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## Entrepreneurial self-efficacy in female Latin American university students

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**Abstract:** The purpose of this study is to examine the effect of locus of control, the social environment, and the university environment on the entrepreneurial self-efficacy of female university students in Latin America. Hypotheses were tested using a sample of students on business administration, computing, and engineering programs taken from the Global University entrepreneurial spirit students' survey, 2018. Deductive triangulation sequential analysis (QUAN → qual) was performed using Stata 12 Software and interviews. The analyses show a positive effect of locus of control, the university environment, and the social environment on the entrepreneurial self-efficacy of female university students, with locus of control having the most significant effect. These findings corroborate those arguments supporting the effect of these variables as predictors of entrepreneurial self-efficacy in female university students.

**Keywords:** entrepreneurial self-efficacy; locus of control; university environment; social environment; female entrepreneurship.

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## 1 Introduction

Higher education institutions (HEIs) can actively participate in the establishment of university environments to promote entrepreneurship (Cañizares et al., 2013; Herrera-Valverde et al., 2020) through entrepreneurial programs (Lebusa, 2011), relationships with business sectors in their local areas (Horváth and Berbegal-Mirabent, 2020), and by allocating specific resources (Turkey and Selcuk, 2009).

In the case of Latin American HEIs, despite the rapid growth of entrepreneurship (Kantis et al., 2021), studies on the matter have focused on the support provided by universities within different groups (Saavedra-García and Camarena-Adame, 2015) but not on the social and psychological aspects that directly influence the entrepreneurial development of their students (Cañizares et al., 2013).

One of the main drivers of entrepreneurship among university students is entrepreneurial self-efficacy (ESE), a concept that establishes robust relationships between cognitive factors, entrepreneurial personality traits, and social and educational factors that encourage entrepreneurship (Boyd and Vozikis, 1994; Chang et al., 2020; Chen et al., 1998; Fuller et al., 2018; Hsu et al., 2019; Newman et al., 2019; Shahriar and Shepherd, 2019).

However, Reid et al. (2018) and Newman et al. (2019) point out the scarce number of studies describing the predictors of ESE, such as locus of control and the social and university environments, especially in relation to the strategies that HEIs use to boost entrepreneurial intentions. Even though entrepreneurial education can increase ESE (Chang et al., 2020; Hsu et al., 2019), few studies have focused on the predictors that improve or impair it (Islam, 2019; Javadian et al., 2018).

Although Fonseca et al. (2015) observe that ESE has a significant impact on female entrepreneurship, and Díaz-García and Jiménez-Moreno (2010) find that high ESE implies better assessment of women's abilities and entrepreneurial development,

Bonneville-Roussy et al. (2019) have described the limited number of empirical studies on female ESE, which is especially so regarding university environments in Latin America.

Consequently, this study intends to improve the understanding of the role that female students can play in the field of entrepreneurship (Henry et al., 2016; Rubio-Banon et al., 2016) and how it can be strengthened (Krauss et al., 2020) by closely examining the main predictors of ESE, focusing on Latin American female university students. From the theoretical standpoint, this study addresses the gap in the research on ESE predictors, and, from a practical standpoint, it furthers the understanding of how these predictors affect female university students' ESE in the context of Latin American universities.

The entrepreneurial effort of university students is conditioned by cultural and social attitudes marked by culturally regulated gender roles (Cadenas et al., 2020; Krauss et al., 2020; Saavedra-García and Camarena-Adame, 2015), which cause university entrepreneurship to be less frequent among females than males (Vivel et al., 2011). Few scientific studies have focused on determining the conditions and motivations of female student entrepreneurship (Bonneville-Roussy et al., 2019; Cadenas et al., 2020), and many questions are still unanswered (Cadenas et al., 2020; Gedeon and Valliere, 2018; Islam, 2019; Mozahem and Adlouni, 2020; Souitaris, 2007).

These unanswered questions include those regarding the role of ESE in female Latin American university students from its psychological, social, and formative predictors (Kroeck et al., 2010; Reid et al., 2018; Javadian et al., 2018; Bonneville-Roussy et al., 2019). Based on Hsu et al. (2019), Islam (2019), and Newman et al. (2019), this study aims to measure the effect of three predictors of ESE (internal Locus of Control, the social environment, and the university environment) on this population.

This paper is divided into five sections. Section 2 consists of a literature review on the variables of the proposed research model and the tested hypotheses. Section 3 describes the methodology, data collection procedures, and analytical techniques used in the study. Section 4 presents the results of the analyses, followed by a discussion thereof. Finally, Section 5 focuses on the conclusions, limitations, implications, and some suggestions for future lines of research.

## **2 Literature review**

### *2.1 Locus of control and entrepreneurial self-efficacy*

Locus of control is a personality trait derived from Rotter's social learning theory (1966). It relates to a person's belief as to whether their characteristics can affect the results of the tasks they perform (Islam, 2019). Following Rotter's work, Levenson (1973) identifies three main measurements of locus of control: internal, powerful others, and chance (Jennings and Zeithaml, 1983). This author claims that locus of control determines people's abilities to protect their interests when doing business, making, and carrying out plans, and determining what happens in their lives. Consequently, people with a high locus of control believe that their actions and abilities have positive results on the tasks they perform, and they feel more capable of coping with problems and obstacles (Anwar and Saleema, 2019; Krauss et al., 2020).

Rotter (1966), Kroeck et al. (2010), and Anwar and Saleema (2019) define external locus of control as when individuals believe that situations are beyond their immediate

control and are more influenced by external factors; and internal locus of control as when individuals consider that they have direct control over the results of their achievements, to protect their interests and to carry out a plan with determination (Jennings and Zeithaml, 1983; Kroeck et al., 2010; Rotter, 1966). A high internal locus of control makes managers and entrepreneurs more able to perform tasks, overcome stress, and have more successful ventures (Anderson et al., 1977; Hordanay, 1971).

Entrepreneurial self-efficacy (ESE), on the other hand, is a cognitive factor derived from Bandura's social cognitive theory (1977b) which determines an individual's belief in their ability to successfully carry out tasks related to their entrepreneurship (Bilgiseven, 2019; Boyd and Vozikis, 1994; Chang, 2020; Hsu et al., 2019; Shahriar and Shepherd, 2019), based on their self-assessment (Chang et al., 2020).

ESE has been studied mainly as a predictor and control variable (Hsu et al., 2019). Models such as those by Bird (1988) and Ajzen (1985, 1987) and later Krueger (1993) and Boyd and Vozikis (1994) place entrepreneurial self-efficacy as a determining factor of entrepreneurial intention and behavior. Due to its association to processes and tasks (Barakat et al., 2014), self-efficacy has been applied to those related to entrepreneurship (Boyd and Vozikis, 1994; Chang et al., 2020; Chen et al., 1998; Hsu et al., 2019; Newman et al., 2019; Shahriar and Shepherd, 2019). Hence, ESE is an essential aspect for understanding the processes by which a new business is established (Boyd and Vozikis, 1994; Zhao et al., 2005).

For Zhao et al. (2005), Chen et al. (1998), and De Noble (1999), ESE is manifested when students identify opportunities, create new products and services, manage business innovation, lead, communicate, build professional networks, develop new business ideas, and successfully manage their businesses.

The weight of the link between locus of control and ESE has been observed by various authors (Luthan and Ibrayeva, 2006). Maes et al., 2014 point out that high levels of internal Locus of Control affect entrepreneurial success, and Newman et al. (2019) identify locus of control as an individual determinant of ESE. Likewise, Wang et al. (2019) and Gist (1987) have argued that locus of control is the personality trait that affects the development of the social cognitive aspect (ESE) of entrepreneurs.

Stajkovic and Luthan (1998) point out that locus of control influences ESE by predicting adaptability and professional self-efficacy for decision-making with regard to a successful entrepreneurial career. Particularly in the case of women entrepreneurs, empirical studies show the specific influence of locus of control when making business decisions (Kesavayuth et al., 2018) and when it comes to feeling confident about oneself and one's entrepreneurial abilities (Maes et al., 2014) as a result of one's social environments (Majzub et al., 2011).

Due to the important influence of the locus of control on ESE described in the academic literature (Stajkovic and Luthan, 1998; Luthan and Ibrayeva, 2006), and especially in the cases of women (Majzub et al., 2011) and university students (Cadenas et al., 2020; Krauss et al., 2020), the following hypothesis is proposed:

H1 Locus of control positively affects the entrepreneurial self-efficacy of female university students in Latin America.

## 2.2 *University environment and entrepreneurial self-efficacy*

The university environment is determined by the social interactions among individuals based on practices, policies, and behaviors (Castillo et al., 2006). It promotes skills in students such as teamwork, the generation of new ideas and problem-solving (Rovira et al., 2011; Tapia, 2000), as well as technology and knowledge transfer (Smyth et al., 2016). Specifically, the entrepreneurial university environment involves competencies related to creation, innovation, and personal initiatives within business environments.

Expressly, Turker and Selcuk (2009) point out that a university environment working as a generator of entrepreneurial self-efficacy fosters the entrepreneurial processes of students (Cañizares et al., 2013; Mozahem and Adlouni, 2020), and improves their assessment (Bonneville-Roussy et al. al., 2019; Lee et al., 2005). Given the importance of the university environment for ESE, De Carolis, and Litzky's (2019) approach focuses on constructing the entrepreneurial mentality of students to nurture their abilities to think, act creatively, and accept failure.

Empirical evidence indicates that entrepreneurial education increases ESE in undergraduate and graduate students (Abaho et al., 2015; Lebusa, 2011), specifically when these strategies are implemented on pedagogical programs and courses on entrepreneurship, when real entrepreneurial experiences are offered, and when such programs are adapted to different learning styles (Abaho et al., 2015; Cooper et al., 2004).

The university environment is related to ESE when the latter is linked to the students' ability to produce creative results, to discovery and exploration, and to testing their potential to become entrepreneurs (Fuller et al., 2018). Franke and Lüthje (2004) note that the ESE of students at technological universities that promote an entrepreneurial university environment is greater since students develop more confidence in their ability to become entrepreneurs. Their desire and ambition are also stronger.

Freire (1973) pointed out the existence of social oppression in the university environment. Deutsch (2006) specified this as a general injustice inflicted by a dominant group whose conditions can even be perpetuated by being integrated into institutional rules that are rarely questioned (Windsor et al., 2015).

This oppression could affect specific groups, such as women (Bakhshaei et al., 2016; Cadenas et al., 2020), especially in areas based on technological knowledge, such as STEM (Souitaris, 2007), where women have had less visibility (Sheu et al., 2018). Cadenas et al. (2020) consider that in order to end this oppression in the university entrepreneurial context, self-efficacy should be strengthened, and especially ESE in women. Azis and Aziz (2020), for example, have pointed out the benefits of training university women in entrepreneurship.

It is important to study the link between the university environment and the promotion of ESE in Latin American university female students (Cadenas et al., 2020; Gedeon and Valliere, 2018; Islam, 2019; Mozahem and Adlouni, 2020; Souitaris, 2007). Therefore, the following hypothesis is postulated:

H2 The university environment has a positive effect on the entrepreneurial self-efficacy of female university students in Latin America

### 2.3 *Social environment and entrepreneurial self-efficacy*

The social environment is determined by the interrelationships between physical, natural, social, and cultural aspects that surround an individual and determine their dynamic and changing interaction with others (Casper, 2001). In the realm of entrepreneurship, Hofstede (1980) determined the relationship between the social context and the entrepreneurial process of individuals in a country.

The academic literature has shown that entrepreneurship is conditioned by the social environment and personal networks of individuals, especially by family (Fonseca et al., 2015), friends, and fellow students (Chen et al., 1998; Criaco et al., 2017; Krueger et al., 2000; Newman et al., 2019; Sarabia, et al., 2020).

Empirical evidence shows that entrepreneurial role models boost the confidence of entrepreneurs and increase their levels of ESE (BarNir et al., 2011). Similarly, peer support, friends, and family strongly influence ESE, especially in women (Rosca et al., 2020). Newman et al. (2019) point out that ESE is affected by social factors such as replication of behavior and social persuasion. Additionally, the social environment around entrepreneurs positively influences their ESE (Hopp and Stephan, 2012), as entrepreneurs' ethnicity, gender, and identities also do (Kroeck et al., 2010; Solesvik et al., 2019).

For Boomkens et al. (2019), the social environment directly affects women's learning, and for Rosca et al. (2020), it strongly affects female entrepreneurs' perception of themselves. Amine et al. (2009) have found that fostering a suitable social environment encourages women into business venturing (Lindvert et al., 2017); Furthermore, Kimbu and Ngoasong (2016) indicate that women entrepreneurs play an essential role in society, especially in developing countries. Shahriar (2018) adds that in patriarchal social environments, where female entrepreneurship is discouraged, women may experience low levels of ESE, which affects the success of their businesses. Therefore, analysis of the influence of social factors in women is relevant for female entrepreneurship (Henry et al., 2016).

Considering that entrepreneurship is affected by social aspects and that these social factors affect levels of ESE, particularly in women, the following hypothesis is proposed:

H3 The social environment positively contributes to the entrepreneurial self-efficacy of female university students in Latin America

## 3 **Method**

### 3.1 *Sample*

Information for this study was gathered from the database of the Global University Entrepreneurial Spirit Students' Survey (GUESSS) 2018, which is focused on generating knowledge about university entrepreneurship worldwide at the undergraduate, graduate, and postgraduate levels (Sieger et al., 2019) and gathering information on the entrepreneurial intentions and activities of students in Higher Education Institutions.

A total of 208,636 students (male and female) from 54 countries and 3,191 university campuses participated in the survey. From Latin American universities, 67,938 students (male and female) of various disciplines (32.5%) and from 11 countries and 433 universities responded.

For this study, the sample consisted of Latin American female students on business administration and engineering courses. The breakdown of the sample is presented in Table 1.

**Table 1** Sample distribution average

<i>Country</i>	<i>No. of university campuses per country</i>	<i>University campuses average per country</i>	<i>Student sample per country</i>	<i>Total sample average per country</i>
Brazil	93	28.35	2,792	25.90
Costa Rica	75	22.87	1,444	13.40
Colombia	48	14.63	2,751	25.52
Mexico	44	13.41	625	5.80
Chile	26	7.93	1,746	16.20
Argentina	18	5.49	224	2.08
Ecuador	8	2.44	530	4.92
Panama	8	2.44	478	4.43
El Salvador	5	1.52	67	0.62
Uruguay	2	0.61	110	1.02
Peru	1	0.30	13	0.12
Total	328	100	10,780	100

*Source:* Data from GUESSS, Sieger et al. (2019)

Regarding the profiles of university women, the average age was 25.53 years (SD = 6.02), and the highest concentration were taking bachelor's degrees (89.9%), followed by master's degrees (4.3%), doctorates (1.0%) and students from other academic degrees (5.0%). 62.3% of respondents declared they were full-time students, while 37.7% were part-time students.

### 3.2 Variables

#### 3.2.1 Dependent variable

Entrepreneurial self-efficacy (ESE). In this study, the dependent variable was measured by GUESSS 2018 from the scale proposed by Zhao et al. (2005); Chen (1998) and De Noble (1999). It includes seven items on a 7-point Likert-type scale (1 = very low competence, 7 = very high competence).

#### 3.2.2 Independent variables

Locus of control. This variable was measured by GUESSS 2018 from the scale adapted by Levenson (1973). It has three items on a 7-point Likert-type scale 1 = completely disagree, 7 = completely agree (see Appendix).

University environment. This was measured by GUESSS 2018 from the scale suggested by Franke and Lüthje (2004), made up of three items measured on a 7-point Likert-type scale 1 = not at all, 7 = a lot (see Appendix).

Social environment. This was measured by GUESSS 2018 from the scale designed by Liñán and Chen (2009). It includes three items on a 7-point Likert-type scale 1 = very positive, 7 = very negative (see Appendix).

### 3.2.3 Control variables

In line with other GUESSS studies, this research used the entrepreneurial family background of university students as a dummy control variable (1 = Entrepreneurial parents, 0 = Salaried parents). Palmer et al. (2019) consider that socioeconomic factors are important in studies related to university entrepreneurship and family history as they could help to understand the mechanisms for entrepreneurship better. Specifically, Tolentino et al. (2014) comment that an entrepreneurial family background reinforces ESE and supports the first entrepreneurial steps of female university students (Morris et al., 2017).

Degree subject was used as a control variable. This variable is in line with previous studies of entrepreneurship, and, in this study is measured as a dummy variable (1 = Business Administration, 0 = Engineering and Computing). Criaco et al. (2017) point out that the specific disciplines of economics, business administration and engineering could affect venturing processes. In addition, students' choices of university studies and personality aspects also affect their entrepreneurial intentions once they have completed higher education (Lechuga et al., 2018; Krauss et al., 2020). Bergman et al. (2016) point out that education related to entrepreneurship significantly affects entrepreneurial processes.

### 3.3 Quantitative phase

The study applies hierarchical regression to test the hypotheses. This analysis is an accepted methodology for exploring predictor variables in entrepreneurship (Brändle et al., 2018; Morris et al., 2017). STATA Software, Version 12, was used for data analysis and hypothesis testing.

To estimate the suitability of executing this type of model, the intraclass correlation coefficient (ICC) was calculated beforehand to determine whether a multilevel model was appropriate or not. This coefficient represents the proportion of the total variability of the dependent variable due to the variability between groups (i.e., countries). The value obtained from this coefficient was 0.03, lower than the commonly accepted rule of 0.15 (Hox, 2010), which indicates that there is not enough variability between groups to run a multilevel model; therefore, hierarchical multiple regression was preferred.

The sequential stages of the hierarchical regression model adopt the following equation (1) (following Pindyck and Rubinfeld, 1981):

$$ESEf_i = \beta_0 + \beta_1 LofCi + \beta_2 Univ\_Env + \beta_3 Soc\_Env + \beta_k Control_i + \varepsilon_i; \quad (1)$$

$$i = 1, 2, \dots, N, k = 4, 5$$

where  $\beta_0$  is the intercept;  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are the estimated coefficients associated with the independent variables in the model;  $\beta_k$  is the estimated coefficient for each of the control variables (Entrepreneurial family background and type of degree);  $\varepsilon_i$  is the error term in the model, and  $ESEf_i$  is the dependent variable in the model entrepreneurial self-efficacy (ESE).

### 3.4 *Qualitative phase*

A second stage was carried out based on sequential deductive triangulation (Morse, 1992; Plano and Cresswell, 2015), which uses qualitative analysis to increase the interpretability and meaning of the constructs (Greene et al., 1989), and their relationships. In this case, to find out how Locus of Control, the university environment, and the social environment affect ESE based on the opinions of Latin American female students.

Sequential qualitative analysis examines quantitative information first and then gathers qualitative information in a second phase (Plano and Cresswell, 2015). It is also used to capture non-quantifiable aspects first-hand (Lafuente et al., 2021), such as students' experiences concerning their ESE and its predictors. Hence, the findings from this second stage will help to explain the quantitative results in more detail.

The interviews were conducted with seven female university students from Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, and Uruguay to address their perception of how their Locus of Control, their university environment, and their social environment could affect or not, positively or negatively, their perceived ESE.

The seven cases were selected according to their suitability for this study and not randomly (Greene et al., 1989). To achieve an adequate selection of students, researchers who were part of the data collection procedure for GUESSS 2018 in each country helped to establish contact with students who could participate in this survey.

The selection criteria for interviewees included their enrolment for a business administration program, not being entrepreneurs or considering entrepreneurship at the time of the interview, their academic levels, and having a self-efficacy level between medium and high as measured by the corresponding Likert-type scale for entrepreneurial self-efficacy proposed by Chen (1998) and Zhao et al. (2005); De Noble (1999) (1 = very low competence, 7 = very high competence). Students were classified by age, years of studies, and their locus of control (Table 4).

The information for the quantitative analysis was collected in 2018 and systematised for this article in 2020. The interviews with female students were conducted online via Zoom meetings between December 2020 and April 2021 and lasted for an average of 16 minutes. They were then transcribed using the Microsoft Word application. The analysis was based on the relationships between the variables established for this study: Locus of control and ESE, social environment and entrepreneurial ESE, and university environment and ESE.

The interviews consisted of four sections. The first provided appropriate information to the participant about the purpose of the interview and the study and promoted a suitably trusting environment for interaction with the students (Plano and Creswell, 2015). The second section included two questions to determine the students' entrepreneurial status and apply the entrepreneurial self-efficacy level scale. Then, in the third section, two open questions were asked to capture the students' perception of the incidence of Locus of Control in their ESE, a question to determine their perception of the incidence of the university environment on their business self-efficacy, and one more question to determine the impact of the social environment on their business self-efficacy. Finally, section four included sociodemographic questions, such as type of university (public or private), age, and years of university studies.

## 4 Results

This section presents the empirical findings of this study. Section 4.1 details the quantitative tests of the hypotheses from the hierarchical regression model proposed in equation (1). The results in section 4.2 illustrate the qualitative approach that complemented the quantitative findings.

### 4.1 Quantitative phase results

This section presents the empirical findings of the study. The descriptive statistics and the correlations between the variables are shown in Table 2. The predictor variables of the model are located between a minimum of 0.31 and a maximum of 0.56 at moderately and statistically significant levels. The correlation between these variables and the dependent variable shows moderate and significant levels.

**Table 2** Descriptive statistics and variable correlations, N = 10,870

<i>Variables</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
1 Entrepreneurial family background	1.000					
2 Course type	-0.021*	1.000				
3 Locus of control	0.055***	0.097***	1.000			
4 University environment	0.045***	0.102***	0.272***	1.000		
5 Social environment	0.035***	0.021*	0.284***	0.226***	1.000	
6 Entrepreneurial self-efficacy	0.080***	0.134***	0.564***	0.332***	0.315***	1.000

Note: Level of significance \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

According to the F-tests, all the models fit and are statistically significant. The variance inflation factor (VIF) is below the threshold (VIF <10) in all cases, so there are no multicollinearity problems (Acock, 2014).

The results show the three regressions models carried out: Model 2, Model 3, and Model 4 show the variables added to each model. Table 3 also shows the change in  $R^2$  for each model.

Model 1 indicates that the control variables do not significantly affect the dependent variable of ESE in female university students compared to the subsequent models.

Model 2, in addition to the control variables, adds the variable locus of control. In this model,  $R^2$  increased by 0.32, from 0.024 to 0.326. This increase is significant,  $F(2, 10,870) = 1,743.35$ ,  $p < 0.001$ . The results show a positive and statistically significant relationship ( $\beta_1 = 0.555$ ,  $p < 0.001$ ) between locus of control and ESE. Hypothesis H1 is thus accepted.

In Model 3, the social environment variable was also added.  $R^2$  increased by 0.026, from 0.326 to 0.352. This increase is significant,  $F(3, 10870) = 1468.82$ ,  $p < 0.001$ . The results show a positive and statistically significant relationship ( $\beta_2 = 0.164$ ,  $p < 0.001$ ) between the social environment and ESE. Hypothesis H2 is therefore also accepted.

By adding the variable university environment to Model 4, R<sup>2</sup> increased by 0.024, from 0.352 to 0.376, and is also significant, F (4, 10870) = 1,302.88, p < 0.001. Therefore, the positive effect of the university environment on the ESE of university students is verified, as stated in hypothesis H3. A positive and statistically significant relationship ( $\beta_3 = 0.165$ , p < 0.001) is found between the university environment and ESE. H3 is also accepted.

The standardised beta coefficient helps to determine each independent variable's effect on the dependent variable (Acock, 2014). It was calculated with stata software, version 12. model 4 shows the effect of each predictor variable. Locus of control has a moderate positive effect ( $\beta = 0.46$ , p < 0.001), and the social environment variable ( $\beta = 0.14$ , p < 0.001) and the university environment variable ( $\beta = 0.16$ , p < 0.001) both have a small positive effect. Comparatively, the predictor variable Locus of Control exerts a greater effect on the ESE of female university students than do the other variables.

**Table 3** Hierarchical Regression Models Results, N=10780

<i>Entrepreneurial self-efficacy</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
Entrepreneurial family background	0.165***	0.102***	0.956***	0.086***
Course type	0.277***	0.166***	0.168***	0.142***
Locus of control		0.555***	0.507***	0.4718***
Social environment			0.164***	0.138***
University environment				0.165***
F-test	136.53***	1743.35***	1468.82***	1302.88***
R <sup>2</sup> (adjusted)	0.024	0.326	0.352	0.376
$\Delta R^2$ and F test		0.302	0.026	0.0024
		4834.55***	433.82***	414087***
VIF average (min-max)				1.08 (1.01–1.15)
Observations	10780	10780	10780	10780

Note: Level of significance \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

#### 4.2 Qualitative phase results

This section presents the results of the qualitative analysis following Lafuente et al. (2019, 2021). The sociodemographic characteristics of the interviewees are shown in Table 4, and the relevant testimonies for this study are presented in Table 5. A matrix is built as follows: 7 rows for each case and three columns for each relationship between variables (column 1: Relationship between locus of control and ESE; column 2: relationship between university environment and ESE and column 3: relationship between social environment and ESE).

**Table 4** Qualitative Analysis: characteristics of female university students

<i>Characteristics</i>	<i>Case 1</i>	<i>Case 2</i>	<i>Case 3</i>	<i>Case 4</i>	<i>Case 5</i>	<i>Case 6</i>	<i>Case 7</i>
Country	Ecuador	Colombia	Peru	Mexico	Chile	Uruguay	Costa Rica
Course	Public business administration	Business administration	Industrial engineering	Economics	Commercial engineering	International business	Business administration
University type	Public	Private	Private	Public	Public	Private	Public
Academic level	Graduate	Graduate	Graduate	Graduate	Graduate	Graduate	Graduate
Entrepreneurial self-efficacy level	Medium	High	High	High	High	High	High
Locus of control level	High	High	High	Medium	High	High	High
Age	21	17	23	28	23	22	21
Years of studies	2	2	7	2	5	2	2

**Table 5** Qualitative analysis: opinions reported in interviews with female university students

Case report	Column 1: Relationship between locus of control and entrepreneurial self-efficacy	Column 2: Relationship between university environment and entrepreneurial self-efficacy	Column 3: Relationship between social environment and entrepreneurial self-efficacy
Case 1	The student says: 'Yes, because of the huge determination you need'.	The student states that the university environment can have a negative influence 'because, for example, it can be an obstacle for the ability to socialise and to be with other people, so it is not possible to move on with these skills, but with other skills, such as identifying new products and businesses, it can be positive'.	The student comments that the social environment has a positive influence; she considers that close contacts, such as family, can always help her and give her emotional and financial support.
Case 2	The student points out that Locus of Control does affect her ESE, and she considers that the training that she gets in her professional field has more influence in safeguarding the entrepreneurial objectives to be fulfilled.	The student states that this environment positively affects her since she can get opinions from third parties to support her ideas and 'receive input from lecturers when they teach certain topics and from classmates.'	The student points out that there may be a balance in the relationship between both variables. However, she adds that 'I feel more strongly about the negative effects because, as they are close, they feel they have the right to judge my actions, and they focus more on mistakes.'
Case 3	The student affirms that both variables are positively related, especially in terms of competencies like communication and leadership. She states that being highly determined to make things happen (locus of control) drives one's desire to venture based on one's previous business knowledge.	The student states that the university environment does have a positive impact because she has seen how her classmates at university have moved on with their ventures. She highlights that by having these role models at university, she grows in confidence knowing that she would not be the only one to embark on a business venture. She points out that these ventures are marketed through digital social networks.	She points out that 'my sister and my cousin have ventures. They are 27 and 28 years old and they can guide me on how to start a businesses'. On the contrary, she adds that 'my parents, uncles and grandparents are more of the opinion that everything has to follow the rules, like, you'd better work in a company because venturing is not going to be good for you.'
Case 4	The student states that there is a positive relationship between both variables: 'Because it is necessary to get ahead as a woman; because here women just think about getting married and don't work; but as a woman, you can do anything you aim for, but you need those qualities and tools to venture, like being organised and having the attitude to get ahead'.	The student states that there is a positive relationship because she can put what she learns at her university into practice, and that she has noticed a change in the value of entrepreneurship depending on the subjects she takes at her university. She states that lecturers can provide her with resources and positive opinions about venturing.	The student comments that the relationship between both variables is positive because all the actors in this environment provide her with a lot of support and motivation. She points out that 'they are the ones who help you the most, they are the family.'

**Table 5** Qualitative analysis: opinions reported in interviews with female university students (continued)

Case report	Column 1: Relationship between locus of control and entrepreneurial self-efficacy	Column 2: Relationship between university environment and entrepreneurial self-efficacy	Column 3: Relationship between social environment and entrepreneurial self-efficacy
Case 5	The student comments that both variables are positively related, and she affirms that she feels very capable of taking the initiative to venture.	The student states that her university has given her all the tools she needs, such as theoretical and practical courses that have taken her closer to entrepreneurship and digital marketing and have helped her develop in the labour world. She also points out that she has met many people at university who have helped her rescue many business ideas; all of this has made her feel she has the full capacity to start a business.	It is important because these close networks allow one to search for other support networks for one's business, so this environment has had a positive impact on her.
Case 6	The student considers there to be a positive relationship between both variables, and this fosters her motivation to venture.	The student considers that the university environment affects her beliefs about her ability to embark on a business venture. She comments, for example, that the university offers entrepreneurship classes and provides her with different entrepreneurial tools such as Design Thinking. She has also participated in innovation and entrepreneurship programs.	The student views the social environment as a positive way to build her support network, which is essential for venturing. However, she points out that this same environment can work negatively.
Case 7	The student indicates that both variables are related, and that she must be aware of how attached she is to her business idea to be able to carry it out. She points out that 'both are related because sometimes we are afraid of strengthening the weaknesses that we cannot recognise'.	The student states that the university environment does not directly affect her ESE. She emphasizes that 'what really promotes my abilities depends more on myself'. However, she points out that actors in this environment, such as lecturers, can help strengthen her entrepreneurial skills (ESE) and the bases for business venturing.	The student states that the social environment 'completely' affects her ESE because she shares her ideas with her closest circle. She also affirms that they provide her with support and are also important connections that strengthen her business. She also points out that the influence of the social environment can harm the start-up of a business due to bad reviews.

Relevant aspects emerged from the conversations with the seven female university students. First, from the qualitative comparison of the interviewees' testimonies, a positive relationship is perceived between locus of control and ESE (column 1: Relationship between locus of control and ESE in Table 5). As a result of this positive relationship, students can identify the things in the field of entrepreneurship that will help them develop a 'desire to get ahead' and will allow them to 'strengthen weaknesses.' These comments are consistent with the quantitative results shown in Model 4, where Locus of Control is the variable that contributes the most to ESE (Table 3).

Regarding the relationship between the university environment and ESE, there is no consensus among the participants on its positive or negative influence on their self-efficacy. Some of the participants' statements hint that the university plays an essential role in ESE because students acquire new ideas that they can share with their peers and lecturers, and because they acquire entrepreneurial knowledge from theoretical and practical courses on entrepreneurship. Examples of this are the opinions of cases 2, 3, 4, 5, and 6 (Table 5 in column 2: relationship between the university environment and ESE). This finding is consistent with Cañizares et al. (2013), indicating that HEIs can promote entrepreneurship through entrepreneurial programs and courses. Particularly in case 1, the student refers to two specific competencies that are part of ESE and are related to the university environment, which 'can be an obstacle for the ability to socialise and to be with other people, so it is not possible to move on with these skills, but with other skills, such as identifying new products and businesses, it can be positive' (case 1, Table 5 in column 2: relationship between the university environment and ESE). Case 7 indicates that this environment does not directly affect her ESE since she considers the promotion of entrepreneurial skills to depend more on herself; she recognises that actors within the university, such as lecturers, could contribute.

The testimonies show similarities with the quantitative results in Model 3 Table 3, where it is observed that the variable university environment has a positive influence on ESE, although its contribution to the explanation of this variable is low compared to that of locus of control. However, it contributes more than the social environment according to the change observed in  $R^2$ .

Likewise, students have different opinions about the relationship between the social environment and ESE. For all cases (Table 5, Column 3: Relationship between the social environment and ESE), at first sight, this environment positively affects ESE, mainly due to the proximity of family members and friends. However, this same closeness negatively influences the interviewees' entrepreneurial skills and decisions (case 2, case 3, case 6, case 7).

There is consensus among the participants regarding the positive relationship between locus of control and ESE, where the former is a characteristic of personality (Rotter, 1966), while the university and social environments are viewed as a set of interactions with other actors (Casper, 2001; Castillo et al; 2006).

## **5 Discussion**

The results have shown that it is possible to identify specific predictors of entrepreneurial self-efficacy (ESE) and that those predictors are both psychological and social. The most significant predictor identified is locus of control, defined as a personality trait that affects the development of social cognition (Luthan and Ibrayeva, 2006), which may

suggest the preponderance of psychological predictors of ESE over social predictors. This is relevant since, as indicated by Newman, et al, (2019), ESE has been studied mainly from social cognitive theories.

For Maes et al. (2014) and Kesavayuth et al. (2018), for the case of women, locus of control is particularly valuable for generating self-reliance, an affirmation that is supported by the results that show that locus of control has a more significant positive effect on the ESE of the female university students in this sample. It is the predictor variable that contributes the most to the explanation of the proposed theoretical model shown in Model 4 in Table 3.

Even though locus of control is the variable that has the highest effect on ESE, the other variables also help to explain it in the female university students in this sample, albeit to a lesser degree. These variables are defined as social aspects in contrast to Locus of Control, which may explain their more discreet effect.

The university environment is a social space (Castillo et al., 2006) that encourages and promotes entrepreneurship, as indicated by Rovira et al. (2011) and Tapia (2000). For Franke and Lüthje (2004), the university environment also affects university students' self-perceptions of their abilities to venture; that is, the university environment has a positive effect on ESE. Both claims are supported by Model 3 of the hierarchical regression and are reaffirmed by the testimonies included in the qualitative phase. The interviewees highlight how the university environment influences their perceived ESE, as shown in Table 5 (Column 2: Relationship between the university environment and ESE). These results are consistent with the arguments of Cadenas et al. (2020), Islam (2019), Gedeon and Valliere (2018), Mozahem and Adlouni (2020) and Souitaris (2007), who emphasise the importance of the university environment for student entrepreneurship, and especially females (Krauss et al., 2020).

The results support the argument that an appropriate university environment can positively affect ESE and, consequently, help improve HEI's strategies to boost entrepreneurial intentions. Even though entrepreneurial education can increase ESE (Chang et al., 2020; Hsu et al., 2019;), few studies have focused on the predictors that improve it or impair it (Islam, 2019; Javadian et al., 2018).

Although to a lesser extent than the previous variables, the social environment positively affects the ESE of female university students. This finding agrees with Criaco et al. (2017), Krueger et al. (2000), and Newman et al. (2019), who indicate that the social environment, and especially the family group (Fonseca et al., 2015), friends and even peers at university play a significant role in the person's entrepreneurial development, especially in women (Rosca et al., 2020).

In relation to the control variable in this study, authors like Bergman et al. (2016) point out that entrepreneurship education significantly affects entrepreneurial processes. However, the results of this study for the variable Course Type show that this variable is not relevant when compared to independent variables.

## 5.1 Conclusions

Entrepreneurship is a process of discovery, co-creation, evaluation, and exploitation of new opportunities to produce goods and services (Shane, 2012). The academic literature has demonstrated the contribution of entrepreneurship to the economy of regions (Cañizares et al., 2013) and, specifically, the increasing participation of Latin American

women in that region's levels of entrepreneurship (Saavedra-García and Camarena-Adame, 2015; Kelley et al., 2017).

To contribute to the theoretical and practical discussion on the predictors of ESE and its relevance for boosting entrepreneurship in Latin American HEI's, this study's objective was to measure the effect of three possible predictors of ESE, specifically, Locus of Control, the social environment, and the university environment in female university students from Latin American HEIs.

This study makes contributions to the theoretical discussions around the concept of ESE in university students and both its psychological predictors, such as the locus of control, and predictors that are external to the student such as the university and social environments, by adding significant evidence to the scarce empirical studies that already exist.

From the results shown here, the positive effect that the predictor variables exert on the ESE of university students is demonstrated. Of particular importance is the positive effect that locus of control has on the ESE of female university students. Both the quantitative and qualitative results support these findings.

We consider the findings presented here to be relevant for HEIs because they show the positive effect of the university environment on the ESE of the female students included in this research. It is suggested that HEIs can do more to improve their students' levels of ESE. They should base the design of their entrepreneurship training programs on personality and social determinants and considering that further gender-related studies are still necessary to improve the entrepreneurial environment for female students. This is supported by the students' testimonies in the qualitative phase but must be further studied in the case of female students (Cadenas et al., 2020; Henry et al., 2016; Krauss et al., 2020; Vivel et al., 2011; Saavedra-García and Camarena-Adame, 2015).

Therefore, to promote more efficient interactions between female students and faculty, practitioners, and policymakers, HEI's (Castillo et al., 2006) should pay more attention to ESE predictors, especially Locus of Control. This study supports the relevance of ESE for improving student skills such as teamwork, the generation of new ideas and problem-solving (Rovira et al., 2011; Tapia, 2000), based on better university environments through technology and knowledge transfer (Smyth et al., 2016). Moreover, entrepreneurial university environments increase students' ESE and contribute to the development of competencies related to the creation, innovation, and development of personal initiatives within business environments.

Furthermore, ESE is especially important in all the different stages of entrepreneurship, such as for nascent entrepreneurs (Brändle et al., 2018). It is therefore advisable to further explore the relationships between Locus of Control and the ESE of university women identified as nascent entrepreneurs, for HEIs contribute to the general economy of countries through their entrepreneurial educational activities.

Some limitations of this study have been identified. First, it was based on a single database (GUESSS 2018). We therefore suggest that future research should conduct similar studies with updated data (Gimenez-Jimenez, et al., 2020) and compare the power of the predictive variables on the ESE of student populations around the world, not only in Latin America. Second, the selected sample consisted only of women from a specific disciplinary area, which did not present a greater incidence on ESE, despite the fact that authors have indicated that this can influence entrepreneurial processes (Bergman et al., 2016; Criaco et al., 2017; Krauss et al., 2020; Lechuga et al., 2018). However, we consider it important to include different disciplinary areas from business administration

in order to make more in-depth comparisons and learn more about the behavior of ESE in students of other subjects.

We also recommend that future studies should apply mixed methodologies such as, for example, the deductive methodology for studies in the business field as recommended by Lafuente et al. (2019). Methodological triangulation (Vasilachis, 2006; Verd-Pericás and López-Roldán, 2008) magnifies the effectiveness of quantitative approaches since it is then possible to integrate other latent variables that could broaden the understanding of a phenomenon (Marradi et al., 2018).

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## Appendix

Items included in the questionnaire for each dependent and independent variable

### *Entrepreneurial self-efficacy*

Please indicate your level of competence in performing the following task (1=very low competence, 7= very high competence).

- 1 Identifying new business opportunities.
- 2 Creating new products and services.
- 3 Managing innovation within a business
- 4 Being a leader and communicator
- 5 Building up a professional network
- 6 Commercialising a new idea or development
- 7 Successfully managing a business

### *Locus of control*

Please indicate your level of agreement with the following statements (1=strongly disagree, 7=strongly agree).

- 1 I am usually able to protect my personal interests
- 2 When I make plans, I am almost certain to make them work

- 3 I can pretty much determine what will happen in my life

*Social environment*

If you would pursue a career as an entrepreneur, how would people in your environmental react (1 = very negatively, 7 = very positively)?

- 1 your close family
- 2 your friends
- 3 your fellow students

*University environment*

Please indicate the extent to which you agree with the following statements about the university environment (1 = not at all, 7 = very much).

- 1 The atmosphere at my university inspires me to develop ideas for new businesses.
- 2 There is a favourable climate for becoming an entrepreneur at my university.
- 3 At my university, students are encouraged to engage in entrepreneurial activities.