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SOCIOLOGY | RESEARCH ARTICLE

Measuring the effect of university students' psychological resilience on their valuation of sustainability in entrepreneurship

Gustavo Barrera-Verdugo^{1*}

Abstract: For decades, resilience and sustainability have been considered to be two concepts that are related on a systemic and organizational level; however, little has been studied regarding the influence of psychological resilience on the valuation of sustainable ventures. This research analyzes the responses of 240 university students in Chile to an online self-report survey through logistic regressions to determine the effect of psychological resilience on the appreciation of sustainable entrepreneurship from an environmental and social perspective, measuring the moderating effect of age cohort and gender. The results supported that students with a higher self-perceived resilience that is measured by the Brief Resilience Scale (BRS) also show a higher appreciation toward sustainability in entrepreneurship. A moderating effect of belonging to the centennial generation on the relationship between psychological resilience and valuation of sustainable ventures has also been supported. The findings contribute to understanding how personal adaptation, which is part of resilience, influences the perceived importance of sustainability in entrepreneurship, which is a perspective related to organizational innovation.

Subjects: Sustainability Education, Training & Leadership; Adult Education and Lifelong Learning; Higher Education

Keywords: Psychological resilience; sustainable entrepreneurship; gender; age cohort; centennial generation

1. Introduction

Several authors have analyzed the relationship between organizational resilience and sustainability. In this line, Marchese et al. (2018) have recognized three general topics in the literature: resilience as a component of sustainability in organizations, sustainability as a component of resilience in organizations, and resilience and sustainability as separate purposes in organizations. Recent research has continued to support the link between resilience and sustainability among organizations and in business management. Rai et al. (2021) found that the ability to predict crises, robustness and recoverability in organizations positively influences their social and economic

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sustainability. The findings of Hajishirzi et al. (2022) supported that organizational resilience favors the economic sustainability of companies and the development of a competitive advantage, which in turn positively affects the social and environmental sustainability of organizations. Wuest (2022). analyzed how family businesses integrate sustainability into their resilient sourcing strategies.

Likewise, studies have recognized the importance of resilience in entrepreneurship development (Fernandes & Franco, 2021). In this regard, a relevant body of research has focused on the effects of individual psychological resilience on entrepreneurial perceptions, attitudes, and behaviors, which is understood as a “process and outcome of successful adaptation to difficult or challenging life experiences, especially through mental, emotional, and behavioral flexibility and adjustment to internal and external demands” (American Psychological Association, n.d.). Therefore, psychological resilience has shown a positive relationship with several relevant variables of entrepreneurial behavior, such as entrepreneurial perceived success (Santoro et al., 2020), entrepreneurial intentions (Bullough et al., 2014), proactivity, which in turn affects business survival (Chadwick & Raver, 2020), and the ability to innovate in ventures to overcome difficulties (Dijk, 2020).

Despite the wide availability of research linking resilience and sustainability at the systemic and organizational levels, little is known about the relationship between individual psychological resilience and personal perceptions of sustainable entrepreneurship. Some research has supported the influence of individual resilience on the development of sustainable entrepreneurship in communities and in indigenous women (Bah Simpong et al., 2022; Padilla-Meléndez et al., 2022) and has argued that psychological resilience has a positive effect on sustainable entrepreneurial orientation in Chinese MBA students (Wu et al., 2019). These investigations have been developed in contexts different from Latin America; hence, the effect of psychological resilience on the appreciation of sustainable ventures in this region is currently unknown in depth. Due to this knowledge gap and the importance of training sustainable entrepreneurs in Latin American universities (OECD, 2022), the following research questions are stated: Does psychological resilience influence university students’ valuation of sustainable entrepreneurship from a social and environmental perspective? Do the demographic conditions of university students affect the influence of psychological resilience on the valuation of sustainable entrepreneurship from a social and environmental perspective?

Such information is relevant since entrepreneurship and sustainability have been topics of high importance in academic research (Fichter & Tiemann, 2018; Silveira et al., 2018); in addition, research about the creation of business that protects communities and natural resources has reached greater relevance in Latin America. In this line, several studies analyzing the sustainability of ventures in prominent economic sectors for countries in this region, such as mining, agriculture and tourism, have been published (Acevedo Duque et al., 2021; Campos-Medina, 2015; Matzembacher & Meira, 2018). Additionally, sustainable entrepreneurship can be considered a unique perspective that links the creation of economic, social and environmental values with a focus on the welfare of future generations (Hockerts & Wüstenhagen, 2010), which is particularly necessary in Latin American countries that show significant environmental and social problems (Schouten et al., 2012). In this sense, Latin American universities are highly relevant because they can create human capital to promote sustainable and inclusive development (OECD, 2022); therefore, higher education in Latin America has the challenge of promoting a new society with a sense of relevance and responsibility in making decisions that impact society and the environment through ethical and transparent conduct that is consistent with sustainable development and the welfare of society (Palacios & Coppa, 2015).

Consequently, this research seeks to evaluate the incidence of university students’ resilience in Chile on their appreciation of sustainable entrepreneurship from a social and environmental perspective, analyzing the moderating effect of gender and belonging to the centennial generation. The selection of university students of Chile as the study population is based on the fact that

for more than 20 years, this country has promoted entrepreneurship and innovation, and this effort has been part of a national strategy that includes state, university and private institutions (Leatherbee et al., 2018); hence, the training of sustainable entrepreneurial professionals is highly important. The moderation effects of these demographic variables are assessed due to the extensive study of gender differences in entrepreneurial behavior (Goel et al., 2015; Pines et al., 2010; Villanueva-Flores et al., 2021) and the interest in generational analysis of entrepreneurial behavior evidenced in the last decade (Arkorful et al., 2022; Ensari, 2017; Zhang & Acs, 2018). The centennial generation, also referred to as Generation Z, which includes people born after 1997 (McGorry & McGorry, 2017), has demonstrated a high interest in and concern for sustainability (Jasrotia et al., 2022; Sharma, 2019).

From a theoretical perspective, this research seeks to deepen the understanding of the relationship between resilience and sustainability from a psychological and personal level that has been underexplored. Therefore, this study aims to analyze the link between resilience and sustainability beyond the general systemic and organizational levels, which has been supported in various studies (Carpenter et al., 2001; Fiksel, 2006; Nelson et al., 2020; Rai et al., 2021; Wuest, 2022). Furthermore, the combined study of resilience, gender and age generation contributes to the comprehension of individual differences that affect the appreciation of sustainable entrepreneurship in university students. This new knowledge about individual characteristics that affect the appreciation of sustainable entrepreneurship is highly relevant for Latin American universities that make efforts to train their students in attitudes and skills associated with sustainable entrepreneurship (Pesantez et al., 2021).

From a practical perspective, the results of this research could contribute to improving the teaching of sustainable entrepreneurship in universities and achieving effective support for sustainable entrepreneurs from governmental organizations in Latin America. Managers of universities could use this information to implement practices aimed at strengthening the resilience of their students or to raise awareness of the relationship between resilience and sustainable entrepreneurship in their students. Universities could also improve the design and implementation of their programs aimed at strengthening attitudes and actions associated with sustainable entrepreneurship. Governmental organizations could design more effective public policies, legal regulations or intervention programs by understanding the relationship between psychological resilience and appreciation for sustainable entrepreneurship; in this line, they could focus resources on people who have failed in their businesses and want to return to develop a new venture, evidencing resilience and adaptive capacity.

2. Theoretical framework

2.1. Resilience and sustainability

Sustainability may be understood as “meeting human needs in a socially just manner without depriving ecosystems of their health” (Vucetich & Nelson, 2010, p. 539). This definition implies a multidisciplinary approach that demands the contribution of various disciplines such as engineering, physics, biotechnology, economics, business, philosophy and ethics. Resilience as a framework for understanding and approaching community development has emerged more gradually from ecological studies in the 1980s, but only recently, since the mid-2000s, has it become a focus of public interest as a way of responding and adapting to increasing changes on the planet (Lew et al., 2016).

According to Folke et al. (2002), resilience in social-ecological systems is related to the following: 1-“the magnitude of the shock that the system can absorb and remain in a given state, 2- the degree to which the system is able to self-organize, and 3- the degree to which the system can build capacity for learning and adaptation”. Therefore, the ecological resilience perspective emphasizes adaptive capacity, which can lead to a new system’s equilibrium (Folke et al., 2010), including biological and socioeconomic entities that are able to survive, adapt and grow in the face

of uncertainty and unforeseen disturbances. This perspective also states that a system without resilience can only possess fragile sustainability (Ahern, 2013) because resilience facilitates achieving the goals of an ecological or social system in a sustainable manner over time (Anderies et al., 2013), and in a sustainable system design process, it is necessary to take into account the system vulnerabilities and disturbances (Blackmore & Plant, 2008).

From an organizational systems perspective that is based on systems constituted by people, resilience is the ability of the organization to adapt, provide competitive services and create organizational value to grow in a turbulent change or unpredicted situation (McManus, 2008; Palmi et al., 2018). Brueller et al. (2019) stated that organizational resilience is related to the organizational ability to cope with difficulties and grow from setbacks. Similarly, sustainable entrepreneurship has been defined as “the examination of how opportunities will bring into existence future goods and services as discovered, created, and exploited, by whom, and with what economic, psychological, social, and environmental consequences” (Cohen & Winn, 2007, p. 58); this vision recognizes that sustainable entrepreneurship aims to protect nature, life and community through the pursuit of opportunities to create future products with both economic and noneconomic benefits to people, the economy and society (Shepherd & Patzelt, 2011).

Additionally, resilience has been studied for decades as an individual characteristic that allows people to overcome problems and face adversity. In this line, individual psychological resilience in adults is understood as “a multifaceted construct that includes a person’s determination and ability to endure, adapt, and recover from adversity” (Taormina, 2015), and there are four domains of adult personal resilience derived from the literature: determination, endurance, adaptability, and recoverability. Furthermore, some recent publications have linked personal resilience with the individual’s ability to survive (Alves et al., 2020), the individual’s ability to overcome difficulties (Chua et al., 2019), the individual’s ability to adapt to adverse conditions (Sturmborg, 2018), and the individual’s capacity to bounce back in the face of adversity (Chang & Kim, 2022).

A significant number of studies on resilience and sustainability have linked these concepts from an organizational perspective, i.e., they have analyzed the capacity for adaptation and recovery of organizations composed of people pursuing a common productive purpose, mostly enterprises (Marchese et al., 2018; Wuest, 2022). Rai et al. (2021) presented a holistic view of organizational resilience, evaluating three aspects that integrate it: crisis anticipation, organizational robustness and recoverability; their findings supported that the ability to predict crisis and shocks and the construction of organizational robustness and recoverability have a positive effect on the social and economic aspects of sustainability. Other studies have argued that the relationship between resilience and sustainable supply chain management (Ramezankhani et al., 2018), the relationship between resilience and sustainable business models of seafood production companies (Fletcher et al., 2021), and the resilient use of organizational resources in small and medium-sized enterprises play the role of transformative sustainability agents (DiBella et al., 2022).

Moreover, several studies have supported the importance of resilience in entrepreneurship development (Fernandes & Franco, 2021). Korber and McNaughton (2017) determined through a literature review that the intersection between entrepreneurship and resilience has been investigated in the following issues: resilience as traits or characteristics of entrepreneurs, resilience as a trigger for entrepreneurial intentions, entrepreneurial behaviors that enhance organizational resilience, entrepreneurial ventures that foster macrolevel resilience (regions, communities, economies), resilience in the context of entrepreneurial failure, and resilience as a process of recovery and transformation. In this field, research has stated the positive relationship between psychological resilience and venture success (Margaça et al., 2022), entrepreneurship intentions (Maslakçı et al., 2022) and venture survival (Becker & Kabongo, 2020).

Despite these studies and the wide evidence linking resilience and sustainability at systemic and organizational levels, little is known about the relationship between psychological resilience and

personal perceptions of sustainable entrepreneurship. Because the characteristics of psychological resilience are similar to the characteristics of sociobiological and organizational resilience, it is reasonable to state that the most resilient people who are able to adapt and recover in the face of adversity should also show a greater appreciation of entrepreneurship that is able to overcome obstacles and transform products and services in a sustainable way, caring for the environment and strengthening social welfare. This idea is consistent with the findings of Bah Simpong et al. (2022) and Padilla-Meléndez et al. (2022), who have recognized the effect of individual resilience on the development of sustainable entrepreneurship in indigenous communities and women, and with Wu et al. (2019), who have shown that individual resilience has a positive effect on sustainable entrepreneurial orientation in MBA students from China. Consequently, the following hypotheses are stated:

Hypothesis 1: Psychological resilience positively influences the appreciation of environmentally sustainable entrepreneurship.

Hypothesis 2: Psychological resilience positively influences the appreciation of socially sustainable entrepreneurship.

Complementarily, gender is a demographic variable that has been examined as a moderating condition in various domains of entrepreneurial behavior; for example, previous research has observed gender moderation in the relationship between opportunity recognition and entrepreneurial intention, gender moderation in the relationship between self-efficacy and entrepreneurial intention (Hassan et al., 2020; Ryu & Kim, 2020), and gender moderation in the relationship between perceived social norms and entrepreneurial intention (Ephrem et al., 2021). Regarding resilience, previous studies have shown that gender is a moderating variable in the relationship between resilience and individual quality of life (Nawaz et al., 2014) and that male gender positively moderates the effect of internal resources for resilience on positive youth development (Gomez-Baya et al., 2020). Additionally, the results of several studies have suggested that female gender is associated with a greater concern for environmental and social sustainability (Chirilli et al., 2022; Olsson & Gericke, 2017; Shrestha et al., 2020). Considering these findings, it is reasonable to state that female gender should be a moderating variable in the relationship between resilience and appraisal of environmentally and socially sustainable entrepreneurship, positively reinforcing the relationship between resilience appreciation of sustainable ventures. Therefore, the following hypotheses are proposed.

Hypothesis 3: Gender moderates the relationship between psychological resilience and the appreciation of environmentally sustainable entrepreneurship.

Hypothesis 4: Gender moderates the relationship between psychological resilience and the appreciation of socially sustainable entrepreneurship.

In addition, the age-generation has been considered as a moderating variable in studies about entrepreneurial behavior. Guerrero et al. (2021) argued that belonging to the millennial generation reinforces the positive influence of organizational determinants on corporate venturing. Maheswari et al. (2018) supported that the age-generation has a moderating effect on the relationship between both environmental and social sustainability practices on family firm performance. Recent research has also supported that belonging to the centennial generation implies

a greater concern for social and environmental sustainability (Barrera-Verdugo et al., 2022; Jasrotia et al., 2022; Sharma, 2019). Moreover, the Global Entrepreneurship Monitor found that sustainable entrepreneurship is more prominent among individuals aged 18–34 (Bosma et al., 2016), and Vuorio (2017) showed that younger adults are more likely to have sustainable entrepreneurial goals than older adults. Based on these previous findings, this research proposes that belonging to the centennial generation should positively moderate the effect of resilience on the appreciation of sustainable entrepreneurship from a social and environmental perspective, and the following research hypotheses are proposed.

Hypothesis 5: Belonging to the centennial generation positively moderates the relationship between psychological resilience and the appreciation of environmentally sustainable entrepreneurship.

Hypothesis 6: Belonging to the centennial generation positively moderates the relationship between psychological resilience and the appreciation of socially sustainable entrepreneurship.

3. Methodology and methods

3.1. Measurement

An online survey was distributed through the Survey Monkey platform. Respondents answered the self-report online survey without the presence of an evaluator. Psychological resilience is measured using the Brief Resilience Scale (BRS) by Smith et al. (2008) derived from the work of Carver (1998). Smith et al. (2008) argued that previous measures of resilience were very large, and they assessed resources that promote resilience rather than specific traits of resilience, such as recovery, resistance, adaptation, or thriving; moreover, they supported that BRS is a reliable tool for measuring resilience. Other reputable resilience scales are much more time-consuming. The Connor-Davidson Resilience Scale (CD-RISC) includes 25 items, each rated on a 5-point scale (0–4) (Connor & Davidson, 2003); Oshio et al. (2003) published the Adolescent Resilience Scale, which includes 21 items; Ryan and Calabiano (2009) proposed the Resilience in Midlife Scale (RIM scale), which includes 25 items. The application of these long scales may be limited by the extensive data collection process, which can result in high nonresponse rates (Windle et al., 2011). The BRS incorporates six statements, has been considered a valid scale for the measurement of resilience and has been included in several studies on this topic (Caniëls et al., 2022; Guan et al., 2022; Konstantinov et al., 2021; Prayag et al., 2020) and in recent studies on entrepreneurial resilience (Moke et al., 2018; Ojewumi et al., 2020).

This research considers the three BRS statements that measure resilience positively; therefore, the three reverse statements—inverse measurement—have not been included in the survey due to their redundancy. Specifically, the three following statements have been evaluated: “a. I tend to bounce back quickly after hard times”, “b. It does not take me long to recover from a stressful event”, “c. I usually come through difficult times with little trouble”. Then, the Cronbach’s alpha coefficient of these sentences was calculated to test its reliability, obtaining a result of 0.75, which supports an adequate reliability for the measurement of resilience (Bonett & Wright, 2015). Spearman’s correlation coefficients between the three sentences were also calculated, and the magnitudes obtained were 0.49 between sentences a. and b.; 0.5 between sentences a. and c.; and 0.55 between sentences b. and c. These correlations were significant with 99% ($p < 0.01$) confidence according to Spearman’s rank order correlation test based on $\text{Prob} > |t|$; correlation coefficients between 0.4 and 0.6 are considered moderate or strong (Chan, 2003; Dancey & Reidy, 2007). Due to the reliability validation of resilience measurement using these three statements,

a resilience index based on the arithmetic mean of these three statements was obtained and used as an independent variable in the ordinal logistic regressions.

The appreciation of sustainable entrepreneurship was assessed from the environmental perspective with the statement “I believe that entrepreneurs should always take care of the environment, even if their profits decrease because of it” and from the social perspective with the statement “I believe that entrepreneurs should always take care of the welfare of the community, even if their profits decrease because of it”. The perceived assessment of sustainability is based on sustainability definitions proposed by various authors (Cohen & Winn, 2007; Katsikis & Kyrgidou, 2007; Shepherd & Patzelt, 2011). The items of the Brief Resilience Scale (BRS) and sustainability were translated from English to Spanish to collect responses from Spanish-speaking students and then translated back into English for presentation in this research. In addition, the pretesting was performed using a trial survey that was completed by university students and validated by professors with experience in entrepreneurship education.

A 7-point Likert scale ranging from “strongly disagree” to “strongly agree” was used in the measurement. Seven levels were selected instead of five, since this allows identifying a wide range of differences in magnitudes about the respondents’ agreement or disagreement with various statements (Debets et al., 2020). The 7-point scale has been used for decades to assess frequency attitudes and perceptions and has also been incorporated in recent studies on sustainable entrepreneurship (Bischoff, 2021; Thelken & de Jong, 2020). Gender and age were asked in the questionnaire and then coded as dichotomous nominal variables (dummy) in the data preparation stage prior to regression analysis and writing of the report; in particular, female gender and belonging to the centennial generation were represented with the number “1”.

3.2. Sample

As has been stated, the study population is university students over 18 years of age in Chile belonging to the centennial and millennial generations due to the importance of entrepreneurship in this country (Leatherbee et al., 2018) and the interest in the study of these generations that has arisen in recent years (Dabas et al., 2021; Mulla, 2022; Seyfi et al., 2022). Nonprobability convenience sampling has been used due to the limitations regarding access to respondents and the low response rates of random sampling (Yang & Banamah, 2014). To reduce nonprobability sampling bias, quotas were defined; specifically, approximately 50% of responses were from males and females and 50% of responses were from centennial and millennial students. Therefore, 240 students of the Faculty of Engineering and Business at the Universidad de Las Américas in Chile fully responded to the online survey, specifically, 120 men and 120 women. The mean age of the students was 28.38 years, and the standard deviation of their age was 9.78 years. The classification of the centenarian generation is considered to be those born since 1997, based on the generational classification by McGorry and McGorry (2017); according to this age range, 112 students of the centennial generation and 128 older students were evaluated.

The survey was distributed through emails sent from the SurveyMonkey platform to approximately 1,100 students of Universidad de Las Américas in Chile during the academic semesters of 2020 and 2021, representing a response rate of approximately 23%. The students’ email addresses were obtained from the career director and from the records of the courses taught by the researcher of the project. Most of the students who responded to the survey were enrolled in Commercial Engineering ($n = 129$) and Engineering in Administration ($n = 46$). The students surveyed belonged to the lower middle, middle and upper middle socioeconomic classes in Chile, and these socioeconomic levels represent approximately 60% of this country’s population (Aim Chile, 2021). The survey incorporated a request for written informed consent that was approved by the Ethics Committee of Universidad de Las Américas (ID: CEC_FP_2019022). The 240 responses analyzed are those that were answered in full and included approval of the written informed consent request. Table 1 details the characteristics of the sample.

Table 1. Description of the sample

	Mean Age	SD Age	Commercial Engineering	Engineering in Administration	Business Technician	Others	Total
Women	27.91	9.21	61	26	17	16	120
Men	28.85	10.34	68	20	13	19	120
Centennial	20.44	1.39	70	15	7	20	112
Older	35.33	8.61	59	31	23	15	128
Total	28.38	9.78	129	46	30	35	240

3.3. Analysis

This research seeks to measure the influence of psychological resilience on the appreciation of sustainable entrepreneurship. For this purpose, an ordinal logistic (ologit) regression analysis was performed, considering the resilience index based on BRS, gender and belonging to the centennial generation as independent variables and the appreciation of environmentally and socially sustainable entrepreneurship as dependent variables. Ordinal logistic regression is an analysis method used to measure the relationship between ordinal scale dependent variables with more than two categories and a set of continuous or categorical predictor variables (Bolton, 2010); it is a statistical technique capable of processing data on an ordinal scale in situations involving several factors that can influence the outcome (Zarb et al., 2015). Consequently, logistic regression models were considered adequate to assess the influence of resilience on the valuation of sustainable entrepreneurship and the moderating effects of gender and age generation.

The overall fit of the ordinal logistic regressions is assessed by the chi2 test and the significance of the regression coefficients by hypothesis testing based on the parameter $P > |z|$. Multicollinearity in ordinal logistic regressions was tested using the variance inflation factor indicator (VIF); according to Hair (2011), if all the VIFs of the variables are less than 0.5 in regression models, this means that the multicollinearity phenomenon does not exist. The moderation effects in ordinal regression were tested by examining the significance of the cross-product between female gender and psychological resilience (Female x Resilience) and between belonging to the centennial generation and psychological resilience (Centennial x Resilience). This method is traditionally used in the evaluation of the moderating effect of a variable (Leonidou et al., 2017; Peeters et al., 2020; Stupnianeck & Schmitt, 2022). In this case, female gender is a dummy variable (1=female gender, 0=not female gender) as well as belonging to the centennial generation (1=centennial generation, 0=millennial generation).

Before the regression models, an analysis of central tendency and correlations was performed using the Wilcoxon-Mann-U test and Spearman's coefficients. These statistical parameters were selected because the measurement scales are ordinal and the data distribution obtained did not meet the requirements of normality, which was determined with the Shapiro Wilks normality test. The Shapiro Wilks test showed p values < 0.01 in all the variables observed, supporting the rejection of the null hypothesis, which states the normal distribution of the data. Spearman's correlation test can be used if the assumption of normality is not met (Abdelhafez et al., 2021); therefore, this research evaluated the link between variables through Spearman's correlation coefficient and Spearman's rank order correlation test based on $\text{Prob} > |t|$. Moreover, the Mann-Whitney Wilcoxon test is a nonparametric statistical test that can be a useful alternative to parametric statistical tests, such as ANOVA, when the test assumptions about the normal distribution of the data are not met; it is also an appropriate method for analyzing ordinal data (Ayadi & Ghorbel, 2018). Statistical analysis was performed with STATA 16. Figure 1 below illustrates the techniques used

Figure 1. Research technique flowchart.

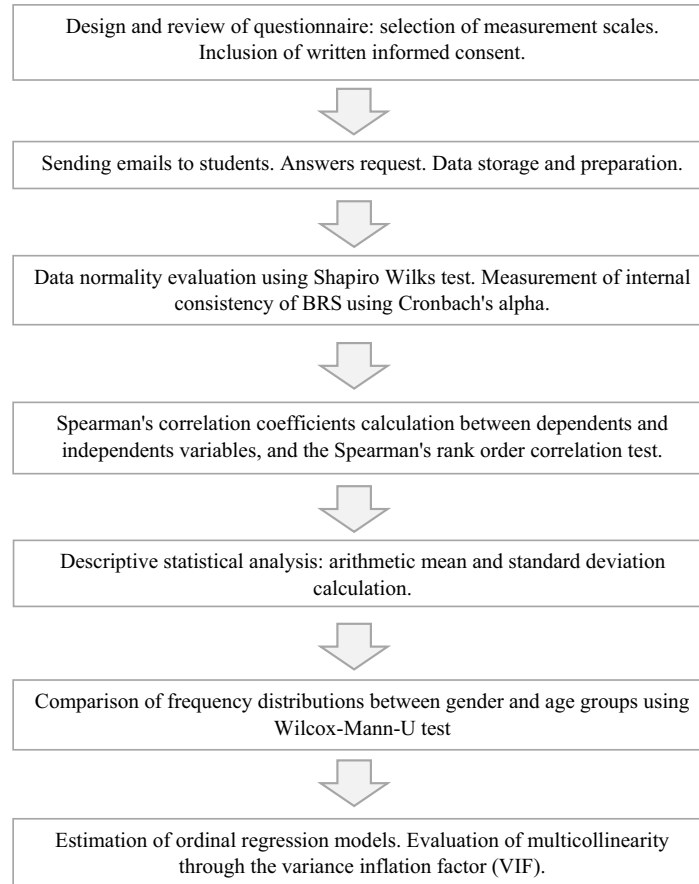


Table 2. Central tendency and dispersion by gender

	Women		Men		Total		p value
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Appreciation of EAS	5.73	1.30	5.90	1.24	5.82	1.27	0.28
Appreciation of ESS	5.72	1.33	5.88	1.23	5.80	1.28	0.36
Psychological resilience	5.38	0.71	5.37	0.73	5.38	0.72	0.96

Notes: *p* values are related to the Wilcoxon Mann-U test.

4. Results

4.1. Descriptive and correlational analysis

Table 2 shows the arithmetic means and standard deviation of the sustainability and resilience measurements, differentiating the results by gender of the respondents. Although the arithmetic means associated with the appreciation of sustainable entrepreneurship, from an environmental and social perspective, were higher in men, the Wilcoxon-Mann-U test did not support statistically significant differences among frequency distributions with 99%, 95%, or 90% confidence (*p* value > 0.10). In the case of resilience measurement, the means of men and women were very similar, and the Wilcoxon test also did not support statistically significant differences (*p* value > 0.10). The standard deviations of the variables were similar between men and women.

Table 3. Central tendency and dispersion by generation

	Centennial		Older		Total		p value
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Appreciation of EAS	5.99	1.28	5.66	1.24	5.82	1.27	0.01
Appreciation of ESS	5.91	1.34	5.70	1.22	5.80	1.28	0.06
Psychological resilience	5.23	0.79	5.51	0.62	5.38	0.72	0.00

Notes: p values are related to the Wilcoxon Mann-U test.

Table 3 shows the arithmetic means and standard deviation of the value for sustainability and resilience, differentiating the results by age group. The results showed that the mean of the appreciation of sustainable entrepreneurship, both from an environmental and social perspective, was higher in those evaluated who belong to the centennial generation; the Wilcoxon Mann-U test supported differences among frequency distributions with 95% (p value < 0.05) or 90% (p value < 0.10) confidence. In the opposite direction, the mean resilience was higher in the older group; likewise, the Wilcoxon Mann-U test supported these differences with 99% confidence (p value < 0.01). The standard deviations of the variables have also been similar between centennials and millennials.

Table 4 presents Spearman's correlation coefficients between the appreciation of sustainable entrepreneurship, resilience, female gender and belonging to the centennial generation. The statistical significance of the correlation coefficients was evaluated through Spearman's rank order correlation test based on $\text{Prob}>|t|$. The results supported significant correlations between the appreciation of environmentally sustainable entrepreneurship and resilience with 99% confidence (p value < 0.01) and between the appreciation of socially sustainable entrepreneurship and resilience with 95% confidence (p value < 0.05). Significant correlation coefficients were also recognized between the appreciation of environmentally sustainable entrepreneurship and belonging to the centennial generation with 95% confidence (p value < 0.05) and between the appreciation of socially sustainable entrepreneurship and belonging to the centennial generation with 90% confidence (p value < 0.10). The results did not show significant correlations between female gender and the appreciation of sustainable entrepreneurship, both from an environmental and social perspective (p value > 10).

Table 4. Correlation coefficients

		a.	b.	c.	d.	e.
(a) Appreciation of EAS	Coefficient	1.00				
	p value					
(b) Appreciation of ESS	Coefficient	0.79	1.00			
	p value	0.00				
(c) Psychological resilience	Coefficient	0.23	0.18	1.00		
	p value	0.00	0.01			
(d) Centennial generation	Coefficient	0.17	0.12	-0.18	1.00	
	p value	0.01	0.06	0.00		
(e) Female gender	Coefficient	-0.07	-0.06	0.00	0.03	1.00
	p value	0.28	0.36	0.96	0.61	

Notes: p values are related to Spearman's rank order correlation test.

Table 5. Regression associated with the effect of resilience, gender and generation on EAS

Appreciation by EAS	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Psychological Resilience	0.58	0.17	3.41	0.00	0.24	0.91
Female Gender	-0.28	0.24	-1.18	0.24	-0.74	0.18
Centennial Generation	0.83	0.25	3.34	0.00	0.34	1.32

Notes: Dependent variable is the appreciation of environmentally sustainable entrepreneurship (EAS). Number of observations= 240, Pseudo R2=0.03, Prob > chi2= 0.01.

Table 6. Regression assessing the moderation of gender and generation associated with ESE

Appreciation of EAS	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Psychological Resilience	0.51	0.17	3.06	0.00	0.18	0.84
Female x Resilience	-0.05	0.04	-1.13	0.26	-0.14	0.04
Centennial x Resilience	0.14	0.05	3.10	0.00	0.05	0.23

Notes: The dependent variable is the appreciation of environmentally sustainable entrepreneurship (ESE). Number of observations= 240, Pseudo R2=0.03, Prob > chi2= 0.00.

4.2. Ologit regressions of Environmentally Sustainable Entrepreneurship (ESE)

Table 5 presents the ologit regression that included the appreciation of environmentally sustainable entrepreneurship (ESE) as a dependent variable. Psychological resilience, gender and belonging to the centennial generation were included as independent variables. The chi2 test supported that the regression goodness-of-fit is adequate with 95% confidence (Prob > chi2 = 0.01). Positive and statistically significant regression coefficients for resilience with 99% confidence ($\beta = 0.58$, $P > |z| = 0.00$) and for belonging to the centennial generation with 99% confidence ($\beta = 0.83$, $P > |z| = 0.00$) were obtained. The regression coefficient associated with female gender was not statistically significant ($\beta = -0.28$, $P > |z| = 0.24$). Therefore, the ologit regression model supports that resilience positively influences the appreciation of environmentally sustainable entrepreneurship, and consequently, Hypothesis 1 of this study was validated.

Table 6 presents the ologit regression results, including the appreciation of environmentally sustainable entrepreneurship (ESE) as a dependent variable. Resilience and the multiplication of gender by resilience (Female x Resilience) and the multiplication of belonging to the centennial generation by resilience (Centennial x Resilience) were included as independent variables. The chi2 test showed that the ologit regression model had an adequate goodness-of-fit with 99% confidence (Prob > chi2 = 0.00), and the VIF parameter obtained was less than 5 for all independent variables, which supports the absence of multicollinearity in the regression model (Hair, 2011). A significant regression coefficient associated with resilience with 99% confidence ($\beta = 0.51$, $P > |z| = 0.00$) and associated with the multiplication between resilience by belonging to the centennial generation were supported with 99% confidence ($\beta = 0.14$, $P > |z| = 0.00$). The regression coefficient linked to multiplying resilience by female gender was not significant ($\beta = -0.05$, $P > |z| = 0.26$). These results show that belonging to the centennial generation positively moderates the relationship between resilience and valuing environmentally sustainable entrepreneurship. This evidence has allowed us to validate Hypothesis 5 previously proposed. In contrast, the gender moderator effect was not supported; therefore, Hypothesis 3 was rejected.

Figure 2. Generational moderating effect associated with ESE.

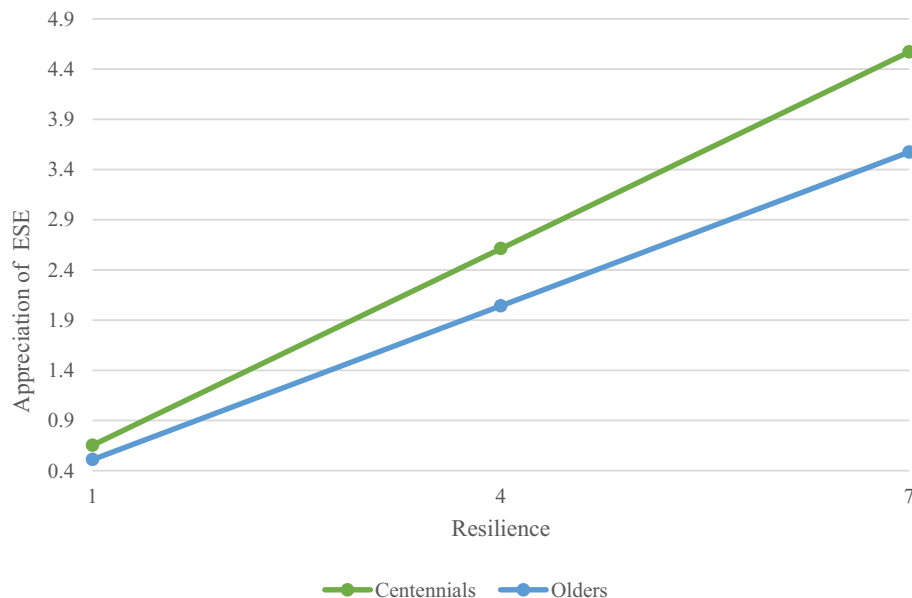


Table 7. Regression associated with the effect of resilience, gender and generation on SSE

Appreciation by SSE	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Psychological Resilience	0.40	0.17	2.38	0.02	0.07	0.73
Female Gender	-0.25	0.24	-1.05	0.30	-0.71	0.22
Centennial Generation	0.60	0.24	2.44	0.02	0.12	1.07

Notes: Dependent variable is the appreciation of socially sustainable entrepreneurship (SSE). Number of observations= 240, Pseudo R2=0.01, Prob > chi2= 0.01.

Figure 2 represents the moderating effect of belonging to the centennial generation on the relationship between resilience and the valuation of environmentally sustainable entrepreneurship. The representation includes the minimum (1), medium (4) and maximum (7) levels of the Likert scale used to assess resilience.

4.3. Ologit regression associated with Socially Sustainable Entrepreneurship (SSE)

Table 7 presents the ologit regression results, including the appreciation of socially sustainable entrepreneurship (SSE) as a dependent variable. Psychological resilience, gender and membership in the centennial generation are also added as independent variables. The chi2 test (prob > chi2) supported that the ologit regression model has an adequate goodness-of-fit with 95% confidence (Prob > chi2 = 0.01). Positive and significant regression coefficients for both resilience with 95% confidence ($\beta = 0.40, P>|z| = 0.02$) and belonging to the centennial generation with 95% confidence ($\beta = 0.60, P>|z| = 0.02$) were found. The regression coefficient associated with female gender was not significant ($\beta = -0.25, P>|z| = 0.30$). These findings have supported that resilience positively influences the appreciation of socially sustainable entrepreneurship (SSE), and consequently, Hypothesis 1 of this research is validated.

Table 8 presents the ologit regression results, including the appreciation of socially sustainable entrepreneurship (SSE) as a dependent variable. Resilience and the multiplication of gender by resilience (Female x Resilience) and the multiplication of belonging to the centennial

Table 8. Regression assessing the moderation of gender and generation associated with SSE

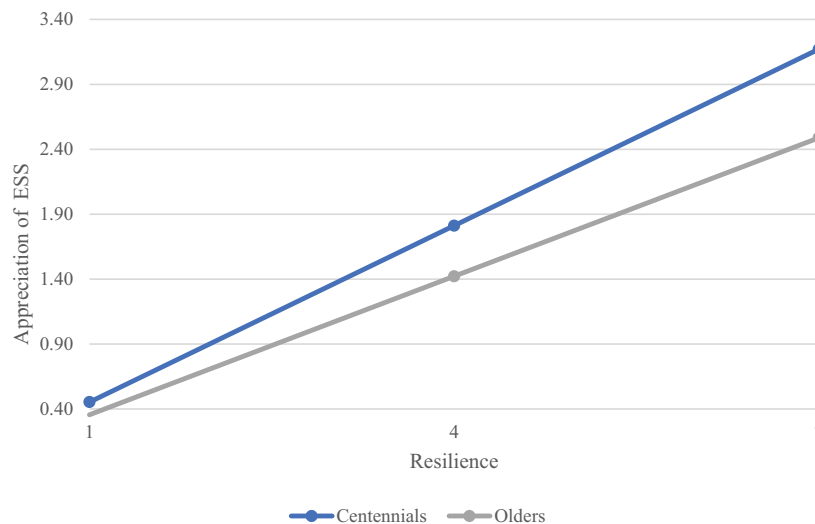
Appreciation by SSE	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Psychological Resilience	0.36	0.17	2.15	0.03	0.03	0.68
Female x Resilience	-0.04	0.04	-1.00	0.32	-0.13	0.04
Centennial x Resilience	0.10	0.04	2.17	0.03	0.01	0.19

Notes: Dependent variable is the appreciation of socially sustainable entrepreneurship (SSE). Number of observations= 240, Pseudo R2=0,01, Prob > chi2= 0.03.

generation by resilience (Centennial x Resilience) were also included as independent variables. The chi2 test showed that the ologit regression model also had an adequate goodness-of-fit with 95% confidence (Prob > chi2=0.03), and the VIF parameter obtained was less than 5 for all independent variables, which supports the absence of multicollinearity in the regression model (Hair, 2011). Positive and significant coefficients for both resilience with 95% confidence ($\beta=0.36$, $P>|z|=0.03$) and the multiplication of resilience by belonging to the centennial generation with 99% confidence ($\beta=0.1$, $P>|z|=0.03$) were supported. The regression coefficient associated with the multiplication of resilience by female gender was not significant ($\beta=-0.04$, $P>|z|=0.32$). These results have shown that belonging to the centennial generation positively moderates the relationship between resilience and the appreciation of socially sustainable entrepreneurship (SSE), and this evidence has allowed us to validate Hypothesis 6 previously proposed. In contrast, the gender moderator effect was not supported; therefore, Hypothesis 4 was rejected.

Finally, Figure 3 represents the moderating effect of belonging to the centennial generation on the relationship between psychological resilience and valuing socially sustainable entrepreneurship (SSE). The representation includes the minimum (1), medium (4) and maximum (7) levels of the 7-point Likert scale utilized to assess resilience.

Figure 3. Generational moderating effect associated with EES.



5. Discussion

5.1. Hypotheses validation

This research supports that university students' resilience affects their appreciation of sustainable entrepreneurship in Latin America, both from an environmental and social perspective. The test used to evaluate the coefficient significance and the goodness of fit in logistic regressions supported that greater psychological resilience that is associated with the ability to overcome difficult situations and recover after difficulties positively influences the appreciation of environmentally and socially sustainable entrepreneurship. The p values lower than 0.10, 0.05 or 0.01 supported that the positive regression coefficients were significant at 99%, 95% or 90% confidence. This evidence has validated Hypotheses 1 and 2 of this study.

In addition, belonging to the centennial generation showed a direct influence on a better appreciation of sustainable entrepreneurship from a social and environmental perspective and an indirect influence since it positively moderated the relationship between personal resilience and appreciation of sustainable entrepreneurship. Therefore, the results support that belonging to the centennial generation reinforces the positive effect of psychological resilience on the appreciation of sustainable entrepreneurship, both from an environmental and social perspective, and this evidence validates Hypotheses 5 and 6 of this study. Finally, there was no evidence of a direct or indirect influence of gender on the appreciation of sustainable entrepreneurship from environmental and social perspectives, since the p values were greater than 0.10, which supports that the regression coefficients are not significant at 99%, 95% or 90% confidence. These results have implied the rejection of Hypotheses 3 and 4 of this research.

5.2. Theoretical implications

The findings represent a further step toward a deeper understanding of the relationship between resilience and sustainability from a personal psychological level since this study extends the comprehension of the relationship between resilience and sustainability beyond the general systemic and organizational perspectives that have been previously argued (Carpenter et al., 2001; Fiksel, 2006; Nelson et al., 2020; Rai et al., 2021; Wuest, 2022). Furthermore, the combined study of resilience, gender and age generation contributes to the identification of profilers with better and worse perceptions of sustainable entrepreneurship since it allows a better understanding of the interaction of psychological resilience with two widely studied demographic variables. In particular, this new knowledge elucidates that personal capacity for adaptation and resilience in the face of adversity is positively related to appreciation for sustainable businesses that are also more resilient and have the ability to overcome difficulties in developing and delivering sustainable solutions from an environmental and social perspective.

The findings are consistent with the relationship between resilience and sustainability on a general systemic level, which has been supported in various studies (Carpenter et al., 2001; Fiksel, 2006; Nelson et al., 2020), and with the relationship between organizational resilience and sustainability argued in recent studies (Rai et al., 2021; Wuest, 2022). Hence, the evidence obtained from this research allowed us to argue that people with higher determination, endurance, adaptability, and recuperability, which are characteristics associated with resilience (Taormina, 2015), also have a greater appreciation of companies that are able to transform and persist to deliver sustainable products through operational and business processes that protect the environment and the well-being of communities. In addition, the positive moderation of centennial generation membership is coincident with the higher relevance of sustainability for this age group according to previous research (Bosma et al., 2016; Sharma, 2019).

Moreover, psychological resilience, which has also been defined as "the implementation of creative ideas through discovery and exploitation of opportunities in entrepreneurial firms" (Hung & Mondejar, 2005, p. 120), is positively linked to entrepreneurial innovation to overcome difficulties (Halberstadt & Alcorta de Bronstein, 2021; Hallak et al., 2018). Creativity is a condition

for innovation, and coincidentally, research has also recognized that creativity is influenced by resilience (Halberstadt et al., 2021) since persistence, adaptation and recovery in the face of failure are necessary to discover new solutions. In a similar sense, the relationship between innovation and sustainability has been argued from the idea that the creation of ecological value and social and economic value depends on the ability to innovate in new processes, products or valuable services to solve ecological and social problems (Lüdeke-Freund, 2020).

5.3. Practical implications

The results of this research could contribute to the practice of sustainable entrepreneurship teaching and enhance the support of sustainable entrepreneurs in Latin America. The managers of higher education institutions in charge of training future professionals should recognize the importance of psychological resilience to foster sustainable entrepreneurship among their students; for this aim, they should allocate greater resources such as financing and specialized personnel for training and support. Psychological resilience should be mostly valued by governmental organizations advocated for strengthening sustainable entrepreneurship; they should develop public policies, legal regulations or programs that support people who have failed in their businesses, learned from these failures and want to develop new ventures that are adapted to their reality.

Moreover, it is relevant to create awareness among university lecturers with the purpose of integrating resilience development into academic programs to strengthen entrepreneurial skills. Although some training programs and frameworks to strengthen entrepreneurial resilience have been implemented (Akhtar, 2021; Lee & Wang, 2017), most programs aimed at strengthening higher education students' resilience have attempted to reduce students' stress or help students cope with stressful situations (Brewer et al., 2019; Mejia-Downs, 2020). The implementation of specific initiatives for strengthening entrepreneurial resilience should enhance students' persistence, adaptability and determination, as well as their innovation capabilities, which favor the creation of sustainable businesses. Moreover, these kinds of programs could be adapted and focused on potential entrepreneurs who are part of the centennial generation, considering the positive moderation of belonging to this young generation in the relationship between psychological resilience and the appreciation for sustainable entrepreneurship.

6. Conclusions

This research provides new evidence to deepen the understanding of the relationship between resilience and sustainability by demonstrating the link between the psychological resilience of Latin American university students and their appreciation for socially and environmentally sustainable entrepreneurship. Moreover, the mediating effect of age-generation on the relation of the aforementioned variables is recognized. This information may be relevant to strengthen the support of entrepreneurship by universities and governmental organizations in this region, which have incorporated sustainability as a priority issue since it significantly affects the integral development of countries from a social and environmental perspective. In this sense, Latin American universities face important challenges in the training of sustainable entrepreneurs who will solve social and environmental problems through innovative solutions.

The creation of sustainable ventures that incorporate new technologies requires flexibility, adaptability and learning, which are qualities consistent with personal resilience. Thus, the evidence from this research should guide the design and implementation of programs to strengthen students' resilience in the face of difficulties, increasing their positive appreciation for sustainability and their predisposition toward the development of sustainable solutions that are more complex and require creativity and innovation. Particularly, programs aimed at training future entrepreneurs could include specific units dealing with psychological, organizational and systemic resilience and its link to sustainability.

7. Limitations and future research

University students from Chile were evaluated in this research, which limits the generalizability of the results. Future studies should extend the sample to other countries in Latin America and other continents. The effect of resilience has been evaluated on the appreciation of environmentally and socially sustainable entrepreneurship without assessing its effect on other variables of high relevance in entrepreneurial behavior, such as the intention to undertake sustainable businesses, the effective creation of sustainable businesses or the success of sustainable ventures. Future research should further investigate the effect of psychological resilience on these variables. The pseudo R2 values were low and reflect that other variables, which were not studied in this research, explain the change in dependent variables. Although the pseudo R2 values are typically lower than the R2 values of linear regressions (Marrero & Marrero-Llinares, 2022), future research could analyze the effect of those other variables. Additionally, future studies could evaluate the intervention of other personal conditions as moderating variables in the relationship between psychological resilience and valuing sustainable entrepreneurship, such as level of education, professional training or religious belonging. Finally, future research could use experimental designs to measure whether strengthening psychological resilience in an experimental group increases their appreciation of sustainability using a control group for comparison.

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