represents the moderating effect of PH on the relationship between ESS and SSN. It can be seen that the relationship between SSN and ESS is positive, and the effect is slightly weaker at higher levels of PH. The interaction effect is not statistically significant (t = -1.091).

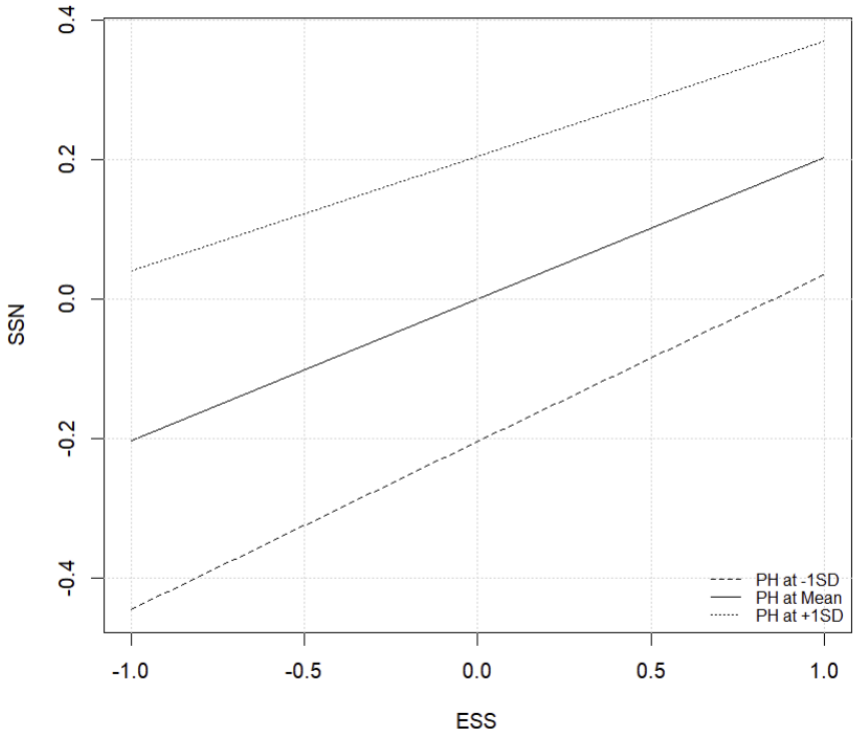

Fig. 4 Slope analysis of the interaction effect ESS*PH on SSN

3) Moderating effect of Gender on the relationship between G and PBC

Fig. 4 shows the slope analysis of the moderating effect of gender on the relationship between G and PBC. The relationship is negative for females, whereas it is positive for males. This interaction effect is not statistically significant (t = -0.832).

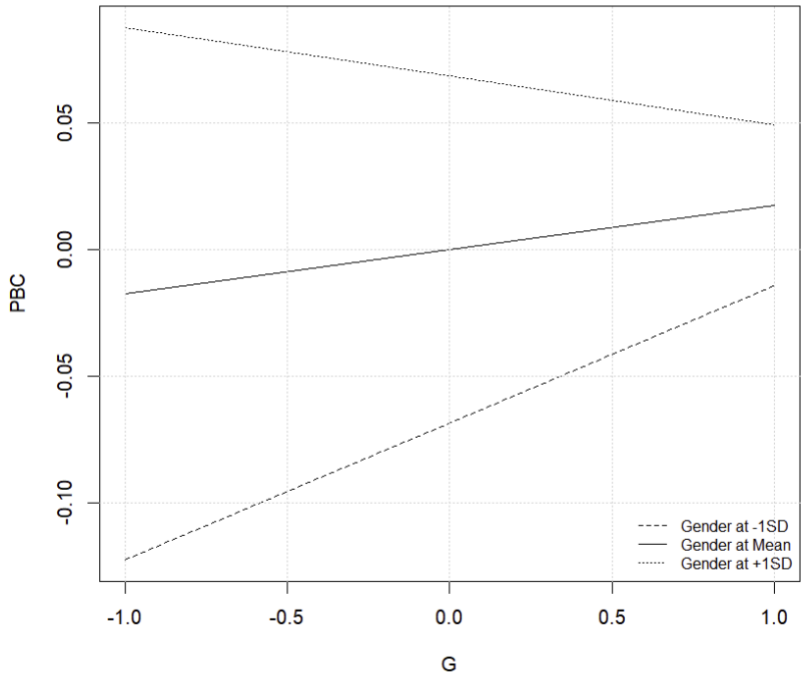

Fig. 5 Slope analysis of the interaction effect G*Gender on PBC

4) Moderating effect of Gender on the relationship between G and ATB

Fig. 5 shows the slope analysis of the moderating effect of gender on the relationship between G and ATB. The relationship is negative for males, whereas it is positive for females. This interaction effect is not statistically significant (t = 0.571).

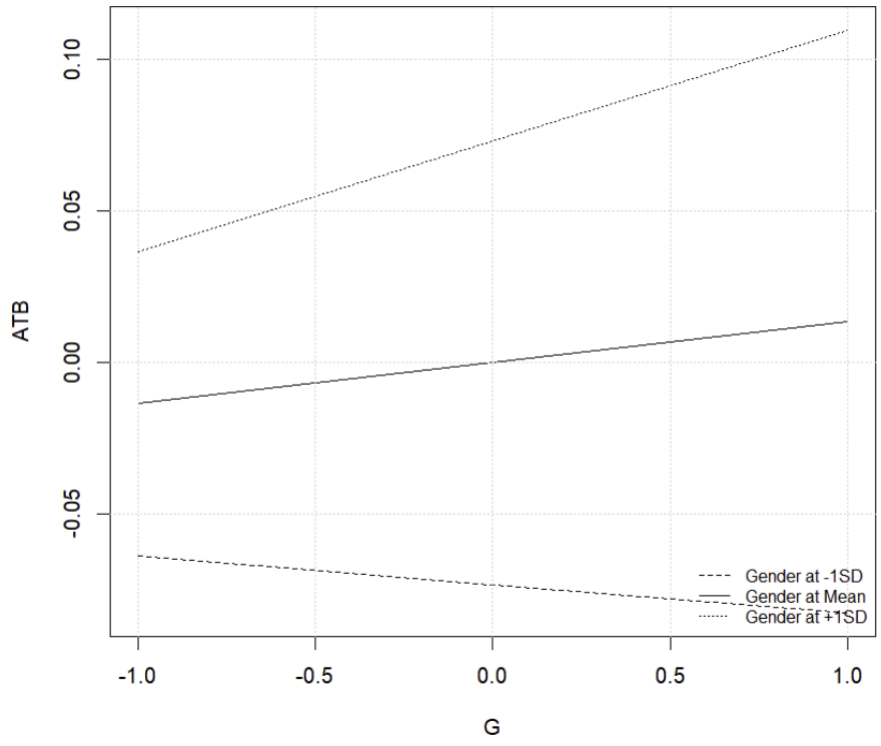

Fig. 6 Slope analysis of the interaction effect G*Gender on ATB

5) Moderating effect of SO on the relationship between SSN and PBC

Fig. 6 shows the slope analysis of the moderating effect of SO on the relationship between SSN and PBC. It shows that the impact of SSN on PBC is weaker at higher levels of SO. This interaction effect is not statistically significant (t = -1.913).

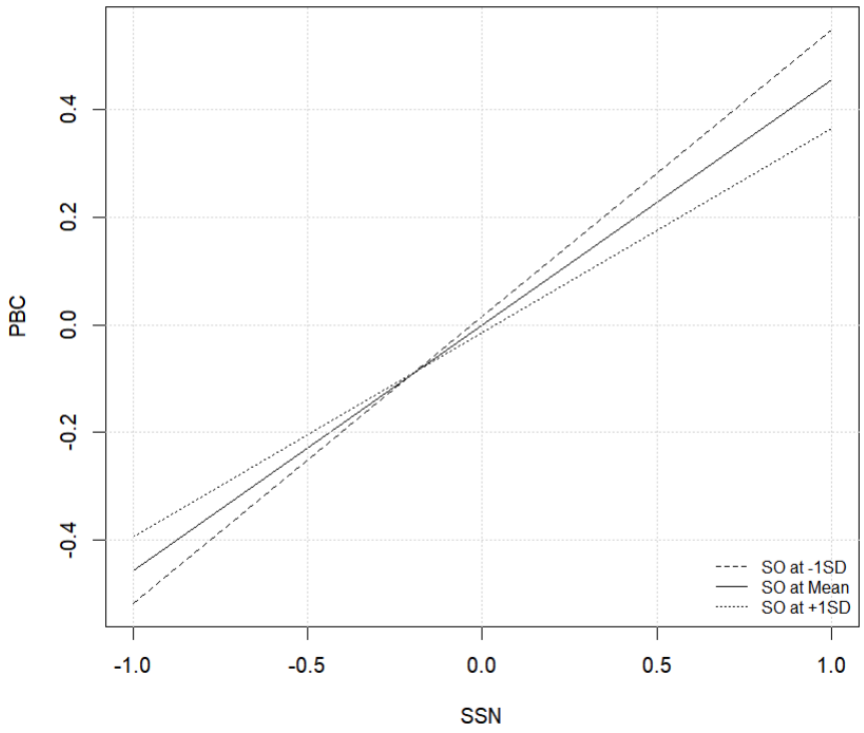

Fig. 7 Slope analysis of the interaction effect SSN*SO on PBC

6) Moderating effect of SO on the relationship between SSN and ATB

Fig. 7 represents the moderating effect of SO on the relationship between SSN and ATB. The effect of SSN on ATB weakens at higher levels of SO. This interaction effect is not statistically significant, with a t-value of -0.359.

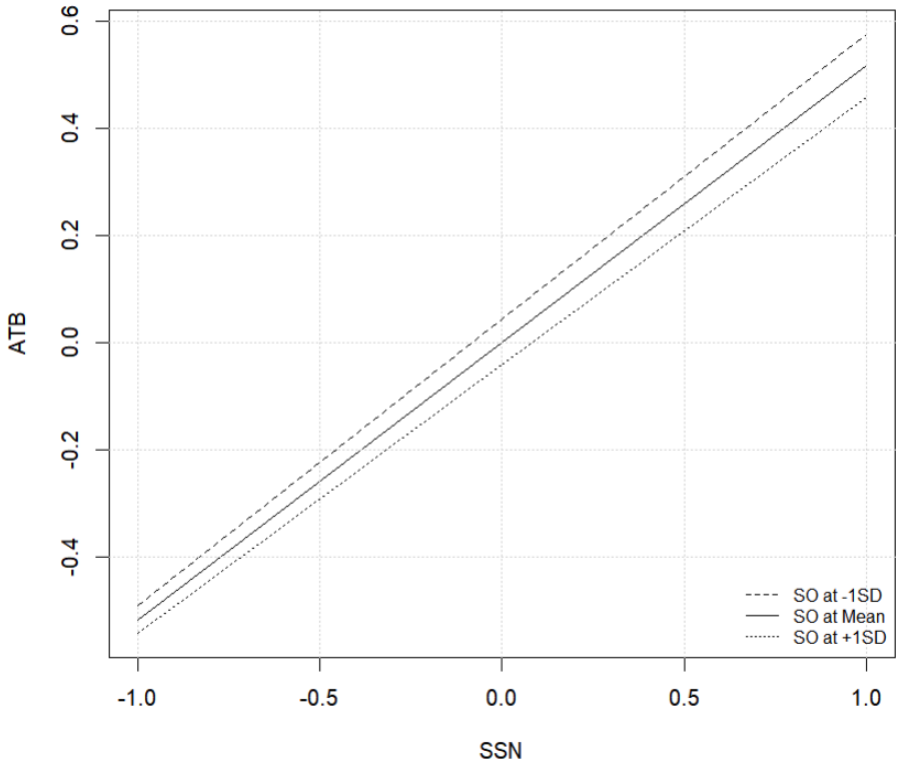

Fig. 8 Slope analysis of the interaction effect SSN*SO on ATB

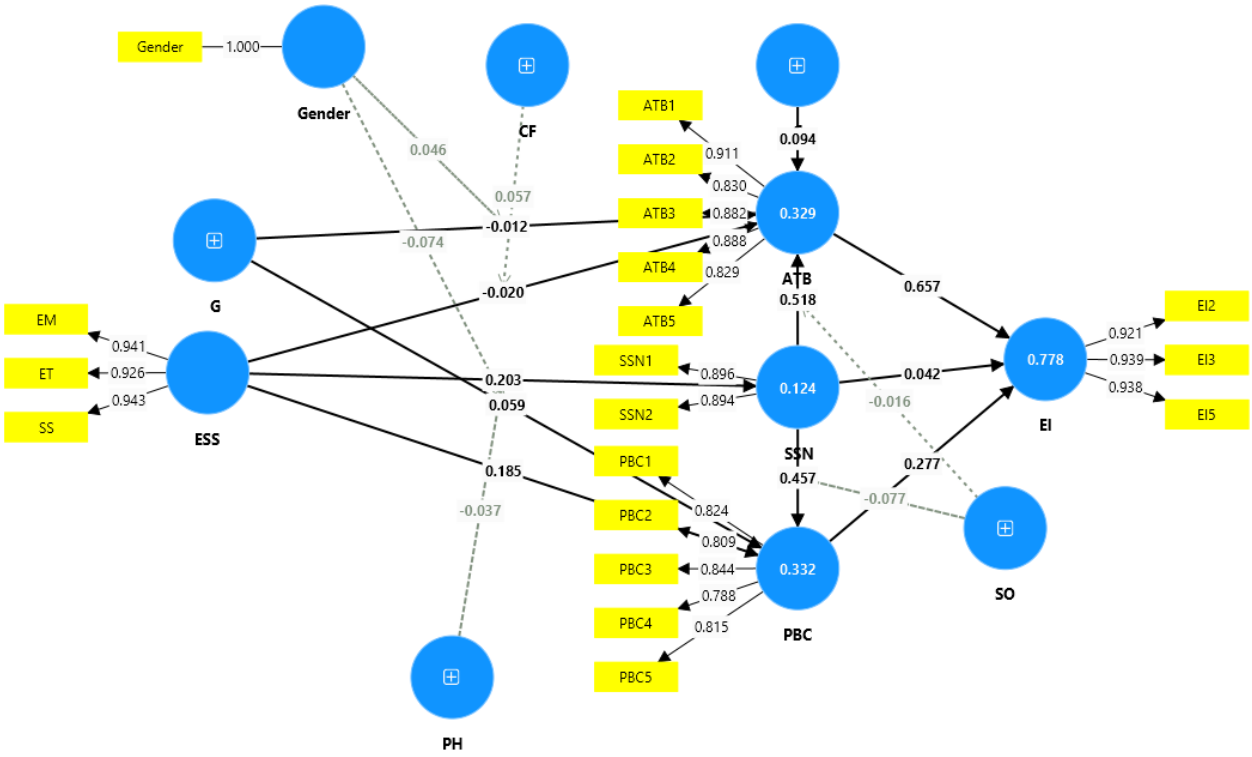

Fig. 9 SEM plot

Figure 8 shows the path coefficients for the different relationships hypothesized in this study.

Next, the predictive power of the model is assessed. To date, there is no published solution for assessing the predictive capabilities of a model with higher-order constructs using the seminr package. As such, the scores of ESS (the second-order construct in this study) were stored in a dummy single-item construct in a new model, with everything else kept the same.

6.6 Predictive power assessment

SmartPLS4 (Ringle et al., 2024) was used to test the model's predictive validity as the *seminr* package could not conduct this assessment for a moderated model with higher-order constructs. The root mean square error (RMSE) values of the prediction errors should be considered to assess the predictive validity when the prediction error distribution is not highly asymmetric, and mean absolute error (MAE) values should be used otherwise (Danks & Ray, 2018). It was observed that the distributions were not highly asymmetric; hence, the RMSE values of the prediction errors for the endogenous constructs were used. The RMSE values of the endogenous constructs were compared to the naïve LM benchmark values obtained by regressing the endogenous constructs' indicator values on the exogenous constructs' indicator values in the PLS path model (Danks & Ray, 2018). According to Shmueli et al. (2019), the model has low, medium, or high predictive power if the minority, majority (or identical), or all of the indicators, respectively, have lower RMSE values than the naïve LM benchmark values. If none of the indicator RMSE values are lower than the LM Benchmark, then the model lacks predictive power. Out of 15 endogenous predictors, 11 have the same or lower RMSE values compared to the LM Benchmark, and as such, the model has medium predictive power.

Another metric for assessing the model's predictive validity is the Q^2 metric, whose values of 0.00, 0.25, and 0.50 indicate that the model possesses small, medium, or ample predictive power, respectively. In our model, we found the Q2 values of EI (0.090), PBC (0.134), and SSN (0.112) to be small-medium, whereas the Q^2 value of ATB (0.048) was small.

Table 10. RMSE values for endogenous indicators and LM Benchmark

	PLS-SEM_RMSE	LM_RMSE
ATB1	0.032	0.032
ATB2	0.027	0.026
ATB3	0.031	0.031
ATB4	0.032	0.031
ATB5	0.028	0.028
EI2	0.035	0.035
EI3	0.034	0.034
EI5	0.033	0.033
PBC1	0.032	0.032
PBC2	0.028	0.029
PBC3	0.03	0.031
PBC4	0.028	0.028
PBC5	0.028	0.028
SSN1	0.028	0.027
SSN2	0.027	0.026

6.7 Model comparisons

Two models were compared – one with all the interaction effects (Model 1) and one without the interaction effects (Model 2) to observe which model best fits the data. A separate measurement model without the interaction effect was specified for Model 2. Subsequently, two structural models were defined – one with the moderation effects and one without the moderation effects. Subsequently, two PLS path models were estimated, and their summaries were extracted. To compare the two models, their Bayesian Information Criterion (BIC) values for the outcome construct of interest (EI) were extracted (Hair et al., 2021). The BIC value for the model without the interaction effects (BIC = -581.974) was found to be slightly better than the BIC value for the model with interaction effects (BIC = -581.926). To learn about the models' relative likelihood, we can assess the BIC Akaike Weights (Hair et al., 2021) for model 1 (0.494) and model 2

(0.506). It can be observed that the BIC Akaike Weight for model 2 is slightly better than that for model 1. Therefore, we can conclude that the model without the moderation effects fits better than the model without moderation effects.

6.8 Longitudinal analysis

A longitudinal analysis was carried out to observe how the impact of ESS on EI and its antecedents has changed over the years. Another aim was to assess how the constructs of ESS and EI have changed over time. The same research instrument collected Three cross-sectional samples from 2020, 2022, and 2024. The longitudinal analysis was conducted based on the guidelines of Roemer (2016) using SmartPLS4 (Ringle et al., 2024).

The sample sizes for 2020, 2022, and 2024 were 350, 1167, and 436, respectively. The sample size for the year 2022 (1167) was considerably larger than the sample sizes of the samples from the years 2020 (350) and 2024 (436), and this could lead to biased results (Roemer, 2016). As such, 450 responses were randomly selected for the 2022 sample, and only those were included in the analysis.

As the first step in the analysis, three different models were created for the samples of 2020 (t0), 2022 (t1), and 2024 (*t2).*

For the 2020 model, all the factor loadings were greater than 0.5; all the internal consistency reliability metrics were greater than 0.708, and the average variance extracted values were greater than 0.5. The overall model fit was assessed by using the standardized root mean square residual (SRMR) values (Henseler et al., 2014). The SRMR value for the 2020 model was found to be 0.144.

Table 11. Internal consistency reliability and convergent validity metrics for the 2020 model

	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
ATB_t0	0.93	0.947	0.782
EI_t0	0.948	0.96	0.828
ESS_t0	0.94	0.962	0.893
PBC_t0	0.841	0.887	0.61
SSN_t0	0.783	0.856	0.598

Table 12. Discriminant validity values for the 2020 model

	ATB_t0	EI_t0	ESS_t0	PBC_t0	SSN_t0
ATB_t0					
EI_t0	0.939				
ESS_t0	0.103	0.125			
PBC_t0	0.675	0.802	0.314		
SSN_t0	0.43	0.419	0.248	0.46	

For the 2022 model, SSN4, SSN5, and SSN6 had low indicator loadings of 0.496, 0.276, and 0.385, respectively, and hence were removed. After removing the indicators, the lowest indicator loading was for SSN3 (0.58), with the composite reliability of all the constructs greater than 0.7. All the AVE values were greater than 0.5, and HTMT ratios were less than 0.9. The SRMR value was found to be 0.088.

Table 13. Internal consistency reliability and convergent validity metrics for the 2022 model

	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
ATB_t1	0.884	0.915	0.683
EI_t1	0.932	0.949	0.787
ESS_t1	0.923	0.951	0.866
PBC_t1	0.853	0.894	0.629
SSN_t1	0.656	0.815	0.601

Table 14. Discriminant validity values for 2022 model

	ATB_t1	EI_t1	ESS_t1	PBC_t1
ATB_t1				
EI_t1	0.927			
ESS_t1	0.389	0.446		
PBC_t1	0.684	0.831	0.548	
SSN_t1	0.771	0.862	0.618	0.866

For the 2024 model, the indicator loadings for SSN4, SSN5, and SSN6 were less than 0.5 and hence were removed. The composite reliability values were found to be greater than 0.7. The lowest AVE value was 0.58, and all HTMT values were less than 0.9, except for ATB and EI. The SRMR value was found to be 0.097.

Table 15. Internal consistency reliability and convergent validity metrics for the 2024 model

	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
ATB_t2	0.918	0.939	0.754
EI_t2	0.946	0.959	0.823
ESS_t2	0.929	0.954	0.875
PBC_t2	0.878	0.911	0.671
SSN_t2	0.619	0.799	0.580

Table 16. Discriminant validity values for 2024 model

	ATB_t2	EI_t2	ESS_t2	PBC_t2
ATB_t2				
EI_t2	0.910			
ESS_t2	0.163	0.257		
PBC_t2	0.656	0.770	0.357	
SSN_t2	0.744	0.758	0.387	0.763

In this analysis, we are interested in evaluating if and how the impact of ESS on the antecedents of EI (ATB, PBC, and SSN) has changed over time and studying the variation in the indirect effects of ESS on EI.

Path coefficients

From Table 17, it can be seen that all the direct effects of ESS on PBC and SSN are significant ($p < 0.05$) for all the samples, whereas none of the direct effects of ESS on ATB are significant ($p > 0.05$).

Table 17. Path coefficients of the direct effects of ESS on ATB, SSN, and PBC for the years 2020, 2022, and 2024.

Effect	Time	n	Path coefficients	t-value	p-value
ESS -> ATB	t0	350	0.022	0.406	0.685
	t1	450	0.047	0.921	0.357
	t2	436	-0.020	0.459	0.646
ESS -> SSN	t0	350	0.198	3.049	0.002
	t1	450	0.546	14.407	0.000
	t2	436	0.301	7.075	0.000
ESS -> PBC	t0	350	0.197	3.998	0.000
	t1	450	0.187	4.093	0.000
	t2	436	0.169	3.746	0.000

Next, the changes in path coefficients over the years were examined. To proceed with the analysis, the PLS path modeling bootstrapping algorithm with 5,000 subsamples at a significance level of 0.05 for two-tailed tests was run, and the “bias-corrected and accelerated” method was chosen for the estimation of confidence intervals (Roemer, 2016).

Table 18 shows the changes in the values of the path coefficients for the effects of ESS on ATB, PBC, and SSN over the years 2020, 2022, and 2024. The values of the path coefficients for the impact of ESS on SSN increased from 2020 to 2022 but reduced from 2022 to 2024, and these changes in the path coefficients are statistically significant ($p < 0.05$). The path coefficient values for the impact of ESS on ATB increased from 2020 to 2022 but reduced from the year 2022 to

2024. However, these changes in the path coefficients are not statistically significant ($p > 0.05$). The path coefficient values for the impact of ESS on PBC reduced slightly from 2020 to 2024, and these changes in the path coefficient values are not statistically significant ($p > 0.05$).

Indirect effects

Next, the changes in the path coefficients of the indirect effects of ESS on EI over the years were analyzed.

Total indirect effects

Table 19 shows that the total indirect effects of ESS on EI are significant for the years 2020, 2022, and 2024.

Table 19. Total indirect effect path coefficients of ESS on EI for the years t0 (2020), t1 (2022), and t2 (2024)

Effect	Time	n	Path coefficients	t-statistics	p-value
ESS -> EI	t0	350	0.15	2.896	0.004
	t1	450	0.426	11.334	0
	t2	436	0.216	4.895	0

As seen from Table 20, the total indirect effect of ESS on EI increased from **2020 to 2022. However, it decreased from 2022 to 2024,** and these variations in the path coefficient values are statistically significant ($p < 0.05$).

Table 18. Results of the test of significance of the changes in path coefficients

Effect	Time	n	Path coefficients	Size of the change	Bias corrected CI		Comparison of path coefficient t+1 with CI t and path coefficient t with CI t+1	Path coefficient t-1 inside CI t? Path coefficient t inside CI t+1?	Significant change?
ESS -> ATB	t0	350	0.022	0.025	-0.079	0.126	-0.079 < 0.047 < 0.126	Yes	No
	t1	450	0.047		-0.051	0.152	-0.051 < 0.022 < 0.152	Yes	No
	t1	450	0.047	-0.067	-0.051	0.152	-0.051 < -0.020 < 0.152	Yes	No
	t2	436	-0.020		-0.107	0.062	-0.107 < 0.047 < 0.062	Yes	No
ESS -> SSN	t0	350	0.198	0.348	0.065	0.317	0.546 > 0.317	No	Yes
	t1	450	0.546		0.467	0.616	0.198 < 0.467	No	Yes
	t1	450	0.546	-0.245	0.467	0.616	0.301 < 0.467	No	Yes
	t2	436	0.301		0.214	0.382	0.546 > 0.382	No	Yes
ESS -> PBC	t0	350	0.197	-0.01	0.096	0.29	0.096 < 0.187 < 0.29	Yes	No
	t1	450	0.187		0.098	0.277	0.098 < 0.197 < 0.277	Yes	No
	t1	450	0.187	-0.006	0.098	0.277	0.098 < 0.169 < 0.277	Yes	No
	t2	436	0.169		0.079	0.256	0.079 < 0.187 < 0.256	Yes	No

Table 20. Change in total indirect effects comparison for the models from the years 2020 (t0), 2022 (t1), and 2024 (t2)

Effect	Time	n	Path coefficients	Size of the change	Bias corrected CI		Comparison of path coefficient t+1 with CI t and path coefficient t with CI t+1	Path coefficient t-1 inside CI t? Path coefficient t inside CI t+1?	Significant change?
ESS -> EI	t0	350	0.15	0.276	0.048	0.247	0.426 > 0.247	No	Yes
	t1	450	0.426		0.348	0.496	0.15 < 0.348	No	Yes
	t1	450	0.426	-0.21	0.348	0.496	0.216 < 0.348	No	Yes
	t2	436	0.216		0.123	0.296	0.426 > 0.296	No	Yes

Specific indirect effects

None of the indirect effects of ESS on EI through ATB (ESS-ATB-EI) for the three years are statistically significant ($p > 0.05$). The indirect effect of ESS on EI through SSN is statistically significant for the year 2022 (t1) but not statistically significant for the years 2020 (t0) and 2024 (t2). The indirect effects of ESS on EI through PBC (ESS-PBC-EI), through SSN and ATB (ESS-SSN-ATB-EI), and through SSN and PBC (ESS-SSN-PBC-EI) are statistically significant for all the three years ($p < 0.05$).

Table 21. Specific indirect effects for the years 2020 (t0), 2022 (t1), and 2024 (t2)

Effect	Time	n	Path coefficients	t-statistics	p-value
ESS -> ATB -> EI	t0	350	0.015	0.407	0.684
	t1	450	0.027	0.917	0.359
	t2	436	-0.007	0.268	0.788
ESS -> SSN -> EI	t0	350	-0.001	0.246	0.805
	t1	450	0.059	3.281	0.001
	t2	436	0.013	1.48	0.139
ESS -> PBC -> EI	t0	350	0.06	3.7	0
	t1	450	0.061	3.732	0
	t2	436	0.055	3.557	0
ESS -> SSN -> ATB -> EI	t0	350	0.055	2.779	0.005
	t1	450	0.181	8.275	0
	t2	436	0.11	5.497	0
ESS -> SSN -> PBC -> EI	t0	350	0.022	2.695	0.007
	t1	450	0.099	6.931	0
	t2	436	0.045	4.815	0

The path coefficient values for the indirect effects of ESS on EI through ATB (ESS – ATB – EI) and through PBC (ESS – PBC – EI) increased from the year 2020 to 2022 but decreased from 2022 to 2024. However, these changes are not statistically significant ($p < 0.05$). The path coefficient values for the indirect effects of ESS on EI through SSN (ESS – SSN – EI), through SSN and ATB (ESS – SSN – ATB – EI), and through SSN and PBC (ESS – SSN – PBC – EI) increased from the year 2020 to 2022 and reduced from 2022 to 2024 and these changes in the path coefficient values are statistically significant ($p < 0.05$).

Table 22. Changes in the path coefficients for specific indirect effects over the years 2020 (t0), 2022 (t1), and 2024 (t2)

Effect	Time	n	Path coefficients	Size of the change	Bias corrected CI		Comparison of path coefficient t+1 with CI t and path coefficient t with CI t+1	Path coefficient t-1 inside CI t? Path coefficient t inside CI t+1?	Significant change?
ESS -> ATB -> EI	t0	350	0.015	0.012	-0.056	0.087	-0.056 < 0.027 < 0.087	Yes	No
	t1	450	0.027		-0.029	0.09	-0.029 < 0.015 < 0.09	Yes	No
	t1	450	0.027	-0.034	-0.029	0.09	-0.029 < -0.007<0.09	Yes	No
	t2	436	-0.007		-0.062	0.047	-0.062 < 0.027 < 0.047	Yes	No
ESS -> SSN -> EI	t0	350	-0.001	0.06	-0.012	0.008	0.059 > 0.008	No	Yes
	t1	450	0.059		0.026	0.097	-0.001 < 0.026	No	Yes
	t1	450	0.059	-0.046	0.026	0.097	0.013 < 0.026	No	Yes
	t2	436	0.013		-0.003	0.032	0.059 > 0.032	No	Yes
ESS -> PBC -> EI	t0	350	0.06	0.001	0.03	0.093	0.03 < 0.061 < 0.093	Yes	No
	t1	450	0.061		0.031	0.095	0.031 < 0.06 < 0.095	Yes	No
	t1	450	0.061	-0.006	0.031	0.095	0.031 < 0.055 < 0.095	Yes	No
	t2	436	0.055		0.027	0.086	0.027 < 0.061 < 0.086	Yes	No
ESS -> SSN -> ATB -> EI	t0	350	0.055	0.126	0.019	0.095	0.181 > 0.095	No	Yes
	t1	450	0.181		0.14	0.225	0.055 < 0.14	No	Yes
	t1	450	0.181	-0.071	0.14	0.225	0.11 < 0.14	No	Yes
	t2	436	0.11		0.071	0.148	0.181 > 0.148	No	Yes
ESS -> SSN -> PBC -> EI	t0	350	0.022	0.077	0.008	0.04	0.099 > 0.04	No	Yes
	t1	450	0.099		0.073	0.128	0.022 < 0.073	No	Yes
	t1	450	0.099	-0.054	0.073	0.128	0.045 < 0.073	No	Yes
	t2	436	0.045		0.028	0.064	0.099 > 0.064	No	Yes

Changes in the constructs over the years

In this section of the longitudinal analysis, the focus lies on how the EI and the antecedents of EI have changed over time among university students. To perform this analysis, PLS importance performance analysis was run with EI set as the target construct, and unstandardized scores were obtained for the constructs ESS, ATB, PBC, SSN, and EI. The data from each year were assigned a grouping variable – t = 0 was assigned to the sample from the year 2020, t = 1 was assigned to the sample from 2022, and t = 2 was assigned to the sample from 2024.

Following that, the data for each year was combined in one sheet with all the unstandardized construct scores for each construct for every year listed under the same column. Then, an independent sample t-test was conducted comparing the means of the constructs between the years 2020 and 2022 as well as the years 2022 and 2024 (Roemer, 2016).

Table 23 shows that the changes in all the constructs are statistically significant except for the change in EI from the year 2020 to 2022, wherein the Mean level of the construct has reduced over time, but the change is not statistically significant. The mean level of ATB has decreased from 2020 to 2022 and 2022 to 2024; in fact, the difference in the means of ATB for the years 2022 and 2024 was the largest change observed. The mean levels of the constructs SSN and PBC increased from 2020 to 2022 but reduced from 2022 to 2024.

Table 23. Independent sample t-test of the significance of the changes in the levels of constructs over the years t0 (2020), t1 (2022), and t2 (2024).

Construct	Time	n	Mean	SD	Mean difference	t-value	p-value	Significance
ATB	t0 to	350	5.3427	1.406787	-0.21658	-2.279	0.023	Yes
	….t1	450	5.12612	1.273987				
	t1 to	450	5.12612	1.273987	-2.03755	-22.974	<0.001	Yes
	….t2	436	3.08857	1.365468				
SSN	t0 to	350	4.69872	0.923661	0.13395	1.974	0.049	Yes
	….t1	450	4.83267	0.97398				
	t1 to	450	4.83267	0.97398	-0.80166	-10.849	<0.001	Yes
	….t2	436	4.03101	1.215769				
PBC	t0 to	350	4.23626	1.213283	0.22178	2.453	0.014	Yes
	….t1	450	4.45804	1.309936				
	t1 to	450	4.45804	1.309936	-0.51611	-5.893	<0.001	Yes
	….t2	436	3.94193	1.296337				
EI	t0 to	350	4.78422	1.6364	-0.18681	-1.632	0.103	No
	….t1	450	4.59741	1.582085				
	t1 to	450	4.59741	1.582085	-0.93698	-8.754	<0.001	Yes
	….t2	436	3.66043	1.603612				

7. Results and discussion

The objectives of this study were to analyze the direct effects of DCB on the antecedents to EI, as well as the moderation effects of DCB on the impact of ESS on the antecedents to EI among university students. Furthermore, the study also investigated how the impact of ESS on the antecedents to EI and the levels of ATB, PBC, SSN, and EI have changed over the years from 2020 to 2024. The analysis observed significant support for the hypotheses H0, H2, H3, H4, H6. H7, H8, and H15 and no statistically significant support was found for hypotheses H1, H5, H9, H10, H11, H12, H13, and H14.

The exogenous constructs in the study explained 78% variation in EI. Of the three antecedents of EI, only ATB and PBC have a statistically significant direct effect on EI, whereas the direct effect of SSN on EI is not statistically significant. This is in line with previous studies wherein SSN did not have a statistically significant impact on EI, indicating that the students' perceptions about how the significant people in their lives view entrepreneurship as a career choice do not significantly impact their EI (Bazan, 2022; Bazan, Datta, et al., 2019).

Direct effects on EI

Among the two antecedents that have a statistically significant effect on EI, the impact of ATB (0.663) is greater than twice the impact of PBC (0.264) on EI, indicating that the desirability of entrepreneurship as a career option has a greater effect on EI than the students' perceived self-ability to undertake an entrepreneurial career.

These findings are in alignment with prior research indicating that the attraction an individual feels towards entrepreneurship plays a more prominent role in sculpting their intentions as compared to their perceived behavior control (Fayolle & Gailly, 2015; Krueger et al., 2000)In an academic

context, this suggests that university initiatives tailored more towards enhancing the desirability of entrepreneurship as a career could have a higher impact on shaping positive entrepreneurial intentions than enhancing students' perceived capability of undertaking an entrepreneurial endeavor.

Direct effects on ATB, PBC, and SSN

Among the direct effects on ATB, only the effects of C and SSN are statistically significant, with the impact of SSN on ATB (0.518) being far greater than that of C on ATB (0.094). This suggests that students who value the perspectives of the significant people in their lives regarding entrepreneurship as a career option, as well as the students who believe to a greater degree that career selection is a once-in-a-lifetime deal and such is a highly crucial choice, perceive entrepreneurship as a more desirable career as compared to those who do not.

Considering the construct PBC, only SSN and ESS have statistically significant effects on PBC, with the effect of SSN on PBC (0.457) being greater than the effect of ESS on PBC (0.185). This indicates that students who value the perceptions of the significant people in their lives towards entrepreneurship and those who perceive that the university environment is conducive to new venture creation believe to a greater extent that they can start a new venture. The positive effects of SSN on ATB and PBC corroborate prior findings (Bazan, 2022; Bazan, Datta, et al., 2019; Liñán & Santos, 2007) wherein similar effects were observed.

Regarding the construct of SSN, only ESS and PH have statistically significant direct effects on SSN, with the impact of ESS (0.203) being equivalent to the direct effect of PH (0.205). This shows that the students who believe in the "magical" role of career assessments and career counselors to provide them with the ideal career choice, as well as the students who perceive the

university environment to be conducive to entrepreneurship, value the opinions of the significant people in their lives regarding entrepreneurship as a career.

Indirect effects and mediation

Although the direct effects of ESS on EI (t = 1.480) and SSN on EI (t = 1.414) are not statistically significant, full mediation was observed for the indirect effects. The indirect effects of ESS on EI through the paths ESS-PBC-EI, ESS-SSN-ATB-EI, and ESS-SSN-PBC-EI were statistically significant. As such, a full mediation was observed. These findings suggest that ESS primarily affects EI by impacting the perceived behavior control and shaping the students' attitudes towards entrepreneurship by influencing subjective social norms. These corroborate the findings of the previous research, where similar effects were observed among the students of Memorial University during the years 2020 and 2022 (Bazan, 2022).

The indirect effects for the paths SSN-PBC-EI and SSN-ATB-EI are statistically significant, and the direct effect of SSN on EI is not statistically significant; as such, there is full mediation in this case as well. As such, the university could tailor its efforts to positively impact the perceptions of the student's friends and family concerning entrepreneurship as a career to improve students' EI. As seen earlier, the impact of ATB on EI is significantly greater than that of PBC on EI. As such, the university could focus on sharing the success stories of alums' entrepreneurial ventures and effectively advertise the access to funding, the availability of entrepreneurial opportunities, and mentorship support to the students' families and friends.

Moderating effects of DCB

Analysis showed interesting patterns concerning the moderating effects of DCB; however, none of the moderating effects were statistically significant. Considering the moderating effect of CF

on the relationship between ESS and ATB, it was observed that among the students who possess an external locus of control and believe to a great extent in the role of chance or fate in determining their career for them, ESS has a positive impact on ATB. In contrast, among the students who do not believe that chance or fate determines their career, ESS negatively impacted ATB.

The moderating effect of PH on the relationship between ESS and SSN was also not statistically significant, and it was observed that the effect of ESS on SSN was positive but slightly weaker for students who believed to a greater extent in the "magical" role of career assessments and career counselors in determining an optimal career for them. The moderating effect of Gender on the relationship between G and PBC was not statistically significant, and it was observed that the female students who possessed biased opinions regarding careers because of gender stereotypes possessed lower levels of self-perception about their capability to start a new venture. However, the male students who possessed biased opinions towards different careers based on gender stereotypes possessed greater levels of self-perception about their capability to start a new venture.

Similar results were observed for the moderating effect of G on the relationship between Gender and ATB. This effect was not statistically significant, and it was observed that female students who possessed biased opinions regarding careers because of gender stereotypes viewed entrepreneurship as a less desirable career choice. However, the male students who possessed biased opinions towards different careers based on gender stereotypes found entrepreneurship to be a more desirable career than those who didn't.

The moderating effect of SO on the relationships between SSN and ATB, as well as the relationship between SSN and PBC, was not statistically significant, and the positive impacts of SSN on ATB and PBC weaken at higher levels of SO. This indicates that for the students who believe that the significant people in their lives know which career they choose better than themselves if the

significant perceived entrepreneurship as a good career choice, they possessed lower levels of ATB and PBC.

Longitudinal analysis

In the longitudinal analysis, it was observed that the impact of ESS on PBC and SSN was statistically significant for all three years under consideration (2020, 2022, and 2024). However, the effect of ESS on ATB was not statistically significant in any of the three years. The effect of ESS on ATB as well as PBC increased from 2020 to 2022 and reduced from 2022 to 2024; however, this change in the effects was only statistically significant for the change in the effect of ESS on PBC in insignificant for the change in the effect of ESS on ATB. The total indirect effects of ESS on EI were statistically significant for all the years under consideration. The specific indirect effects of ESS on EI through the paths ESS-PBC-EI, ESS-SSN-ATB-EI, and ESS-SSN-PBC-EI were statistically significant for the three years under consideration. In contrast, the specific indirect effect of ESS on EI through the path ESS-SSN-EI was only statistically significant for the year 2022. The indirect effects of ESS on EI through the path ESS-ATB-EI were not statistically significant for any of the three years under consideration. The changes in the specific indirect effects of ESS on EI through the paths ESS-SSN-EI, ESS-SSN-ATB-EI, and ESS-SSN-PBC-EI are statistically significant and follow the same trend wherein the effects increase from 2020 to 2022 and decrease from 2022 to 2024.

The changes in the levels of various constructs were found to be statistically significant except for EI, wherein the change in its level from 2020 to 2022 was not statistically significant. The levels of ATB and EI were found to decrease from 2020 to 2022 and from 2022 to 2024. The levels of SSN and PBC increased from 2020 to 2022 but reduced from 2022 to 2024.

8. Practical implications

1. For universities:

- *Enhanced and adaptive ESS programs:* To bolster ATB, PBC, and SSN, universities should design ESS programs that foster positive attitudes toward entrepreneurship through alum success stories, case studies, and workshops on its societal impact. As we observed in this study, ESS impact fluctuates with economic conditions. Universities should implement flexible ESS frameworks offering virtual workshops and mentorship during disruptions to ensure continuous relevance and accessibility.
- *Targeted support during economic uncertainty:* The 2022 peak in EI, possibly due to pandemic-driven job insecurity, suggests that students may turn to entrepreneurship during employment instability. Universities can respond by providing short-term incubators, funding workshops, co-working spaces, and resilience training to help students navigate entrepreneurship in volatile markets.
- *Longitudinal ESS monitoring:* Regular assessments of ESS programs via surveys or feedback sessions could help universities track and adapt to changing student needs, optimizing support to remain effective across varying economic climates.
- *ESS responsive to economic and social shifts:* The varying effect of ESS on EI over time indicates the need for adaptive ESS models that align with students' evolving needs. Universities could enhance virtual support and networking during economic downturns to maintain strong, relevant entrepreneurial support despite external challenges.
- *Integrated professional guidance:* With professional help beliefs significantly influencing EI, universities should incorporate tailored mentorship and career counseling within their ESS.

Offering access to experienced mentors and personalized resources can reassure students and bolster their entrepreneurial confidence and PBC**.**

2. For career counselors:

- *Responsive counseling in economic uncertainty:* As we observed a spike in EI during economic instability (e.g., the pandemic), counselors should offer resilience-focused career planning sessions to equip students with skills for both entrepreneurial and traditional paths. Workshops on adaptability, financial management, and crisis planning could further increase students' PBC, making them well-equipped to handle entrepreneurial challenges effectively.
- *Engagement with social networks:* Since SSN significantly impacts EI, counselors could organize family and peer workshops highlighting entrepreneurship's benefits. This engagement can bolster social support for students' entrepreneurial aspirations, especially during periods of high ESS impact, helping them feel validated in pursuing entrepreneurship.
- *Informed career exploration for students with decision-criticality beliefs:* Career counselors could guide students with high levels of decision-criticality beliefs to perceive entrepreneurship as one of several impactful career choices. Through goal-setting workshops and career-planning sessions that emphasize adaptability, counselors can encourage informed, flexible career choices that would allow students to appreciate entrepreneurship without high-stakes pressure.
- *Balanced Approach to Professional Help:* Since beliefs about professional help significantly impact EI and its antecedents, counselors should guide students to balance reliance on guidance from others with developing self-reliant skills. Workshops on entrepreneurial decision-making and self-efficacy could empower students to take the initiative while valuing mentorship, enhancing their confidence, and decreasing over-reliance on professional help.

3. For policymakers:

- *Promoting Entrepreneurship as a High-Impact Career:* Policymakers can fund initiatives like awareness campaigns, success stories, and guest speakers to promote entrepreneurship as a meaningful and impactful career.
- *Enhanced ESS Support During Economic Downturns:* Given ESS's variable effect on EI during economic volatility, policymakers should increase funding for ESS during economic downturns, enabling universities to provide expanded resources, grants, and resilience training for students to pursue new venture creation as an alternative to traditional employment.
- *Building Regional Entrepreneurial Networks:* Policymakers can create networks connecting university ESS programs with industry leaders and mentors, offering stable support for aspiring entrepreneurs even during economic uncertainty.
- *Adjustable ESS Funding Based on Economic Climate:* Policymakers could allocate variable ESS funding, increasing resources like digital incubators and start-up grants during economic downturns or heightened entrepreneurial interest, ensuring universities can cope with evolving student needs.

9. Recommendations for future research

Longitudinal Impact of ESS: Future research could investigate how specific economic events influence ESS impact over time, providing insights to tailor ESS responses across different contexts.

Psychological Factors in Longitudinal Analysis: Since DCBs were not included in the longitudinal analysis, future studies could investigate how these beliefs evolve and influence ESS efficacy, especially under varying external challenges.

Comparative Studies on ESS Effectiveness: Research comparing ESS elements across universities with varying resources could pinpoint the most influential components and suggest models for resource optimization**.**

Expanded Exploration of DCBs: Further research could investigate additional or refined DCB types to understand their nuanced roles in shaping entrepreneurial intentions, especially around external validation and cultural beliefs.

Cross-Cultural Studies on ESS and DCBs: Investigating ESS and DCBs across cultures could reveal how entrepreneurial intentions are shaped by different cultural and educational norms, contributing to developing culturally responsive ESS.

ESS Adaptation Models for Economic Instability: Studies could be performed to develop adaptable ESS frameworks tailored to economic volatility, helping students view entrepreneurship as a viable option during uncertain times.

10. Limitations

There are several limitations to this study. First, this study elicits students' responses for different items to measure latent constructs, essentially measuring the students' perceptions instead of reality. There could be a difference between perceptions and reality. Second, the construct measuring the DCB regarding the chance of fate (CF) had a little less value for Average Variance Extracted than the recommended threshold of 0.5. As a result, it lacks convergent validity. However, it was retained as it exhibits sufficient internal consistency and discriminant validity values. The scales measuring DCB need to be further validated by conducting more studies. Third, convenience sampling was used as the survey was only conducted among the students at a university in a province of Atlantic Canada. The survey may not be representative of the "university student" population, and as such, these results cannot be generalized. Fourth, the study of the interplay of DCB and ESS and their effects on EI was conducted using a cross-sectional survey and as such, there is no temporal connection between the outcome and the exposure. Fifth, the data was collected through a questionnaire. As such, the respondents' perceptions and selection of questionnaire items were considered reliable indicators of their levels of the different constructs studied.

11. Conclusion

This study investigated the role dysfunctional career beliefs (DCB) and the university's environment and support system (ESS) play in shaping the entrepreneurial intentions (EI) of the students at Memorial University of Newfoundland. It examined the direct effects of DCB, specifically regarding the criticality of the decision (C), on attitude towards behavior (ATB), as well as the direct effects of ESS on the antecedents of EI. The study further investigated the moderating effects of DCB related to the role of chance or fate (CF) and the role of professional help (PH) on the impact of ESS on ATB and subjective social norms (SSN), respectively. Additional moderation effects explored in this research were the influence of Gender on the relationship between DCB regarding the gender stereotypes (G) and ATB and perceived behavior control (PBC). The study also assessed how DCB, regarding the role of significant others (SO), moderated the effect of SSN on ATB and PBC. A longitudinal analysis was performed to determine how the effects of the university's ESS on the students' EI have evolved from 2020 to 2024.

The study's findings support the hypotheses related to ATB and PBC being significant determinants of EI. The analysis demonstrates that ATB has a substantially stronger impact on EI as compared to PBC, which aligns with the existing literature that suggests that the desirability of entrepreneurship as a career is a stronger predictor of EI than perceived behavior control (Fayolle & Gailly, 2015; Krueger et al., 2000). As such, cultivating positive attitudes towards entrepreneurship among students, such as enhancing their perceived entrepreneurial opportunities and innovation skills, has a greater impact on students' EI than initiatives to bolster perceived behavior control.

Considering the direct effects on ATB, the study found that both SSN and C have statistically significant effects, with the influence of SSN being more substantial. As such, the university could focus on designing initiatives that would positively impact students' SSN by improving the perceptions of students' family and friends regarding entrepreneurship as a viable career. Similarly, SSN also had a statistically significant positive impact on students' PBC. Additionally, the study found that ESS has a positive statistically significant impact on SSN, indicating that students who value social support for entrepreneurship and their perception of a supportive university environment feel more capable of initiating new ventures.

The indirect role of ESS in nurturing EI among university students was evident through its impact on ATB and PBC. While the direct effects of ESS on EI were not statistically significant, the mediation effects evinced that ESS positively impacts the students' EI by enhancing their perceived capabilities of undertaking an entrepreneurial venture and by fostering a more favorable attitude toward new venture creation. Additionally, ESS has positive indirect effects on EI, positively impacting the student's SSN and enhancing their ATB and PBC. The university could organize workshops, seminars, and guest speaker events inviting alums entrepreneurs to help students see entrepreneurship as a desirable career path. The results of the analysis justify fostering a supportive environment on campus by launching co-working spaces, incubators, and innovation centers where students can work on their ventures and also have an opportunity to connect with like-minded peers. Additionally, offering financial support to alleviate financial barriers to starting new ventures could boost PBC among the students. Memorial University has implemented such initiatives, and their impact on the EI of students was evident in this study. However, it was evident from the longitudinal study that the impact of ESS on students' ATB, PBC, SSN, and EI was significantly higher in the year 2022 than in the years 2020 and 2024. It would be interesting to

understand the factors that might have led to such results, e.g., between 2020 and 2022, the world was facing the COVID-19 pandemic wherein many people suffered loss of employment. As such, there could be a general higher interest in being self-employed.

The study also revealed a statistically significant positive relationship between DCB regarding the criticality of the decision (C) and ATB, suggesting that students who believe that career decision-making is a once-in-a-life event are more likely to consider entrepreneurship a desirable career path. This finding goes against the hypothesis that students with higher levels of C would have a less favorable attitude toward entrepreneurship.

These findings highlight these beliefs' complex role in shaping EI and open up an exciting research arena. It should be investigated why students who possess such irrational beliefs regarding the criticality of the decision have a favorable attitude towards entrepreneurship by considering the mediating roles of career decision-making anxiety and the mechanisms that students adopt to process such anxiety in the relationship between C and ATB.

This study also demonstrated optimal scaling using the Gifi method to transform categorical data into metric data, making it possible to perform statistical analysis requiring the variables to be metric. Another significant contribution of the study is that it showed the application of the *seminr* r package to perform PLS-SEM analysis wherein a vital limitation was found to the package's functionality – it cannot perform predictive capability assessments for the models that possess moderating variables yet.

Another important finding, although not initially hypothesized, was that DCB regarding the role of professional help (PH) had a statistically significant and positive direct effect on SSN. This

suggests that students who believe in the “magical” role of career counselors tend to place excessive emphasis on how their family and friends perceive entrepreneurship as a profession.

As such, this study makes important contributions to the literature in the fields of career counseling and entrepreneurship by highlighting the irrational beliefs university students possess regarding career decision-making and how these beliefs affect their entrepreneurial intentions and their ability to benefit from the initiatives of a university’s ESS to enhance their entrepreneurial intentions.

12. References

Aguinis, H., Gottfredson, R. K., & Joo, H. (2013). Best-Practice Recommendations for Defining, Identifying, and Handling Outliers. *Organizational Research Methods*, *16*(2), 270–301. https://doi.org/10.1177/1094428112470848

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Akinwale, Y. O., Ababtain, A. K., & Alaraifi, A. A. (2019). *Structural equation model analysis of factors influencing entrepreneurial interest among university students in Saudi Arabia*. *22*(4).

Anjum, T., Amoozegar, A., Farrukh, M., & Heidler, P. (2023). Entrepreneurial intentions among business students: The mediating role of attitude and the moderating role of university support. *Education + Training*, *65*(4), 587–606. https://doi.org/10.1108/ET-01-2021-0020

Arenius, P., & Minniti, M. (2005). Perceptual Variables and Nascent Entrepreneurship. *Small Business Economics*, *24*(3), 233–247. https://doi.org/10.1007/s11187-005-1984-x

Attygalle, T. I., Withanaarachchi, A. S., & Jayalal, S. (2023). Factors Influencing the Success of Software Startups in Sri Lanka: A Comparative Analysis using SmartPLS & SEMinR. *2023 International Research Conference on Smart Computing and Systems Engineering (SCSE)*, 1–8. https://doi.org/10.1109/SCSE59836.2023.10215016

Baron, R. A., Markman, G. D., & Hirsa, A. (2001). Perceptions of women and men as entrepreneurs: Evidence for differential effects of attributional augmenting. *Journal of Applied Psychology*, *86*(5), 923–929. https://doi.org/10.1037/0021-9010.86.5.923

Baubonienė, Ž., Hahn, K. H., Puksas, A., & Malinauskienė, E. (2018). Factors influencing student entrepreneurship intentions: The case of Lithuanian and South Korean universities. *Entrepreneurship and Sustainability Issues*, *6*(2), 854–871. https://doi.org/10.9770/jesi.2018.6.2(26)

Bazan, C. (2022). Effect of the University's Environment and Support System on Subjective Social Norms as Precursor of the Entrepreneurial Intention of Students. *SAGE Open*, *12*(4), 215824402211291. https://doi.org/10.1177/21582440221129105

Bazan, C., Datta, A., Gaultois, H., Shaikh, A., Gillespie, K., & Jones, J. (2019). EFFECT OF THE UNIVERSITY IN THE ENTREPRENEURIAL INTENTION OF FEMALE STUDENTS: Bazan, C., Datta, A., Gaultois, H., Shaikh, A., Gillespie, K. & Jones, J. (2019). Effect of the University in the Entrepreneurial Intention of Female Students. International Journal of Entrepreneurial Knowledge, 7(2), 73-97. doi:10.12345-0012. *International Journal of Entrepreneurial Knowledge*, *7*(2). https://doi.org/10.37335/ijek.v7i2.95

Bazan, C., Shaikh, A., Frederick, S., Amjad, A., Yap, S., Finn, C., & Rayner, J. (2019). Effect of Memorial University's Environment & Support System in shaping Entrepreneurial Intention of students. *Journal of Entrepreneurship Education*, *22*(1), 1–35.

Becker, J.-M., Ringle, C. M., & Sarstedt, M. (2018). ESTIMATING MODERATING EFFECTS IN PLS-SEM AND PLSc-SEM: INTERACTION TERM GENERATION*DATA TREATMENT. *Journal of Applied Structural Equation Modeling*, *2*(2), 1–21. https://doi.org/10.47263/JASEM.2(2)01

Berenguer-Contri, G., Gil-Saura, I., Ruiz-Molina, M.-E., Gil, R., & Juma-Michilena, I. (2024). How to generate economic satisfaction in b2b contexts? The role of value co-creation and relationship quality. *Journal of Industrial and Business Economics*, *51*(1), 189–209. https://doi.org/10.1007/s40812-023-00287-9

Bock, Zmud, Kim, & Lee. (2005). Behavioral Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces, and Organizational Climate. *MIS Quarterly*, *29*(1), 87. https://doi.org/10.2307/25148669

Boldureanu, G., Ionescu, A. M., Bercu, A.-M., Bedrule-Grigoruță, M. V., & Boldureanu, D. (2020). Entrepreneurship Education through Successful Entrepreneurial Models in Higher Education Institutions. *Sustainability*, *12*(3), 1267. https://doi.org/10.3390/su12031267

Bright, J. E. H., Pryor, R. G. L., & Harpham, L. (2005). The role of chance events in career decision making. *Journal of Vocational Behavior*, *66*(3), 561–576. https://doi.org/10.1016/j.jvb.2004.05.001

Carifio, J., & Perla, R. (2008). Resolving the 50-year debate around using and misusing Likert scales. *Medical Education*, *42*(12), 1150–1152. https://doi.org/10.1111/j.1365-2923.2008.03172.x

Choongo, P. (2017). A Longitudinal Study of the Impact of Corporate Social Responsibility on Firm Performance in SMEs in Zambia. *Sustainability*, *9*(8), 1300. https://doi.org/10.3390/su9081300

Conklin, A. M., Dahling, J. J., & Garcia, P. A. (2013). Linking Affective Commitment, Career Self-Efficacy, and Outcome Expectations: A Test of Social Cognitive Career Theory. *Journal of Career Development*, *40*(1), 68–83. https://doi.org/10.1177/0894845311423534

Cooper, A. C. (1993). Challenges in predicting new firm performance. *Journal of Business Venturing*, *8*(3), 241–253. https://doi.org/10.1016/0883-9026(93)90030-9

Cox, A. (1996). Relational competence and strategic procurement management. *European Journal of Purchasing & Supply Management*, *2*(1), 57–70. https://doi.org/10.1016/0969-7012(95)00019-4

Creed, P. A., Fallon, T., & Hood, M. (2009). The relationship between career adaptability, person and situation variables, and career concerns in young adults. *Journal of Vocational Behavior*, *74*(2), 219–229. https://doi.org/10.1016/j.jvb.2008.12.004

Danks, N. P., & Ray, S. (2018). Predictions from Partial Least Squares Models. In F. Ali, S. M. Rasoolimanesh, & C. Cobanoglu (Eds.), *Applying Partial Least Squares in Tourism and*

Hospitality Research (pp. 35–52). Emerald Publishing Limited. https://doi.org/10.1108/978-1-78756-699-620181003

Davidsson, P. (2016). *Researching Entrepreneurship* (Vol. 33). Springer International Publishing. https://doi.org/10.1007/978-3-319-26692-3

Davison, A. C., & Hinkley, D. V. (1997). *Bootstrap Methods and their Application* (1st ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511802843

Debackere, K., & Veugelers, R. (2005). The role of academic technology transfer organizations in improving industry science links. *Research Policy*, *34*(3), 321–342. https://doi.org/10.1016/j.respol.2004.12.003

Delmar, F., Davidsson, P., & Gartner, W. B. (2003). Arriving at the high-growth firm. *Journal of Business Venturing*, *18*(2), 189–216. https://doi.org/10.1016/S0883-9026(02)00080-0

Dijkhuizen, J., Gorgievski, M., Van Veldhoven, M., & Schalk, R. (2018). Well-Being, Personal Success and Business Performance Among Entrepreneurs: A Two-Wave Study. *Journal of Happiness Studies*, *19*(8), 2187–2204. https://doi.org/10.1007/s10902-017-9914-6

Dong, X., Fang, N., & Ye, L. (2024). College students' disciplinary expertise and their entrepreneurial intentions: An exploratory study based on foreign language majors with experience in innovation and entrepreneurship training programs. *BMC Psychology*, *12*(1), 787. https://doi.org/10.1186/s40359-024-02149-y

Ellemers, N. (2018). Gender Stereotypes. *Annual Review of Psychology*, *69*(1), 275–298. https://doi.org/10.1146/annurev-psych-122216-011719

F. Hair Jr, J., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, *26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128

Fan, J., Hu, J., & Wang, J. (2024). How entrepreneurship education affects college students' entrepreneurial intention: Samples from China. *Heliyon*, *10*(10), e30776. https://doi.org/10.1016/j.heliyon.2024.e30776

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. https://doi.org/10.1111/jsbm.12065

Ferri, L., Ginesti, G., Spanò, R., & Zampella, A. (2018). Exploring the Entrepreneurial Intention of Female Students in Italy. *Journal of Open Innovation: Technology, Market, and Complexity*, *4*(3), 27. https://doi.org/10.3390/joitmc4030027

Figueiredo Belchior, R., & Lyons, R. (2022). An exploration of changing student entrepreneurial motivators – a longitudinal analysis. *International Journal of Entrepreneurial Behavior & Research*, *28*(1), 151–181. https://doi.org/10.1108/IJEBR-05-2021-0417

Fishbein, M., & Ajzen, I. (2011). *Predicting and Changing Behavior* (0 ed.). Psychology Press. https://doi.org/10.4324/9780203838020

Fogliati, V. J., & Bussey, K. (2013). Stereotype Threat Reduces Motivation to Improve: Effects of Stereotype Threat and Feedback on Women's Intentions to Improve Mathematical Ability. *Psychology of Women Quarterly*, *37*(3), 310–324. https://doi.org/10.1177/0361684313480045

Franke, N., & Lüthje, C. (2004). Entrepreneurial Intentions of Business students—A benchmarking study. *International Journal of Innovation and Technology Management*, *01*(03), 269–288. https://doi.org/10.1142/S0219877004000209

Gadassi, R., & Gati, I. (2009). The Effect of Gender Stereotypes on Explicit and Implicit Career Preferences. *The Counseling Psychologist*, *37*(6), 902–922. https://doi.org/10.1177/0011000009334093

Gadassi, R., Gati, I., & Dayan, A. (2012). The adaptability of Career Decision-Making Profiles. *Journal of Counseling Psychology*, *59*(4), 612–622. https://doi.org/10.1037/a0029155

Galvão, A. R., Marques, C. S., Mendes, T., & Azevedo, C. (2024). How Does Perceived University Support Boost Students' Entrepreneurial Intentions? *Journal of the Knowledge Economy*. https://doi.org/10.1007/s13132-024-02441-7

García-Rodríguez, F. J., Gil-Soto, E., Ruiz-Rosa, I., & Gutiérrez-Taño, D. (2017). Entrepreneurial potential in less innovative regions: The impact of social and cultural environment. *European Journal of Management and Business Economics*, *26*(2), 163–179. https://doi.org/10.1108/EJMBE-07-2017-010

Gati, I., Amir, T., & Landman, S. (2010). Career counsellors' perceptions of the severity of career decision-making difficulties. *British Journal of Guidance & Counselling*, *38*(4), 393–408. https://doi.org/10.1080/03069885.2010.503700

Gati, I., Krausz, M., & Osipow, S. H. (1996). A taxonomy of difficulties in career decision making. *Journal of Counseling Psychology*, *43*(4), 510–526. https://doi.org/10.1037/0022-0167.43.4.510

Gati, I., & Levin, N. (2012). The Stability and Structure of Career Decision-Making Profiles: A 1-Year Follow-Up. *Journal of Career Assessment*, *20*(4), 390–403. https://doi.org/10.1177/1069072712448892

Gati, I., & Levin, N. (2014). Counseling for Career Decision-Making Difficulties: Measures and Methods. *The Career Development Quarterly*, *62*(2), 98–113. https://doi.org/10.1002/j.2161-0045.2014.00073.x

Gati, I., Ryzhik, T., & Vertsberger, D. (2013). Preparing young veterans for civilian life: The effects of a workshop on career decision-making difficulties and self-efficacy. *Journal of Vocational Behavior*, *83*(3), 373–385. https://doi.org/10.1016/j.jvb.2013.06.001

Ghouse, S. M., Barber Iii, D., & Alipour, K. (2024). Shaping the future Entrepreneurs: Influence of human capital and self-efficacy on entrepreneurial intentions of rural students. *The International Journal of Management Education*, *22*(3), 101035. https://doi.org/10.1016/j.ijme.2024.101035

Gifi, A. (1990). *Nonlinear Multivariate Analysis*. Wiley.

Gottfredson, L. S. (1981). Circumscription and compromise: A developmental theory of occupational aspirations. *Journal of Counseling Psychology*, *28*(6), 545–579. https://doi.org/10.1037/0022-0167.28.6.545

Guerrero, M., & Urbano, D. (2014). Academics' start-up intentions and knowledge filters: An individual perspective of the knowledge spillover theory of entrepreneurship. *Small Business Economics*, *43*(1), 57–74. https://doi.org/10.1007/s11187-013-9526-4

Gurel, E., Madanoglu, M., & Altinay, L. (2021). Gender, risk-taking and entrepreneurial intentions: Assessing the impact of higher education longitudinally. *Education + Training*, *63*(5), 777–792. https://doi.org/10.1108/ET-08-2019-0190

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (Second edition). Sage.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). An Introduction to Structural Equation Modeling. In J. F. Hair, G. T. M. Hult, C. M. Ringle, M. Sarstedt, N. P. Danks, & S. Ray, *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R* (pp. 1–29). Springer International Publishing. https://doi.org/10.1007/978-3-030-80519-7_1

Harren, V. A. (1979). A model of career decision making for college students. *Journal of Vocational Behavior*, *14*(2), 119–133. https://doi.org/10.1016/0001-8791(79)90065-4

Hechtlinger, S., Levin, N., & Gati, I. (2019). Dysfunctional Career Decision-Making Beliefs: A Multidimensional Model and Measure. *Journal of Career Assessment*, *27*(2), 209–229. https://doi.org/10.1177/1069072717748677

Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., Ketchen, D. J., Hair, J. F., Hult, G. T. M., & Calantone, R. J. (2014). Common Beliefs and Reality About PLS: Comments on Rönkkö and Evermann (2013). *Organizational Research Methods*, *17*(2), 182–209. https://doi.org/10.1177/1094428114526928

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hentschel, T., Heilman, M. E., & Peus, C. V. (2019). The Multiple Dimensions of Gender Stereotypes: A Current Look at Men's and Women's Characterizations of Others and Themselves. *Frontiers in Psychology*, *10*, 11. https://doi.org/10.3389/fpsyg.2019.00011

Iakovleva, T., Kolvereid, L., & Stephan, U. (2011). Entrepreneurial intentions in developing and developed countries. *Education + Training*, *53*(5), 353–370. https://doi.org/10.1108/00400911111147686

Joensuu-Salo, S. (2020). A Long-Term Effect of Entrepreneurship Education on Entrepreneurial Intentions: Results from Finnish Higher Education Students. *Journal of Finnish Studies*, *23*(2), 9–31. https://doi.org/10.5406/28315081.23.2.04

Kakouris, A., Tampouri, S., Kaliris, A., Mastrokoukou, S., & Georgopoulos, N. (2023). Entrepreneurship as a Career Option within Education: A Critical Review of Psychological Constructs. *Education Sciences*, *14*(1), 46. https://doi.org/10.3390/educsci14010046

Kautonen, T., Van Gelderen, M., & Tornikoski, E. T. (2013). Predicting entrepreneurial behaviour: A test of the theory of planned behaviour. *Applied Economics*, *45*(6), 697–707. https://doi.org/10.1080/00036846.2011.610750

Khalil, H., Hashim, K. F., Rababa, M., & Atallah, S. (2024). Shaping the entrepreneurial mindset: Exploring the impact of entrepreneurship education on entrepreneurial intentions among university students in the UAE: The mediating role of individual entrepreneurial orientation. *International Journal of Educational Research*, *127*, 102430. https://doi.org/10.1016/j.ijer.2024.102430

Kırdök, O., & Harman, E. (2018). High School Students' Career Decision-making Difficulties According to Locus of Control. *Universal Journal of Educational Research*, *6*(2), 242–248. https://doi.org/10.13189/ujer.2018.060205

Klein, A. G., & Muthén, B. O. (2007). Quasi-Maximum Likelihood Estimation of Structural Equation Models With Multiple Interaction and Quadratic Effects. *Multivariate Behavioral Research*, *42*(4), 647–673. https://doi.org/10.1080/00273170701710205

Klein, A., & Moosbrugger, H. (2000). Maximum likelihood estimation of latent interaction effects with the LMS method. *Psychometrika*, *65*(4), 457–474. https://doi.org/10.1007/BF02296338

Kollmayer, M., Schultes, M.-T., Schober, B., Hodosi, T., & Spiel, C. (2018). Parents' Judgments about the Desirability of Toys for Their Children: Associations with Gender Role Attitudes, Gender-typing of Toys, and Demographics. *Sex Roles*, *79*(5–6), 329–341. https://doi.org/10.1007/s11199-017-0882-4

Kolvereid, L., & Isaksen, E. (2006). New business start-up and subsequent entry into self-employment. *Journal of Business Venturing*, *21*(6), 866–885. https://doi.org/10.1016/j.jbusvent.2005.06.008

Koydemir, S., & Demir, A. (2008). Shyness and Cognitions: An Examination of Turkish University Students. *The Journal of Psychology*, *142*(6), 633–644. https://doi.org/10.3200/JRLP.142.6.633-644

Krueger, N. F. (2007). What Lies Beneath? The Experiential Essence of Entrepreneurial Thinking. *Entrepreneurship Theory and Practice*, *31*(1), 123–138. https://doi.org/10.1111/j.1540-6520.2007.00166.x

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, *15*(5–6), 411–432. https://doi.org/10.1016/S0883-9026(98)00033-0

Krumboltz, J. D. (1994). The Career Beliefs Inventory. *Journal of Counseling & Development*, *72*(4), 424–428. https://doi.org/10.1002/j.1556-6676.1994.tb00962.x

Kulcsár, V., Dobrean, A., & Gati, I. (2020). Challenges and difficulties in career decision making: Their causes, and their effects on the process and the decision. *Journal of Vocational Behavior*, *116*, 103346. https://doi.org/10.1016/j.jvb.2019.103346

Kuratko, D. F., Morris, M. H., & Schindehutte, M. (2015). Understanding the dynamics of entrepreneurship through framework approaches. *Small Business Economics*, *45*(1), 1–13. https://doi.org/10.1007/s11187-015-9627-3

Laguía González, A., Jaén, I., Topa, G., & Moriano, J. (2019). University environment and entrepreneurial intention: The mediating role of the components of the theory of planned behaviour / El entorno universitario y la intención emprendedora: el papel mediador de los componentes de la teoría de la acción planificada. *Revista de Psicología Social*, *34*(1), 137–167. https://doi.org/10.1080/02134748.2018.1542789

Lee, S. H., & Wong, P. K. (2004). An exploratory study of technopreneurial intentions: A career anchor perspective. *Journal of Business Venturing*, *19*(1), 7–28. https://doi.org/10.1016/S0883-9026(02)00112-X

Lent, R. W., & Brown, S. D. (2013). Social cognitive model of career self-management: Toward a unifying view of adaptive career behavior across the life span. *Journal of Counseling Psychology*, *60*(4), 557–568. https://doi.org/10.1037/a0033446

Leong, F. T. L., & Chervinko, S. (1996). Construct Validity of Career Indecision: Negative Personality Traits as Predictors of Career Indecision. *Journal of Career Assessment*, *4*(3), 315–329. https://doi.org/10.1177/106907279600400306

Lerner, J. (2004). The University and the Start-Up:Lessons from the Past Two Decades. *The Journal of Technology Transfer*, *30*(1–2), 49–56. https://doi.org/10.1007/s10961-004-4357-8

Liengaard, B. D., Sharma, P. N., Hult, G. T. M., Jensen, M. B., Sarstedt, M., Hair, J. F., & Ringle, C. M. (2021). Prediction: Coveted, Yet Forsaken? Introducing a Cross-Validated Predictive Ability Test in Partial Least Squares Path Modeling. *Decision Sciences*, *52*(2), 362–392. https://doi.org/10.1111/deci.12445

Lim, W. (2018). The Effects of Academic Environment through Self-Efficacy on Entrepreneurial Intention: SEM-PLS Approach. *The Journal of Social Sciences Research*, *SPI6*, 664–669. https://doi.org/10.32861/jssr.spi6.664.669

Liñán, F., & Chen, Y. (2009a). Development and Cross–Cultural Application of a Specific Instrument to Measure Entrepreneurial Intentions. *Entrepreneurship Theory and Practice*, *33*(3), 593–617. https://doi.org/10.1111/j.1540-6520.2009.00318.x

Liñán, F., & Chen, Y. (2009b). Development and Cross–Cultural Application of a Specific Instrument to Measure Entrepreneurial Intentions. *Entrepreneurship Theory and Practice*, *33*(3), 593–617. https://doi.org/10.1111/j.1540-6520.2009.00318.x

Liñán, F., & Fayolle, A. (2015). A systematic literature review on entrepreneurial intentions: Citation, thematic analyses, and research agenda. *International Entrepreneurship and Management Journal*, *11*(4), 907–933. https://doi.org/10.1007/s11365-015-0356-5

Liñán, F., & Santos, F. J. (2007). Does Social Capital Affect Entrepreneurial Intentions? *International Advances in Economic Research*, *13*(4), 443–453. https://doi.org/10.1007/s11294-007-9109-8

Lipshits-Braziler, Y., Gati, I., & Tatar, M. (2016). Strategies for Coping with Career Indecision. *Journal of Career Assessment*, *24*(1), 42–66. https://doi.org/10.1177/1069072714566795

Liu, M., Gorgievski, M. J., Qi, J., & Paas, F. (2022). Perceived university support and entrepreneurial intentions: Do different students benefit differently? *Studies in Educational Evaluation*, *73*, 101150. https://doi.org/10.1016/j.stueduc.2022.101150

Liu, Z., Zhang, M., Guo, Y., Mao, T., Deng, S., & Li, Y. (2025). Entrepreneurship education stimulates entrepreneurial intention of college students in China: A dual-pathway model. *The International Journal of Management Education*, *23*(2), 101107. https://doi.org/10.1016/j.ijme.2024.101107

Lopez, T., & Alvarez, C. (2019). Influence of university-related factors on students' entrepreneurial intentions. *International Journal of Entrepreneurial Venturing*, *11*(6), 521. https://doi.org/10.1504/IJEV.2019.103751

Lüthje, C., & Franke, N. (2003). the 'making' of an entrepreneur: Testing a model of entrepreneurial intent among engineering students at MIT. *R&D Management*, *33*(2), 135–147. https://doi.org/10.1111/1467-9310.00288

Mair, P. (2018). *Modern Psychometrics with R*. Springer International Publishing. https://doi.org/10.1007/978-3-319-93177-7

Mair, P., Leeuw, J. D., & Groenen, P. J. F. (2022). *Gifi: Multivariate Analysis with Optimal Scaling* (Version 0.4-0) [Computer software]. https://cran.r-project.org/web/packages/Gifi/index.html

Manley, S. C., Hair, J. F., Williams, R. I., & McDowell, W. C. (2021). Essential new PLS-SEM analysis methods for your entrepreneurship analytical toolbox. *International Entrepreneurship and Management Journal*, *17*(4), 1805–1825. https://doi.org/10.1007/s11365-020-00687-6

Markuerkiaga, L., Caiazza, R., Igartua, J. I., & Errasti, N. (2016). Factors fostering students' spin-off firm formation: An empirical comparative study of universities from North and South Europe. *Journal of Management Development*, *35*(6), 814–846. https://doi.org/10.1108/JMD-03-2016-0034

Mathews, C. H., & Moser, S. B. (1995). Family background and gender: Implications for interest in small firm ownership. *Entrepreneurship & Regional Development*, *7*(4), 365–378. https://doi.org/10.1080/08985629500000023

Mau, W.-C. (2001). Assessing Career Decision-Making Difficulties: A Cross-Cultural Study. *Journal of Career Assessment*, *9*(4), 353–364. https://doi.org/10.1177/106907270100900403

Mitchell, K. E., Al Levin, S., & Krumboltz, J. D. (1999). Planned Happenstance: Constructing Unexpected Career Opportunities. *Journal of Counseling & Development*, *77*(2), 115–124. https://doi.org/10.1002/j.1556-6676.1999.tb02431.x

Mitchell, R. K., Smith, B., Seawright, K. W., & Morse, E. A. (2000). CROSS-CULTURAL COGNITIONS AND THE VENTURE CREATION DECISION. *Academy of Management Journal*, *43*(5), 974–993. https://doi.org/10.2307/1556422

Mustafa, M. J., Hernandez, E., Mahon, C., & Chee, L. K. (2016). Entrepreneurial intentions of university students in an emerging economy: The influence of university support and

proactive personality on students' entrepreneurial intention. *Journal of Entrepreneurship in Emerging Economies*, *8*(2), 162–179. https://doi.org/10.1108/JEEE-10-2015-0058

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. https://doi.org/10.5465/amle.2015.0026

Nabi, G., Walmsley, A., Liñán, F., Akhtar, I., & Neame, C. (2018). Does entrepreneurship education in the first year of higher education develop entrepreneurial intentions? The role of learning and inspiration. *Studies in Higher Education*, *43*(3), 452–467. https://doi.org/10.1080/03075079.2016.1177716

Nadal, K. L. (Ed.). (2017). *The Sage encyclopedia of psychology and gender* (First edition). SAGE Publications.

Nguyen, G. N., & Nguyen, T. K. (2024). Entrepreneurial passion of business and technical students: The roles of subjective norms, entrepreneurial education, entrepreneurial self-efficacy, and risk propensity. *The International Journal of Management Education*, *22*(3), 101012. https://doi.org/10.1016/j.ijme.2024.101012

Oluwaseun Peter Oyeyemi, Azeez Jason Kess-Momoh, Ganiyu Bolawale Omotoye, Binaebi Gloria Bello, Sunday Tubokirifuruar Tula, & Andrew Ifesinachi Daraojimba. (2024). Entrepreneurship in the digital age: A comprehensive review of start-up success factors and technological impact. *International Journal of Science and Research Archive*, *11*(1), 182–191. https://doi.org/10.30574/ijsra.2024.11.1.0030

Osipow, S. H. (1999). Assessing Career Indecision. *Journal of Vocational Behavior*, *55*(1), 147–154. https://doi.org/10.1006/jvbe.1999.1704

Overwien, A., Jahnke, L., & Leker, J. (2024). Can entrepreneurship education activities promote students' entrepreneurial intention? *The International Journal of Management Education*, *22*(1), 100928. https://doi.org/10.1016/j.ijme.2023.100928

Packham, G., Jones, P., Miller, C., Pickernell, D., & Thomas, B. (2010). Attitudes towards entrepreneurship education: A comparative analysis. *Education + Training*, *52*(8/9), 568–586. https://doi.org/10.1108/00400911011088926

Pečjak, S., Podlesek, A., & Pirc, T. (2019). Decision-making stylesas predictors of career decision difficulties in secondary school studentswith regard to gender. *Psihologijske Teme*, *28*(3), 601–620. https://doi.org/10.31820/pt.28.3.8

Pérez-López, M. C., González-López, M. J., & Rodríguez-Ariza, L. (2019). Applying the social cognitive model of career self-management to the entrepreneurial career decision: The role of exploratory and coping adaptive behaviours. *Journal of Vocational Behavior*, *112*, 255–269. https://doi.org/10.1016/j.jvb.2019.03.005

Peterman, N. E., & Kennedy, J. (2003). Enterprise Education: Influencing Students' Perceptions of Entrepreneurship. *Entrepreneurship Theory and Practice*, *28*(2), 129–144. https://doi.org/10.1046/j.1540-6520.2003.00035.x

Pittaway, L., & Cope, J. (2007). Entrepreneurship Education: A Systematic Review of the Evidence. *International Small Business Journal: Researching Entrepreneurship*, *25*(5), 479–510. https://doi.org/10.1177/0266242607080656

Pryor, R. G., & Bright, J. E. (2014). The Chaos Theory of Careers (CTC): Ten years on and only just begun. *Australian Journal of Career Development*, *23*(1), 4–12. https://doi.org/10.1177/1038416213518506

Radomir, L., & Moisescu, O. I. (2019). Discriminant validity of the customer-based corporate reputation scale: Some causes for concern. *Journal of Product & Brand Management*, *29*(4), 457–469. https://doi.org/10.1108/JPBM-11-2018-2115

Rakićević, Z., Rakićević, J., Anđelković Labrović, J., & Ljamić-Ivanović, B. (2022). How Entrepreneurial Education and Environment Affect Entrepreneurial Readiness of STEM and Business Students? A Longitudinal Study. *Engineering Economics*, *33*(4), 414–432. https://doi.org/10.5755/j01.ee.33.4.30244

Rauch, A., & Hulsink, W. (2015). Putting Entrepreneurship Education Where the Intention to Act Lies: An Investigation Into the Impact of Entrepreneurship Education on Entrepreneurial Behavior. *Academy of Management Learning & Education*, *14*(2), 187–204. https://doi.org/10.5465/amle.2012.0293

Ray, S., Danks, N. P., Valdez, A. C., Estrada, J. M. V., Uanhoro, J., Nakayama, J., Koyan, L., Burbach, L., Bejar, A. H. C., & Adler, S. (2024). *seminr: Building and Estimating Structural Equation Models* (Version 2.3.3) [Computer software]. https://cran.r-project.org/web/packages/seminr/index.html

Razi-ur-Rahim, M., Uddin, F., Dwivedi, P., & Pandey, D. K. (2024). Entrepreneurial intentions among polytechnic students in India: Examining the theory of planned behaviour using PLS-SEM. *The International Journal of Management Education*, *22*(3), 101020. https://doi.org/10.1016/j.ijme.2024.101020

Rhemtulla, M., Brosseau-Liard, P. É., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods*, *17*(3), 354–373. https://doi.org/10.1037/a0029315

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. https://doi.org/10.1111/jsbm.12021

Ringle, C. M., Wende, S., & Becker, J. (2024). *SmartPLS 4* (Version 4) [Computer software]. SmartPLS. https://www.smartpls.com

Rizopoulos, D., & Moustaki, I. (2008). Generalized latent variable models with non-linear effects. *British Journal of Mathematical and Statistical Psychology*, *61*(2), 415–438. https://doi.org/10.1348/000711007X213963

Roemer, E. (2016). A tutorial on the use of PLS path modeling in longitudinal studies. *Industrial Management & Data Systems*, *116*(9), 1901–1921. https://doi.org/10.1108/IMDS-07-2015-0317

Roxas, B. (2014). Effects of entrepreneurial knowledge on entrepreneurial intentions: A longitudinal study of selected South-east Asian business students. *Journal of Education and Work*, *27*(4), 432–453. https://doi.org/10.1080/13639080.2012.760191

Saeed, S., Yousafzai, S. Y., Yani-De-Soriano, M., & Muffatto, M. (2015). The Role of Perceived University Support in the Formation of Students' Entrepreneurial Intention. *Journal of Small Business Management*, *53*(4), 1127–1145. https://doi.org/10.1111/jsbm.12090

Sampson, J. P., McClain, M., Musch, E., & Reardon, R. C. (2013). Variables Affecting Readiness to Benefit From Career Interventions. *The Career Development Quarterly*, *61*(2), 98–109. https://doi.org/10.1002/j.2161-0045.2013.00040.x

Sarstedt, M., Hair, J. F., Cheah, J.-H., Becker, J.-M., & Ringle, C. M. (2019). How to Specify, Estimate, and Validate Higher-Order Constructs in PLS-SEM. *Australasian Marketing Journal*, *27*(3), 197–211. https://doi.org/10.1016/j.ausmj.2019.05.003

Savickas, M. L. (1997). Career Adaptability: An Integrative Construct for Life-Span, Life-Space Theory. *The Career Development Quarterly*, *45*(3), 247–259. https://doi.org/10.1002/j.2161-0045.1997.tb00469.x

Schmutzler, J., Andonova, V., & Diaz-Serrano, L. (2019). How Context Shapes Entrepreneurial Self-Efficacy as a Driver of Entrepreneurial Intentions: A Multilevel Approach. *Entrepreneurship Theory and Practice*, *43*(5), 880–920. https://doi.org/10.1177/1042258717753142

Setiawan, B., Phan, T. D., Medina, J., Wieriks, M., Nathan, R. J., & Fekete-Farkas, M. (2024). Quest for financial inclusion via digital financial services (Fintech) during COVID-19 pandemic: Case study of women in Indonesia. *Journal of Financial Services Marketing*, *29*(2), 459–473. https://doi.org/10.1057/s41264-023-00217-9

Sharma, P. N., Liengaard, B. D., Hair, J. F., Sarstedt, M., & Ringle, C. M. (2023). Predictive model assessment and selection in composite-based modeling using PLS-SEM: Extensions and guidelines for using CVPAT. *European Journal of Marketing*, *57*(6), 1662–1677. https://doi.org/10.1108/EJM-08-2020-0636

Sharma, Y., Madan, A., Suri, A., Sijariya, R., Lohani, V. J., & Jindal, L. (2024). Building career resilience: The interplay between university life satisfaction, career decision, and career adaptability. *International Journal of Learning and Change*, *16*(5), 529–551. https://doi.org/10.1504/IJLC.2024.140902

Shen, F., Li, J., Li, L., He, X., Li, H., & Yang, S. (2025). Exploring the effect of students' engagement in entrepreneurship competitions on their entrepreneurial intention. *The International Journal of Management Education*, *23*(2), 101103. https://doi.org/10.1016/j.ijme.2024.101103

Shirokova, G., Osiyevskyy, O., & Bogatyreva, K. (2016). Exploring the intention–behavior link in student entrepreneurship: Moderating effects of individual and environmental

characteristics. *European Management Journal*, *34*(4), 386–399. https://doi.org/10.1016/j.emj.2015.12.007

Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J.-H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict. *European Journal of Marketing*, *53*(11), 2322–2347. https://doi.org/10.1108/EJM-02-2019-0189

Sidiropoulou-Dimakakou, D., Mylonas, K., Argyropoulou, K., & Tampouri, S. (2012). Career Decision-making Difficulties, Dysfunctional Thinking and Generalized Self-Efficacy of University Students in Greece. *World Journal of Education*, *2*(1), p117. https://doi.org/10.5430/wje.v2n1p117

Song, Y., & Lu, G. (2024). The impact of university entrepreneurship support on college students' entrepreneurial intention: A cognitive-affective perspective. *The International Journal of Management Education*, *22*(3), 101087. https://doi.org/10.1016/j.ijme.2024.101087

Soria-Barreto, K., Honores-Marin, G., Gutiérrez-Zepeda, P., & Gutiérrez-Rodríguez, J. (2017). Prior Exposure and Educational Environment towards Entrepreneurial Intention. *Journal of Technology Management & Innovation*, *12*(2), 45–58. https://doi.org/10.4067/S0718-27242017000200006

Souitaris, V., Zerbinati, S., & Al-Laham, A. (2007). Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources. *Journal of Business Venturing*, *22*(4), 566–591. https://doi.org/10.1016/j.jbusvent.2006.05.002

Stead, G. B., & Watson, M. B. (1993). The Career Myths Scale: Its validity and applicability. *International Journal for the Advancement of Counselling*, *16*(2), 89–97. https://doi.org/10.1007/BF01418145

Tampouri, S., Kakouris, A., Kaliris, A., & Kousiounelos, A. (2023). Introducing Sources of Self-efficacy and Dysfunctional Career Beliefs in Socio-cognitive Career Theory in Entrepreneurship. *European Conference on Innovation and Entrepreneurship*, *18*(2), 866–874. https://doi.org/10.34190/ecie.18.2.1603

Thompson, A. P. (1976). Client Misconceptions in Vocational Counseling: Some of the reasons vocational counselors are asked the wrong questions. *The Personnel and Guidance Journal*, *55*(1), 30–33. https://doi.org/10.1002/j.2164-4918.1976.tb04607.x

Tinsley, H. E. A., & Bradley, R. W. (1986). Test Interpretation. *Journal of Counseling & Development*, *64*(7), 462–466. https://doi.org/10.1002/j.1556-6676.1986.tb01166.x

Tognazzo, A., Gianecchini, M., & Gubitta, P. (2017). Educational Context and Entrepreneurial Intentions of University Students: An Italian Study. In P. Jones, G. Maas, & L. Pittaway (Eds.), *Contemporary Issues in Entrepreneurship Research* (Vol. 7, pp. 47–74). Emerald Publishing Limited. https://doi.org/10.1108/S2040-724620170000007008

Tohidinia, Z., & Mosakhani, M. (2010). Knowledge sharing behaviour and its predictors. *Industrial Management & Data Systems*, *110*(4), 611–631. https://doi.org/10.1108/02635571011039052

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. https://doi.org/10.1108/JSBED-10-2015-0149

Trivedi, R. H. (2017). Entrepreneurial-intention constraint model: A comparative analysis among post-graduate management students in India, Singapore and Malaysia. *International Entrepreneurship and Management Journal*, *13*(4), 1239–1261. https://doi.org/10.1007/s11365-017-0449-4

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. https://doi.org/10.1108/13620430810901688

Vegelius, J., & Jin, S. (2021). A Semiparametric Approach for Structural Equation Modeling with Ordinal Data. *Structural Equation Modeling: A Multidisciplinary Journal*, *28*(4), 497–505. https://doi.org/10.1080/10705511.2020.1848431

Xu, H. (2022). Understanding the Dysfunctionality of Dysfunctional Career Decision-Making Beliefs: Ambiguity Aversion as a General Mechanism. *Journal of Career Assessment*, *30*(2), 221–237. https://doi.org/10.1177/10690727211036887

Xu, H., & Tracey, T. J. G. (2014). The role of ambiguity tolerance in career decision making. *Journal of Vocational Behavior*, *85*(1), 18–26. https://doi.org/10.1016/j.jvb.2014.04.001

Yaghi, A., & Alabed, N. (2021). Career decision-making difficulties among university students: Does employment status matter? *Higher Education, Skills and Work-Based Learning*, *11*(5), 1143–1159. https://doi.org/10.1108/HESWBL-07-2020-0149

Young, F. W. (1981). Quantitative analysis of qualitative data. *Psychometrika*, *46*(4), 357–388. https://doi.org/10.1007/BF02293796

Zollo, L., Laudano, M. C., Ciappei, C., & Zampi, V. (2017). Factors affecting universities' ability to foster students' entrepreneurial behaviour: An empirical investigation. *Journal of Management Development*, *36*(2), 268–285. https://doi.org/10.1108/JMD-06-2016-0093

Appendix 1: Ethics Approval

MEMORIAL UNIVERSITY

Interdisciplinary Committee on
Ethics in Human Research (ICEHR)

St. John's, NL Canada A1C 5S7
Tel: 709 864-2561 icehr@mun.ca
www.mun.ca/research/ethics/humans/icehr

ICEHR Number:	**20250178-BA**
Approval Period:	May 9, 2024 – May 31, 2025
Funding Source:	
Responsible Faculty:	Dr. Carlos Bazan Faculty of Business Administration
Title of Project:	*Career decision making difficulties in entrepreneurship among university students*

Title of Parent Project:	*Gender differences in Opportunity recognition as a precursor to the antecedents of entrepreneurial intention, among university students*
ICEHR Number:	*20241263-BA*

May 9, 2024

Mr. Jay Bhargav Vyas
Faculty of Business Administration
Memorial University

Dear Mr. Vyas:

Thank you for your submission to the Interdisciplinary Committee on Ethics in Human Research (ICEHR) seeking ethical clearance for the above-named research project. The Committee has reviewed the proposal and agrees that the project is consistent with the guidelines of the *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans* (TCPS2). *Full ethics clearance* is *granted to* May 31, 2025. ICEHR approval applies to the ethical acceptability of the research, as per Article 6.3 of the *TCPS2*. Researchers are responsible for adherence to any other relevant University policies and/or funded or non-funded agreements that may be associated with the project. If funding is obtained subsequent to ethics approval, you must submit a Funding and/or Partner Change Request to ICEHR so that this ethics clearance can be linked to your award.

The *TCPS2* **requires** that you **strictly adhere to the protocol and documents as last reviewed** by ICEHR. If you need to make additions and/or modifications, you must submit an Amendment Request with a description of these changes, for the Committee's review of potential ethical issues, before they may be implemented. Submit a Personnel Change Form to add or remove project team members and/or research staff. Also, to inform ICEHR of any unanticipated occurrences, an Adverse Event Report must be submitted with an indication of how the unexpected event may affect the continuation of the project.

The *TCPS2* **requires** that you submit an Annual Update to ICEHR before May 31, 2025. If you plan to continue the project, you need to request renewal of your ethics clearance and include a brief summary on the progress of your research. When the project no longer involves contact with human participants, is completed and/or terminated, you are **required** to provide an annual update with a brief final summary and your file will be closed. All post-approval ICEHR event forms noted above must be submitted by selecting the ***Applications: Post-Review*** link on your Researcher Portal homepage. We wish you success with your research.

Yours sincerely,

James R Drover

James Drover, Ph.D.
Chair, Interdisciplinary Committee on
Ethics in Human Research

JD/bc

cc: Supervisor – Dr. Carlos Bazan, Faculty of Business Administration

Appendix 2: Questionnaire items

You have the option to skip any question you prefer not to answer.

Please indicate your level of agreement with the below statements based on the following scale:

1. I completely disagree
2. I disagree
3. I rather disagree
4. I neither agree nor disagree
5. I rather agree
6. I agree
7. I completely agree

In addition, If you complete the survey but decide that you do not want to submit it, you can press the 'Do Not Submit' button, and the system will redirect you to the email intake form for the draw without recording or submitting your response.

Attitude Towards Behavior (ATB)

- ATB1—A career as an entrepreneur is attractive to me.
- ATB2—I would prefer to run my own business than work for someone else.
- ATB3—Being an entrepreneur would give me great satisfaction.
- ATB4—Among various career options, I would rather be an entrepreneur.
- ATB5—If I had the opportunity and resources, I would like to start a business.

Subjective Social Norms (SSN)

- SSN1—My immediate family values the entrepreneurial career more than any other careers
- SSN2—My friends value the entrepreneurial career more than any other careers.
- SSN3—My immediate family would approve of my decision to start a business.
- SSN4—My friends would approve of my decision to start a business.
- SSN5—The expectations of my immediate family are important to me.
- SSN6—The expectations of my friends are important to me.

Perceived Behavioral Control (PBC)

- PBC1—I am prepared to start a viable business.
- PBC2—If I wanted to, I could easily pursue a career as an entrepreneur.
- PBC3—Starting a business and keeping it viable would be easy for me.
- PBC4—I know the necessary practical details to start a business.
- PBC5—If I tried to start a business, I would have a high probability of success.

Entrepreneurial Intention (EI)

- EI1—I am ready to do what it takes to be an entrepreneur.
- EI2—My professional goal is to be an entrepreneur.
- EI3—I will make every effort to start and run my own business.
- EI4—I am determined to start my business in the future.

- EI5—I am seriously thinking about starting my own business.

University Environment & Support System (ESS)

- SS1—Memorial University organizes business idea competitions.
- SS2—Memorial University has many resources to support a start-up company.
- SS3—Memorial University provides students with ideas to start a new business.
- SS4—Memorial University arranges meetings with successful entrepreneurs to share their experiences.
- SS5—Memorial University provides students with the financial means needed to start a new business.
- ET1—Memorial University provides students with the knowledge needed to start a new business.
- ET2—Memorial University offers training in entrepreneurship.
- ET3—Memorial University arranges conferences and workshops on entrepreneurship.
- ET4—Memorial University arranges for mentoring and advisory services for student entrepreneurs.
- ET5—Memorial University offers to work in projects that focus on entrepreneurship.
- EM1—Memorial University provides a creative atmosphere to develop ideas for new business start-ups.
- EM2—Memorial University helps students build the required network for starting a business.
- EM3—Memorial University motivates students to start a new business.
- EM4—Memorial University creates awareness of entrepreneurship as a possible career choice.
- EM5—Memorial University brings entrepreneurial students in contact with each other.

Dysfunctional Career Beliefs (DCB)

Note: The items representing dysfunctional beliefs involving gender (G1, G2, G3) have different versions for men and women.

- WU1—Choosing a career that suits my preferences is important to me.
- SO1— My family and peers know me better than I know myself.
- SO2—My family and peers know which career I should choose better than I do.
- CF1—It is not worthwhile to invest time and effort into choosing a career, as everything in life is a matter of luck anyway.
- CF2—It does not really matter what career I choose, as ultimately fate will determine my future career.
- CF3—It is unnecessary to invest a lot of effort into choosing a career, as opportunities will appear sooner or later in any case.
- PH1—Memorial University's career advisor would know exactly what career would suit me best.
- PH2—Psychological tests (such as skill or preference tests) can predict how successful I will be at my chosen career.
- PH3—Memorial University's career advisor will make the best decision for me.

- C1—I believe that choosing a career is a onetime lifelong commitment.
- C2—Choosing a career is a crucial decision, so I must not make a mistake.
- C3—I must invest effort in the process of choosing a career, as the decision will affect the rest of my life.
- G1—I cannot work in a profession that requires skills that are considered “feminine”. (m)
  I cannot work in a profession that requires skills that are considered “masculine”.(f)
- G2—There are some careers that I will not pursue because they seem too “feminine” (m)
  There are some careers that I will not pursue because they seem too “masculine,” (f)

Demographics

If I were to start a business, it would be a <dropdown for type of business>

My age is: <dropdown> (+Prefer not to say)

I am a(n) ☐ student from Newfoundland & Labrador ☐ student from another Canadian province ☐ international student ☐ Prefer not to say

I am a(n) ☐ undergraduate ☐ graduate student ☐ Prefer not to say

I identify as a: ☐ male ☐ female ☐ Other (Please specify) ☐ Prefer not to say

My area if study is: <dropdown> in the Faculty/School <dropdown> ☐ Prefer not to say

This is my ☐ first ☐ second ☐ third ☐ fourth ☐ fifth ☐ sixth year in my program ☐ Prefer not to say

I identify as ☐ Indigenous ☐ a member of a visible minority ☐ Prefer not to say Other

Do not submit☐ (By pressing this button, the system will redirect you to the email intake form for the draw without recording or submitting your response)

Appendix 3: R code

```
# Optimal Scaling

# Loading the libraries

library(seminr)
library(lavaan)
library(lavaanPlot)
library(dplyr)
library(tidyr)
library(knitr)
library(mvnormalTest)
library(psych)
library(Gifi)
library(readxl)
library(MPsychoR)
library(mirt)
library(car)

# Load data

ess_data <- read_xlsx("Final imputed file.xlsx")

df2 <- as.data.frame(ess_data)

df_ess <- subset(df2, select = -c(Gender))


## Loss function value for linear princals fit

knotslin <- knotsGifi(df_ess, type = "E")
prlin <- princals(df_ess, knots = knotslin, degrees = 1, ordinal
= FALSE)
prlin

# Loss function value for ordinal princals fit

ess_optimal <- princals(df_ess)
ess_optimal$loadings

# visualizing the ordinal transformation through the princals
transformation plot
```

```
plot(ess_optimal, plot.type = "transplot", var.subset = c(1:5),
lwd = 2)
```

 # replacing the original category scores with new category quantifications

```
df_optimal <- as.data.frame(round(ess_optimal$scoremat, 3))
df_optimal$Gender <- df2$Gender
View(df_optimal)
```

 # skewness and kurtosis data for assessing the normality

```
skewness_data <- sapply(df_optimal, skewness)
write.csv(skewness_data, "Skewness indices.csv")
kurtosis_data <- sapply(df_optimal, kurtosis)
write.csv(skewness_data, "Kurtosis indices.csv")
```

#Calculating Mahalanobis distance for outliers

```
df_optimal$mahalanobis <- mahalanobis(df_optimal,
colMeans(df_optimal), cov(df_optimal))
df_optimal$pvalue <- pchisq(df_optimal$mahalanobis, df = 50)
```

#Adding the demographic data to the dataframe

```
df_demo <- read_xlsx("Final imputed file with
demographics.xlsx")
df_optimal$D1 <- df_demo$D1
df_optimal$D2 <- df_demo$D2
df_optimal$D3 <- df_demo$D3
df_optimal$D4 <- df_demo$D4
df_optimal$D5 <- df_demo$D5
df_optimal$D6 <- df_demo$D6
df_optimal$D7 <- df_demo$D7
df_optimal$D8 <- df_demo$D8
df_optimal$D9 <- df_demo$D9
df_optimal$WU1 <- df_demo$WU1
```

 # Removing all the responses with p-value less than 0.001

```
df_data <- df_optimal %>% filter(pvalue >= 0.001)
df_data <- subset(df_data, select = -c(mahalanobis,pvalue))
```

```
setwd("C:/MUN/Research Project/Thesis/Analysis/Final data
analysis")
write_xlsx(df_data, "Scaled data.xlsx")
```

```
# Partial Least Square Structural Equation Modeling Analysis

# The code has been written based on the work of Mair (2018)
(https://doi.org/10.1007/978-3-319-93177-7)

# and Hair et. al (2021) (https://doi.org/10.1007/978-3-030-
80519-7)

# Specifying the data frame

df1 <- read_xlsx("Scaled data.xlsx")

# Specifying measurement model

ess_mm <- constructs(
  composite("Gender", single_item("Gender")),
  composite("ATB", multi_items("ATB", 1:5)),
  composite("SSN", multi_items("SSN", 1:6)),
  composite("PBC", multi_items("PBC", 1:5)),
  composite("EI", multi_items("EI", 1:5)),
  composite("SS", multi_items("SS", 1:5)),
  composite("ET", multi_items("ET", 1:5)),
  composite("EM", multi_items("EM", 1:5)),
  higher_composite("ESS", c("SS","ET","EM"), method =
two_stage),
  composite("CF", multi_items("CF", 1:3)),
  composite("C", multi_items("C",1:3)),
  composite("SO", multi_items("SO", 1:2)),
  composite("PH", multi_items("PH", 1:3)),
  composite("G", multi_items("G", 1:2)),
  interaction_term(iv = "G", moderator = "Gender", method =
two_stage),
  interaction_term(iv = "ESS", moderator = "CF", method =
two_stage),
  interaction_term(iv = "ESS", moderator = "PH", method =
two_stage),
  interaction_term(iv = "SSN", moderator = "SO", method =
two_stage)
)

# Specifying the structural model

ess_sm <- relationships(
```

```
  paths(from = c("G", "Gender", "G*Gender"), to = c("PBC")),
  paths(from = c("G", "Gender", "G*Gender"), to = c("ATB")),
  paths(from = c("ESS", "CF", "ESS*CF"), to = c("ATB")),
  paths(from = c("ESS", "PH", "ESS*PH"), to = c("SSN")),
  paths(from = c("ESS"), to = c("PBC", "EI")),
  paths(from = c("SSN","SO", "SSN*SO"), to = c("PBC")),
  paths(from = c("SSN","SO", "SSN*SO"), to = c("ATB")),
  paths(from = c("SSN"), to = c("EI")),
  paths(from = c("PBC", "ATB"), to = c("EI")),
  paths(from = c("C"), to = c("ATB"))
)


# Estimating the model

ess_pls_mod <- estimate_pls(
  data = df1,
  measurement_model = ess_mm,
  structural_model = ess_sm
)

# Extracting the summary

ess_summary <- summary(ess_pls_mod)







# Measurement model assessment

# Inspecting the outer loadings
df_loadings <- ess_summary$loadings
df_loadings
write.csv(df_loadings, "Indicator loadings.csv")

# Obtaining the internal consistency and reliability metrics
df_int_reliability <- as.data.frame(ess_summary$reliability)
write.csv(df_int_reliability, "Internal reliability.csv")

# Updated measurement model

ess_mm1 <- constructs(
  composite("Gender", single_item("Gender")),
  composite("ATB", multi_items("ATB", 1:5)),
  composite("SSN", multi_items("SSN", 1:2)),
```

```
  composite("PBC", multi_items("PBC", 1:5)),
  composite("EI", c("EI2","EI3","EI5")),
  composite("SS", multi_items("SS", 1:5)),
  composite("ET", multi_items("ET", 1:5)),
  composite("EM", multi_items("EM", 1:5)),
  higher_composite("ESS", c("SS","ET","EM"), method =
two_stage),
  composite("CF", c("CF1", "CF2","CF3")),
  composite("C", multi_items("C",1:2)),
  composite("SO", multi_items("SO", 1:2)),
  composite("PH", c("PH1","PH3")),
  composite("G", multi_items("G", 1:2)),
  interaction_term(iv = "G", moderator = "Gender", method =
two_stage),
  interaction_term(iv = "ESS", moderator = "CF", method =
two_stage),
  interaction_term(iv = "ESS", moderator = "PH", method =
two_stage),
  interaction_term(iv = "SSN", moderator = "SO", method =
two_stage)


# Estimating the model

ess_pls_mod1 <- estimate_pls(
  data = df1,
  measurement_model = ess_mm1,
  structural_model = ess_sm
)

# Extracting the summary

ess_summary1 <- summary(ess_pls_mod1)

# Bootstrap the model

ess_bootstrap1 <- bootstrap_model(
  seminr_model = ess_pls_mod1,
  nboot = 10000,
  cores = parallel::detectCores(),
  seed = 123)


# Summarizing the bootstrap results

ess_bootstrap_summary1 <- summary(ess_bootstrap1, alpha = 0.05)
```

```
# Updated Measurement model estimation

# Inspecting the outer loadings
df_loadings1 <- as.data.frame(ess_summary1$loadings)
df_loadings1
write.csv(df_loadings1, "Indicator loadings2.csv")

# Obtaining the internal consistency and reliability metrics
df_int_reliability1 <- as.data.frame(ess_summary1$reliability)
df_int_reliability1
write.csv(df_int_reliability1, "Internal reliability3.csv")

# Obtaining the HTMT ratio to assess discriminant validity
ess_htmt <- ess_summary1$validity$htmt
ess_htmt
write.csv(ess_htmt, "HTMT.csv")

# Structural model assessment

# Inspecting structural model collinearity

ess_collinearity <- ess_summary1$vif_antecedents
ess_collinearity

# Obtaining structural path coefficients
ess_paths <- ess_bootstrap_summary1$bootstrapped_paths
write.csv(ess_paths, "Path coefficients2.csv")
ess_paths

# Total effects
ess_tot_effects <-
ess_bootstrap_summary1$bootstrapped_total_paths
write.csv(ess_tot_effects, "Total path effects1.csv")

# Model RSquares
ess_rsquare <- ess_summary1$paths
write.csv(ess_rsquare, "R square values1.csv")

# Effect sizes
ess_effect_size <- ess_summary1$fSquare
write.csv(ess_effect_size, "Effect sizes2.csv")


# Assessing the predictive power of the model
# Creating a dummy ESS variable to store the construct scores of
ESS
ESS_dummy <- ess_pls_mod1$construct_scores
```

```
ESS_dummy <- as.data.frame(round(subset(ESS_dummy, select =
c("ESS")),3))
```

#Creating a temporary measurement model

```
ess_mm1_temp <- constructs(
  composite("Gender", single_item("Gender")),
  composite("ATB", multi_items("ATB", 1:5)),
  composite("SSN", multi_items("SSN", 1:2)),
  composite("PBC", multi_items("PBC", 1:5)),
  composite("EI", c("EI2","EI3","EI5")),
  composite("ESS", single_item("ESS")),
  composite("CF", c("CF1", "CF2","CF3")),
  composite("C", multi_items("C",1:2)),
  composite("SO", multi_items("SO", 1:2)),
  composite("PH", c("PH1","PH3")),
  composite("G", multi_items("G", 1:2)),
  interaction_term(iv = "G", moderator = "Gender", method =
two_stage),
  interaction_term(iv = "ESS", moderator = "CF", method =
two_stage),
  interaction_term(iv = "ESS", moderator = "PH", method =
two_stage),
  interaction_term(iv = "SSN", moderator = "SO", method =
two_stage)
)
```

 # Creating a temporary structural model

```
ess_sm_temp <- relationships(
  paths(from = c("G", "Gender", "G*Gender"), to = c("PBC")),
  paths(from = c("G", "Gender", "G*Gender"), to = c("ATB")),
  paths(from = c("ESS", "CF", "ESS*CF"), to = c("ATB")),
  paths(from = c("ESS", "PH", "ESS*PH"), to = c("SSN")),
  paths(from = c("ESS"), to = c("PBC", "EI")),
  paths(from = c("SSN","SO", "SSN*SO"), to = c("PBC")),
  paths(from = c("SSN","SO", "SSN*SO"), to = c("ATB")),
  paths(from = c("SSN"), to = c("EI")),
  paths(from = c("PBC", "ATB"), to = c("EI")),
  paths(from = c("C"), to = c("ATB"))
)
```

 # temporary data frame

```
df1_temp <- df1
```

```
df1_temp$ESS <- ESS_dummy$ESS

# Estimating the temporary model

ess_pls_mod1_temp <- estimate_pls(
  data = df1_temp,
  measurement_model = ess_mm1_temp,
  structural_model = ess_sm_temp
)

# Generating the model predictions

predict_ess <- predict_pls(
  model = ess_pls_mod1_temp,
  technique = predict_DA,
  noFolds = 10,
  reps = 10
)

# Could not finish predictive power assessment as seminr cannot
#perform the test for a model containing moderators and higher
#order constructs



#MODERATION EFFECTS

# interaction effect ESS-CF-ATB
slope_analysis(
  moderated_model = ess_pls_mod1,
  dv = "ATB",
  moderator = "CF",
  iv = "ESS",
  leg_place = "bottomright")

# interaction effect ESS-PH-SSN
slope_analysis(
  moderated_model = ess_pls_mod1,
  dv = "SSN",
  moderator = "PH",
  iv = "ESS",
  leg_place = "bottomright")

# interaction effect G-Gender-PBC
slope_analysis(
  moderated_model = ess_pls_mod1,
```

```
  dv = "PBC",
  moderator = "Gender",
  iv = "G",
  leg_place = "bottomright")

# interaction effect G-Gender-ATB
slope_analysis(
  moderated_model = ess_pls_mod1,
  dv = "ATB",
  moderator = "Gender",
  iv = "G",
  leg_place = "bottomright")

# interaction effect SSN-SO-PBC
slope_analysis(
  moderated_model = ess_pls_mod1,
  dv = "PBC",
  moderator = "SO",
  iv = "SSN",
  leg_place = "bottomright")

# interaction effect SSN-SO-PBC
slope_analysis(
  moderated_model = ess_pls_mod1,
  dv = "ATB",
  moderator = "SO",
  iv = "SSN",
  leg_place = "bottomright")


# Mediation effects

ess_indirect <- ess_summary1$total_indirect_effects
write.csv(ess_indirect, "Total indirect effects1.csv")

# Inspect indirect effects from ESS to EI through ATB

med_ess_atb_ei <- specific_effect_significance(ess_bootstrap1,
                                               from = "ESS",
                                               through = "ATB",
                                               to = "EI",
                                               alpha = 0.05)
write.csv(med_ess_atb_ei, "Mediation ESS ATB EI1.csv")

# Inspect indirect effects from ESS to EI through SSN

med_ess_ssn_ei <- specific_effect_significance(ess_bootstrap1,
```

```
                                                    from = "ESS",
                                                    through = "SSN",
                                                    to = "EI",
                                                    alpha = 0.05)
write.csv(med_ess_ssn_ei, "Mediation ESS SSN EI1.csv")

# Inspect indirect effects from ESS to EI through PBC

med_ess_pbc_ei <- specific_effect_significance(ess_bootstrap1,
                                                    from = "ESS",
                                                    through = "PBC",
                                                    to = "EI",
                                                    alpha = 0.05)
write.csv(med_ess_pbc_ei, "Mediation ESS PBC EI1.csv")

# Inspect indirect effects from SSN to EI through PBC

med_ess_pbc_ei <- specific_effect_significance(ess_bootstrap1,
                                                    from = "SSN",
                                                    through = "PBC",
                                                    to = "EI",
                                                    alpha = 0.05)
write.csv(med_ess_pbc_ei, "Mediation SSN PBC EI1.csv")



# Inspect indirect effects from SSN to EI through ATB

med_ess_pbc_ei <- specific_effect_significance(ess_bootstrap1,
                                                    from = "SSN",
                                                    through = "ATB",
                                                    to = "EI",
                                                    alpha = 0.05)
write.csv(med_ess_pbc_ei, "Mediation SSN ATB EI1.csv")

# Inspect indirect effects from ESS to EI through SSN and ATB

med_ess_ssn_atb_ei <-
specific_effect_significance(ess_bootstrap1,
                                                        from = "ESS",
                                                        through =
c("SSN","ATB"),
                                                        to = "EI",
                                                        alpha = 0.05)
write.csv(med_ess_ssn_atb_ei, "Mediation ESS SSN ATB EI1.csv")

# Inspect indirect effects from ESS to EI through SSN and PBC
```

```
med_ess_ssn_pbc_ei <-
specific_effect_significance(ess_bootstrap1,
                                                    from = "ESS",
                                                    through =
c("SSN","PBC"),
                                                    to = "EI",
                                                    alpha = 0.05)
write.csv(med_ess_ssn_pbc_ei, "Mediation ESS SSN PBC EI1.csv")
```