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The Effect of Vigor and Affective Commitment on the Performance of Women Student Entrepreneurs: the Moderating Role of the Social and University Environment

El efecto del vigor y el compromiso afectivo en el desempeño de las mujeres estudiantes emprendedoras: el papel moderador del entorno social y universitario

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ABSTRACT

This study aims to analyze the performance of university women in active entrepreneurship from the perspective of cognitive variables, such as vigor and affective commitment, and contextual variables, such as the social and university environments. The study follows a multilevel analysis with a three-way interaction model. The data analysis covers 6779 university students from 39 countries, included in the GUESSS Survey, 2018. The evidence indicates a positive influence of the interaction between vigor and affective commitment on the performance of companies created by female university entrepreneurs. It shows the dependence of this interaction on the social and university environment, mainly on the social environment. This empirical study focuses on university students with active startups and determines the main influences on their business performance. This study has important theoretical implications that enrich the understanding of the relationships between the studied variables and contribute to existing knowledge. It mainly highlights the relevance of vigor and affective commitment for business success. Furthermore, it suggests the need for a more elaborate theory on interactions in the business context.

Keywords: Performance, Vigor, Affective commitment, University environment, Social environment, GUESSS.

RESUMEN

Este estudio tiene como objetivo analizar el desempeño de emprendimientos activos de mujeres universitarias desde la perspectiva de variables cognitivas como el vigor y el compromiso afectivo y variables de un contexto como el entorno social y universitario. El estudio aplica un diseño cuantitativo. El análisis de los datos abarca una muestra de 6779 estudiantes universitarias de 39 países, incluidas en la Encuesta GUESSS, 2018. Se aplicó un análisis multinivel. La evidencia indica que existe una influencia positiva de la interacción entre el vigor y el compromiso afectivo en el desempeño de empresas creadas por mujeres emprendedoras universitarias, así como la dependencia de esa interacción con el entorno social y universitario, principalmente con el social. Este estudio empírico se centra en las estudiantes universitarias con emprendimientos activos y determina las principales influencias en su desempeño empresarial. Este estudio tiene implicaciones teóricas importantes que enriquecen la comprensión de las relaciones entre las variables estudiadas y contribuyen al conocimiento existente, principalmente destaca la relevancia del vigor y el compromiso afectivo para el éxito empresarial. Además, sugiere la necesidad de una teoría más elaborada sobre interacciones en el contexto empresarial.

Palabras clave: Desempeño, Vigor, Compromiso afectivo, Entorno universitario, Entorno social, GUESSS.

1. INTRODUCTION

Entrepreneurship constitutes a significant field of study (Shane & Venkataraman, 2000) due to its contribution to job creation and socioeconomic growth (Bellò *et al.*, 2018; Jones & Colwill, 2013). New companies bring new jobs, higher income, and added value, in part through the introduction of new ideas, technologies, and products to society (GEM, 2022; Stoica *et al.*, 2020), as well as for stimulating competition and competitiveness (Stoica *et al.*, 2020).

The rate of creation of new businesses among women doubled during the pandemic years (WEF, 2022). The GEM report (2022) showed that one in three high-growth, innovative ventures focused on local and international markets corresponded to women. A nation's Gross Domestic Product (GDP) increases as women in a country advance in entrepreneurship and innovation (Sinha & Kumar, 2018). Literature has highlighted that female entrepreneurship is a crucial driver for economic growth, with the potential to significantly boost a nation's GDP (Nagabhaskar & MohanPrasad, 2022). In support of this claim, a study by the McKinsey Global Institute revealed that a total of $12 trillion could be added to the global GDP by 2025 by advancing gender equality. This optimistic projection is based on the premise that the capabilities of women in the workforce are fully developed and that both genders assume the same responsibilities and opportunities (McKinsey, 2015).

The literature has drawn attention to the study of various independent variables associated with the performance of women entrepreneurs (Corrêa *et al.*, 2022) in different regions and has pointed out the social and cultural challenges that women entrepreneurs face in those contexts (Cardella *et al.*, 2020).

Among those independent variables, vigor and emotional commitment influence business performance, although the results are still not definitive. Existing literature invites further exploration of the topic together with the study of contextual aspects such as the university environment (Bergmann *et al.*, 2016; Gnyawali & Fogel, 1994; Herrera *et al.*, 2020; Holienka *et al.*, 2017; Shirokova *et al.*, 2016; Spigel, 2017) or the social environment influencing business performance.

The general literature on female entrepreneurship suggests deepening research on the contexts surrounding female entrepreneurs and how these contexts influence the performance of their businesses (Adom *et al.*, 2018; Kim *et al.*, 2020). So, it seems essential to study the role of the cultural context and social environments in the business environment (Laskovaia *et al.*, 2017) by mainly focusing on women and the performance of their businesses (Corrêa *et al.*, 2022).

The GUESSS study (2021) indicates that active entrepreneurship comprises around 10.8% of the university population, with approximately 2.6% corresponding to women already in charge of their businesses. This group shows a promising level of performance; almost 36% of these ventures obtain a rating above 5 on a scale of 1 to 7. Despite these positive results, a gender gap persists with noticeable differences among countries. This issue requires focused attention (Romaní *et al.*, 2021).

As far as we have been able to investigate, the literature needs to include specific studies about the active entrepreneurship of university women (AEWUS), most significantly from the perspective of cognitive variables such as vigor and affective commitment or contextual variables such as social and university environments. Therefore, this study seeks to answer the following research questions: how does the interaction between vigor and affective commitment affect the performance of companies created by women university entrepreneurs? Moreover, how do the social and university environments influence this relationship?

This issue is particularly relevant for universities and actors in the academic sector supporting entrepreneurship in its advanced stages and for those governmental agencies and institutions that consider entrepreneurship as an alternative to development and self-employment. Therefore, this study aims to provide knowledge and understanding of the performance of female university entrepreneurs and their link to cognition and context.

The document is structured as follows. Section 2 presents the arguments that support the study and proposed hypotheses. Section 3 contains a description of the empirical method. Section 4 presents the results, and the final section synthesizes and discusses the main findings and describes their practical implications and future lines of research.

2. THEORETICAL BACKGROUND AND HYPOTHESES

The theory of planned behavior states that behavior is preceded by one's predisposition to carry out such behavior (Ajzen, 1991). This theory can help understand how internal and external factors influence female entrepreneurship and how to promote a more favorable environment for it.

Authors such as Lerner *et al.* (1997) have mentioned how environmental factors affect performance and how environmental motivations are strongly related, particularly in female entrepreneurship. The present study also analyses the relationship between the performance of university women in entrepreneurship and two cognitive variables, vigor and affective commitment, and two contextual variables, the social environment, and the university environment.

2.1. Vigor, affective commitment and performance

Vigor is defined by Ryan and Frederick (1997) as a positive feeling of vitality and energy, often associated with self-motivation; this term has been associated with well-being derived from a psychological effect of one's available energy and feeling good (Bostic *et al.*, 2000), which can vary due to internal or external individual conditions (Wiklund *et al.*, 2019).

Shir *et al.* study (2019) showed that active engagement in entrepreneurial tasks is associated with feeling good. They also link feeling good with vigor in entrepreneurship, showing that higher levels of well-being are more frequent in entrepreneurs than in employees. Associated with the above, Shirom (2011) proposed that vigor has positive consequences for individuals and organizations and is related to job satisfaction, organizational commitment, and job performance. When referring to affective commitment, for Bowlby (1979), attachment behaviors are instinctive and will be activated by any condition that may threaten the achievement of proximity at the business level; entrepreneurs, for example, usually show intense commitment and dedication to maintaining that relationship.

For Lahti *et al.* (2019), the emotional ties of founding entrepreneurs toward their ventures are surprisingly similar to the emotional ties of parents toward their children. Using neuroimaging techniques, researchers discovered neural correlations between company and parental attachment. This finding suggests that entrepreneurs may establish a similar emotional bond with their company and children, influencing their emotional commitment to the business.

Added to the above, Dawson *et al.* (2014) considered that affectively committed entrepreneurs assume behaviors and make decisions that positively impact the performance of their family businesses. Their study focuses on members of the next generation in family businesses and examines the consequences of commitment to the family business. The authors found that the affective commitment of members of the next generation is positively associated with favorable behavioral outcomes, such as job satisfaction, performance, and intention to remain in the family business.

Referring to the relationship between vigor and affective commitment, studies such as that of Hemsworth *et al.* (2020), whose purpose was to examine the impact of different levels of personal energy on the well-being of nurses, found that a solid and positive relationship between vigor and the affective commitment of employees is related to greater productivity, performance, and the quality of work and life. Their study demonstrates the positive relationship between vigor and affective commitment, well-being, and personal performance.

Studying the combined aspect of the interaction between vigor and affective commitment is relevant to understanding how these factors interact in performance as variables that contribute to each other (Puspitasari *et al.*, 2023). In this relationship, the literature has shown that vigor, a component of positive psychological capital, positively affects work performance and is linked to affective commitment (Sari *et al.*, 2023). Studying their combined impact is essential to understanding the psychological and emotional factors that drive entrepreneurial success (Budiningsih *et al.*, 2018; Tasnim *et al.*, 2014). Likewise, Kundi *et al.* (2021) investigated the mediating role of affective commitment between well-being and job performance, concluding that affective commitment and well-being can be very advantageous for the results of an organization since it generates security in the employees, improves performance, and promotes work-related attitudes and behaviors. The above suggests that the relationship between affective commitment and vigor impacts ventures' performance equally.

The previous arguments allow us to postulate that:

H1: The interaction between vigor and affective commitment is positively related to female university students' active entrepreneurship performance.

2.2. The moderating role of the university environment

The literature has mentioned that universities can encourage people's decisions to pursue an entrepreneurial career (Bergmann *et al.*, 2016; Ramos-Rodríguez *et al.*, 2019). Furthermore, the literature has highlighted the concept of the entrepreneurial university (Forliano *et al.*, 2021; Hayter *et al.*, 2018; Schmitz *et al.*, 2017) as a valuable source of resources for university ventures ranging from the accumulation of knowledge reservoirs, support infrastructure, opportunities to access contact networks and social capital (Bergmann *et al.*, 2016; Morris *et al.*, 2017).

The literature also mentioned that the university environment determines students' interactions based on their practices, policies, and behaviors (Castillo *et al.*, 2006). Previous studies have been emphatic about the influence of the university environment on entrepreneurship and the environmental factors associated with this environment (Shirokova *et al.*, 2016; Víquez *et al.*, 2022). For example, it is mentioned that this environment enhances the role of university graduates as founders of innovative companies (Franke & Lüthje, 2004) and often enhances the knowledge and skills of students in favor of entrepreneurship and the sustainability and performance of their venture (Jones, 2022; Orobia *et al.*, 2020; Robinson & Sexton, 1994).

Various studies have shown that inducers such as the university context and the development of behaviors and decision-making to establish one's own business can encourage entrepreneurship and impact its performance (Bergmann *et al.*, 2016; Holienka *et al.*, 2017). Studies about the university environment demonstrate the more significant value female students give to the university contexts (Díaz Bretones & Radrigán, 2018; Wilson *et al.*, 2007) since they feel more confident having training and the support of the university.

All the above leads us to hypothesize that:

H2: The university environment moderates the positive relationship between vigor and affective commitment and female university students' active entrepreneurship performance.

2.3. The moderating role of the social environment

The social environment is determined by the relationships between the physical, natural, social, and cultural aspects surrounding an individual and their interaction with others (Barnett & Casper, 2001). Liñán and Chen (2009) have stated that entrepreneurship is conditioned and favored by the social environment; the more the social environment favors entrepreneurship, the better entrepreneurship is carried out.

It has been mentioned that good knowledge of this environment guides people, their skills, and abilities to carry out a business with greater business efficiency (Păunescu *et al.*, 2018). Particularly in the case of women, it is suggested that feeling integrated into the social context and the strength of a woman's relationships help women confront gender structures, entrepreneurship, and challenges and favor the performance of their entrepreneurship. The above strengthens the process of making suitable entrepreneurs, building relationships, and changing processes favoring entrepreneurship (Roos, 2019).

Regarding vigor and performance moderated by a social environment, Obschonka *et al.* (2015) reveal that the local culture (which is part of the social environment) alone is not responsible for business vitality and its contribution to the economy of a region; it rather depends on the interaction between culture and the creation of knowledge by entrepreneurs. The study, therefore, suggests that local culture provides a specific cultural environment. However, entrepreneurs' ability to har-

ness and combine that cultural knowledge with their knowledge creation drives business vitality and economic contribution in a region.

Moreover, recent studies have shown that the social environment is related to vigor and entrepreneurial spirit (Stephan *et al.*, 2020) since it shapes the entrepreneur's experience and meaning, his work autonomy, and, indirectly, subjective vitality. Studies suggest that the social environment plays a fundamental role in entrepreneurship since social support and resources are key factors that can energize and enable entrepreneurship, positively impacting the well-being of individuals involved in business activities.

All the above leads us to postulate our third hypothesis:

H3: The social environment moderates the positive relationship between vigor and affective commitment and female university students' active entrepreneurship performance.

Figure 1 shows the study model.

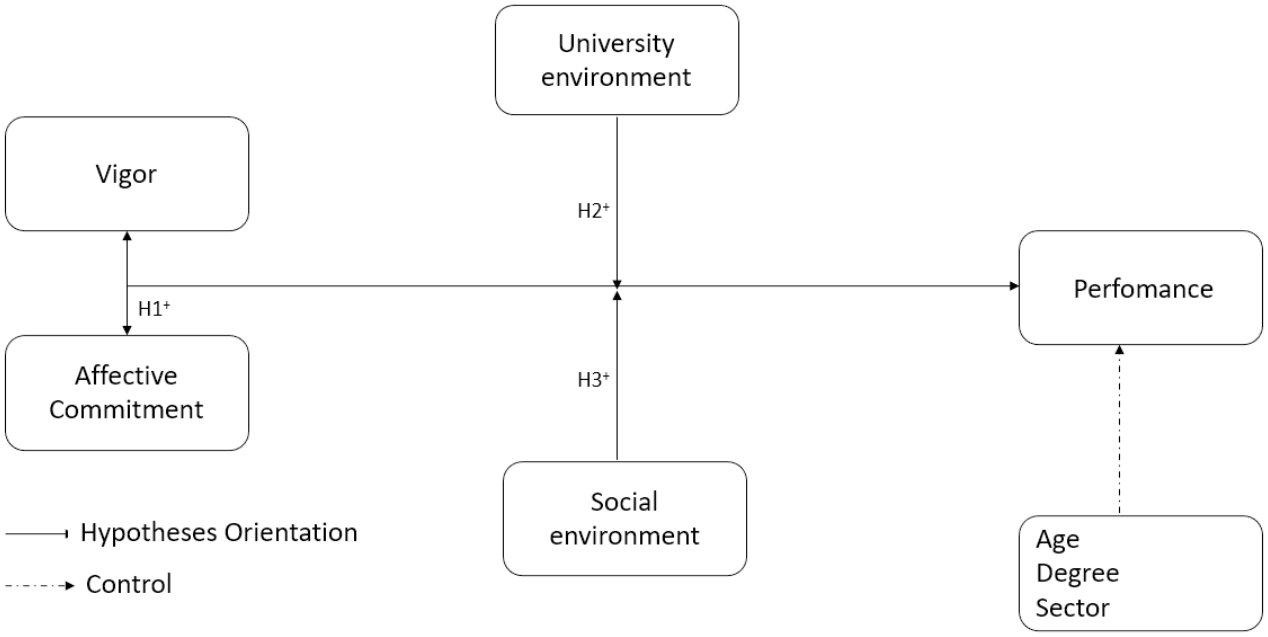

Figure 1
Proposed theoretical research model
Source: Own elaboration based on the theoretical framework.

3. SAMPLE, DEFINITION OF VARIABLES AND METHOD

3.1. Sample

This study utilizes data from the 2018 Global University Entrepreneurial Spirit Students' Survey (GUESSS) data wave. GUESSS is part of an international research project aiming to unveil insights into student entrepreneurship worldwide through regular surveys across numerous countries. Enabled by a centralized online platform, it facilitates comprehensive cross-country comparisons and in-depth analyses (see www.guesssurvey.org/goals/). Each team from participating international universities strives to maximize student participation in completing the online questionnaire provided by the central GUESSS team. While not necessarily a random sampling strategy, a specific sample of active startup founders was selected based on Politis *et al.* (2012), illustrating the heterogeneity of student data by comparing causal and effectual logics. Additionally, as described by Dillman *et al.* (2009), an online survey method is suitable for reaching students from various universities in different countries.

Due to our interest in active university entrepreneurs, we only used those respondents who ran their businesses or were already self-employed. Thus, the subset of data resulted in a sample of 6779 entrepreneurial university students based on the variables of interest in this study. Several works focusing on the study of active entrepreneurs have used GUESSS data (Bergmann *et al.*, 2016; Braun & Sieger, 2021; Hahn, 2020; Holienka *et al.*, 2017; Laskovaia *et al.*, 2017).

For this final sample, university women show an age range between 21 and 64 years, with an average age of 31 (SD = 7.93). The students come mainly from majors related to Computer Science/IT (29.81%), followed by Business Administration (14.43%). The sample represents 39 countries (Appendix 1) and includes countries with a sample of greater than ten observations (Shirokova *et al.*, 2021). The average age of the companies is 11 years (DS = 12), 31% are companies in the Advertising / Design / Marketing and Trade (wholesale/retail) sectors, and 54% have from 0 to 2 employees.

3.2. Variables

A. Dependent variable

Company performance was measured using the Dess and Robinson (1984) and Eddleston *et al.* (2008) scales used by

GUESSS. The latter measures firm performance through five items on a 7-point Likert scale (1 = much worse, 7 = much better), where the variable is measured based on the venture's performance compared to its competitors concerning sales, market share, profits, job creation, and innovation.

It is essential to note that, as highlighted by Camisón and Villar-López (2014), supported by other authors (Dess & Robinson, 1984; Homburg *et al.*, 1999; Venkatraman & Ramanujan, 1987), the existing literature advocates for the utilization of diverse performance metrics, primarily distinguished by their objective or subjective nature. While it is often assumed that objective measurements possess superior validity compared to subjective ones, previous studies consistently demonstrate in the literature a strong correlation and concurrent validity between both types of measurements.

Additionally, the validity of employing this scale stems from its attributes. For instance, Dijkhuizen *et al.* (2018) forecasted personal success perceptions, highlighting the validity of assessing performance through personal perceptions in companies. This notion is further supported by Wach *et al.* (2020), who argue that entrepreneurs' success ought to be gauged via personal perceptions, as they value subjective indicators like personal fulfillment and community impact, not solely financial performance. This comprehensive approach enhances the comprehension of overall performance, extending beyond traditional company growth metrics, as discussed by Kiyabo and Isaga (2020).

B. Independent variables

The independent variable subjective vitality (vigor) is measured with Bostic *et al.* (2000) scale, also used in Hahn *et al.* (2012) as used by the GUESSS study, through six items on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree), associated with expressions of vitality, for example, *I feel alive and vital, and I nearly always feel awake and alert.*

As in the GUESSS study, Dawson *et al.* (2014) scale was used to measure affective commitment through three items on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree), with expressions associated with the level of significance of the business for the entrepreneur such as, *I feel like if my business's problems are my own, and My business has great personal meaning for me.*

C. Moderating variables

In this study, we included well-established scales used in GUESSS that have also been used in prior research. First, we utilized the scale introduced by Franke and Lüthje (2004), further adapted by Geißler (2013). This scale evaluates the university environment using three items measured on a 7-point Likert scale (ranging from 1 = not at all to 7 = very much). These items encapsulate expressions closely tied to the university environment and its conductive conditions for fostering entrepreneurship.

Second, to capture the social environment variable, we used the scale developed by Liñán and Chen (2009), following the methodology of the GUESSS study. This variable assesses individuals' perceptions of how their close family, friends, and fellow students would react if they were to pursue a career as an entrepreneur. Respondents provided their responses on a 7-point Likert scale, ranging from 1 (very negatively) to 7 (very positively).

D. Control

As control measures, we consider the age of the student (Gimenez-Jimenez *et al.*, 2020; Hahn, 2020; Laskovaia *et al.*, 2017; Liñán & Chen, 2009; Maresch *et al.*, 2016; Silva *et al.*, 2021) the sector of activity (Laskovaia *et al.*, 2017) and the type of career (Criaco *et al.*, 2017). These variables have been widely used in the literature and will contribute to outlining the profile of active female entrepreneurship. These control variables are chosen based on the substantial relationships between the independent and dependent variables, as discussed in the entrepreneurship literature. Specifically, the literature has highlighted the importance and influence of age (Prasad *et al.*, 2015), the choice of university major (Mahmood *et al.*, 2021; Wadhwa *et al.*, 2008), and the sector in which the entrepreneurial activity takes place (Kosa *et al.*, 2018; McDougall *et al.*, 1994) on the performance of entrepreneurship.

E. Data processing

Before exploring our hypotheses, we followed a rigorous methodological approach to ensure the reliability and validity of the scales and constructs used in our study. First, we carried out a confirmatory factor analysis (Hair *et al.* 2019) to evaluate the internal consistency of our measurements and to identify the convergence of variables in different countries, following previous practices (Lafuente *et al.*, 2010). It is worth mentioning that the analysis was carried out through the STATA Statistical package software, version 17, following the process suggested by Acock (2013). All model variables are reliable and acceptable.

In the second phase, we calculated the intraclass correlation coefficient (ICC), a key metric to determine the proportion of total variability of the dependent variable attributed to variability between groups (in this case, countries). The resulting coefficient was calculated at 0.13, exceeding the commonly accepted threshold of 0.15 (Hox, 2010). This observation suggests that there is adequate variability between groups to justify the implementation of a multilevel model. In this case the ICC level is close to 0.15, within the moderate rating range.

Subsequently, we applied a multilevel analysis following the methodology that Acock (2014) and Rabe-Hesketh and Skrondal (2012) proposed. This approach has been used in related research (Shirokova *et al.*, 2021; Wales *et al.*, 2021). Given the number of interaction terms in our model estimates, we prioritized consideration of the independent variables before calculating the product terms.

Active entrepreneur students are nested within countries; thus, the proposed hierarchical multilevel regression model (estimated via OLS) had the following notation (Snijders & Bosker, 1999):

$$Y_{ij} = \beta_{oj} + \beta_{kij}{}^{*}X_{kij} + \beta_{5ij}{}^{*}(X_{1ij}{}^{*}X_{2ij}) + \beta_{6ij}{}^{*}(X_{1ij}{}^{*}X_{3ij}{}^{*}X_{4ij}) + \\ + \beta_{7ij}{}^{*}(X_{2ij}{}^{*}X_{3ij}{}^{*}X_{4ij}) + \beta_{mij}{}^{*}C_{mij} + eij; \quad (1)$$

where i = 1, …., Nj; j = 1, …, J; k = 1, 2, 3, 4; m = 8, 9, 10

In equation (1), β_{oj} is the intercept for the dependent variable in group j (country's subscript j = 1, ..., J), βkj represents the regression coefficient estimated for the k-th predictor variable, Xkij denotes the k-th predictor variable (X_1 = Vigor, X_2 = Affective Commitment, X_3 = University Environment, and X_4 = Social Environment), β_{5ij} indicates the regression coefficient for the two-way interaction among predictors X_1 and X_2; β_{6ij} designates the regression coefficient for the triple-way interaction among predictors X_3, X_1 and X_2; β_{7ij} denotes the regression coefficient for the triple-way interaction among predictors X_4, X_1 and X_2; β_{mij} designates the regression coefficient for m-th control variable, eij is the residual error term estimated for each sampled individual in j-th country, and assumed to have a mean of 0 and a variance to be estimated; and Y_{oj} represents firm´s performance for the i-th active entrepreneur student in his/her j-th country (the subscript i is used for individual active entrepreneur students in each j-th country; j = 1, ..., 39).

The β_{oj} and β_{kj} change if the intercept and the regression coefficients vary across countries.

$$\beta_{oj} = \Upsilon_{oo} + \mu_{oj} \text{ (level 2 equation)} \quad (2)$$

$$\beta_{kj} = \Upsilon_{ko} + \Upsilon_{6o} + \Upsilon_{7o} + \Upsilon_{mo} + \mu_{kj} \text{ (level 2 equation)} \quad (3)$$

Regarding equation (2), Υ_{oo} represents the overall intercept, that is, the grand mean of the dependent variable scores across all groups when all predictors equal 0, and μ_{oj} denotes the random error component for the deviation of the intercept of a group from the overall intercept. On the other hand, in equation (3), Υ_{ko}, Υ_{6o}, Υ_{7o}, Υ_{mo} represents the overall regression coefficient for the relationship between a k-th, 6, 7, and m-th level 1 predictor and the dependent variable, and μ_{kj} is the error component for the slope, which is the deviation of the group slope from the overall slope.

We generated four models to evaluate our hypotheses. Model 1 examines the effects of the control variables on the dependent variable. Model 2 adds the independent variables to the previous model. Model 3 incorporates a two-way interaction; finally, Model 4 adds the effects of the three-way interactions. The results of these models will provide crucial information to support or refute our hypotheses.

4. RESULTS AND DISCUSSION

4.1. Correlation between Variables and Results of Multilevel Analysis

Table 1 presents the correlations between the variables studied, showing low and moderate correlations. The results derived from the multilevel analysis and their corresponding models are detailed in Table 2. This comprehensive analysis provides a deeper understanding of the relationships between the variables and their implications in the context of our study.

Regarding the control variables, throughout the models, it is possible to observe that the age variable is positively associated with the performance of female entrepreneurship ($\beta 1$ = 0.007, $p < 0.01$), while the choice of career and sector did not prove to be determining variables.

The subsequent Model 2 explored the positive relationship between vigor, affective commitment, and business performance. Both factors positively impact company performance ($\beta 4$ = 0.311, $p < 0.01$ and $\beta 5$ = 0.151, $p < 0.01$). This positive association persists throughout subsequent models.

4.2. Exploring Interactions in Successive Models

In Model 3, interaction terms were introduced between vigor, affective commitment, and business performance. The results revealed that the interaction between vigor and affective commitment is positively related to the performance of companies led by female university entrepreneurs ($\beta 6$ = 0.49; $p < 0.01$), supporting hypothesis *H1*.

To facilitate the understanding of the interaction effect, we have generated Figure 2. According to Figure 2, the double interaction reveals a significant pattern. Those entrepreneurs with a high level of vigor present a notably higher performance, which supports a direct and statistically solid relationship between this cognitive variable and performance. In contrast, this relationship is practically nonexistent in those entrepreneurs with a low level of vigor. Therefore, this result supports *H1*, which postulates that the interaction between vigor and affective commitment is positively correlated to performance in active entrepreneurship of female university students.

Model 4 expanded the exploration to interaction terms by incorporating the university and social environment as moderators.

In the case of the university environment, the results indicated that this interaction is positive concerning the joint impact of vigor and affective commitment on the performance of companies created by university women entrepreneurs ($\beta 7$ = 0.038). This finding means that the university environment effectively moderates the relationship between the cognitive variables under study and performance. This effect is intensified in students who experience more significant support from this environment, while it is attenuated when the university environment does not exert this moderation. Therefore, the analysis provides empirical support for hypothesis *H2*. Figure 3 facilitates the understanding of the interaction effect.

Similarly, we found a positive moderation of the social environment between vigor and affective commitment and the performance of these companies ($\beta 8$ = 0.015; $p < 0.1$). That is, when considering the effect of the three-way interaction between vigor, affective commitment, and the social environment with performance, the moderation exerted by the social environment stands out. The above allows us to confirm hypothesis *H3*. To facilitate the understanding of the interaction effect, we have generated Figure 4. According to Figure 4, performance is higher when the moderation of the social environment is high compared to when it is low, but only when both the level of vigor and emotional commitment are high. Therefore, this result supports that the social environment positively influences performance, but only when combined with significant levels of vigor and affective commitment.

Table 1
Descriptive Statistics and Correlations between variables, N = 6779

Variable	Obs	Mean	Std. Dev.	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Age	6779	1991.940	7.924	1959	2002	1.000							
(2) Degree	6779	5.014	3.175	1	12	−0.044***	1.000						
(3) Sector	6779	7.720	4.373	1	13	0.001*	0.012*	1.000					
(4) Vigor	6779	0	1	−3.529	1.232	−0019*	−0.084***	−0.076***	1.000				
(5) Affective Commitment	6779	0	1	−3.504	1.108	−0.072***	−0.084***	−0.063***	0.491***	1.000			
(6) University environment	6779	0	.999	−2.221	1.220	0.047***	−0.125***	−0.118***	0.388***	0.269***	1.000		
(7) Social environment	6779	.001	1	−4.236	1.002	0.003*	−0.021*	0.059***	0.309***	0.235***	0.279***	1.000	
(8) Performance	6779	−.001	1.001	−2.710	1.382	0.086***	−0.097***	−0.072***	0.442***	0.346***	0.319***	0.205***	1.000

Note: Results of descriptive data and correlations of the variables. The variables show low and moderate associations. They are statistically significant. Significance level *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Source: Research data; generated using STATA.

Table 2
Results of multilevel analysis, N = 6779

	Model 1	Model 2	Model 3	Model 4
Control Variables				
Age	.001	.007***	.007***	.007***
Degree	−.011***	−.004	−.004	−.004
Sector	.002	.003	.003	.003
Independent Variables				
Vigor		.311***	.339***	.327***
Affective Commitment		.151***	.159***	.142***
Double interactions				
c.Vigor#c. Affective Commitment			.049***	.068***
c. University environment#c.Vigor			.036*	.044**
c. University environment#c. Affective Commitment			−.012	0
c. Social environment#c.Vigor			.016	.022*
c. Social environment#c. Affective Commitment			−.017	-.005
Triple interactions				
c. University environment#c.Vigor#c. Affective Commitment				.038
c. Social environment#c.Vigor#c. Affective Commitment				.015*
Log likelihood	−9106.8395	−8476.0833	−8450.4489	−8428.9665
Wald test (Chi-square)	13.64	212.80	299.44	856.86
Number of obs	6753	6753	6753	6753
Number of countries	39	39	39	39

Note: This table shows the multilevel analysis results and their corresponding models. Level of significance: *** p<0.01, ** p<0.05, * p<0.1

Source: Own analysis based on data run in STATA.

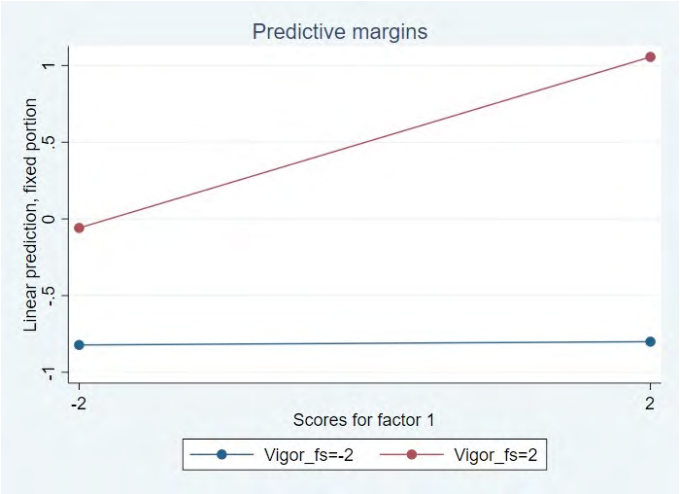

Figure 2
Effect of the double interaction between Vigor and Affective Commitment with Performance

Note: This figure shows the effect of the two-way interaction between Vigor and Affective with performance.

Source: Research data; generated using STATA.

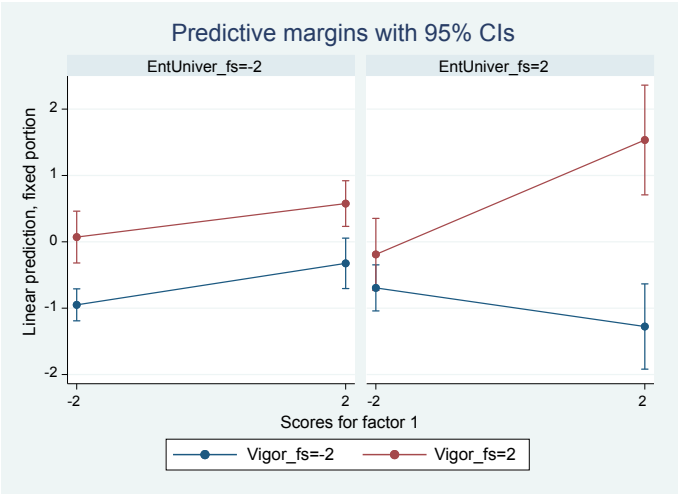

Figure 3
Effect of the triple interaction of the independent variables with the dependent variable when moderated by the university environment

Note: This figure shows the effect of the three-way interaction of the independent variables with the dependent variable when moderated by the university environment.

Source: Research data; generated using STATA.

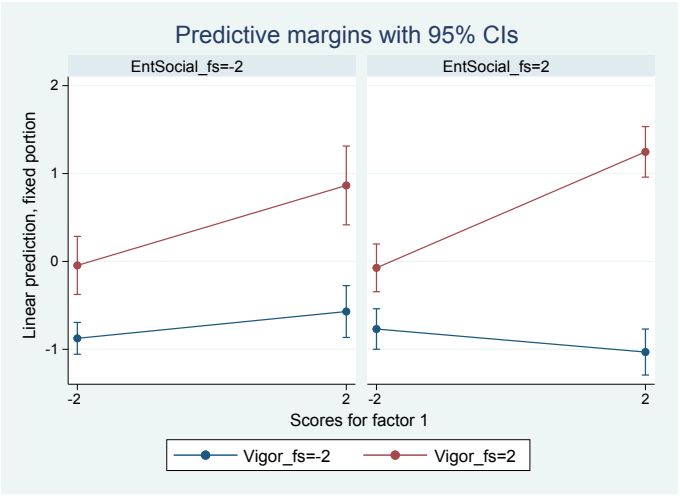

Figure 4
Effect of the triple interaction of the independent variables with the dependent variable when it moderates the social environment

Note: This figure shows the effect of the three-way interaction of the independent variables with the dependent variable when moderated by the social environment.

Source: Own analysis based on data run in STATA.

Our findings contribute to a deeper understanding of the link between cognitive and contextual factors and the performance of university female entrepreneurship. First, we contribute to the existing body of knowledge by highlighting the importance of the interaction of management styles, specifically vigor and affective commitment, as critical factors in entrepreneurial success. This interaction positively impacts business performance, a relationship that had already been hinted at in previous research unrelated to entrepreneurship (Hemsworth *et al.*, 2020; Kundi *et al.*, 2021). We must emphasize that the literature has shown how combining these variables contributes to understanding the psychological and emotional factors that drive business performance (Budiningsih *et al.* 2018; Tasnim *et al.*, 2014).

Secondly, regarding the influence of contextual factors, we have added to the existing literature by identifying the university environment as a variable that can enhance the knowledge and skills of students in favor of entrepreneurship and their performance (Orobia *et al.*, 2020; Robinson & Sexton, 1994). Likewise, the university environment can encourage entrepreneurship and impact its performance (Bergmann *et al.*, 2016; Holienka *et al.*, 2017) and has been positively valued by women (Díaz Bretones & Radrigán, 2018; Wilson *et al.*, 2007).

The moderation of the social environment in the effect of the interaction between vigor and affective commitment, positively related to the performance of companies created by female university entrepreneurs, is significant and greater than the moderation of the university environment. This finding highlights the importance of this environment as it can have a significant impact on female entrepreneurship, as mentioned by Păunescu *et al.* (2018), in the case of women, this environment allows them to face the challenges towards the best performance of their entrepreneurship.

This underlines the need to continue promoting the participation of this environment in the academic sphere, especially in promoting relationships with family, friends, and university colleagues, as suggested in previous studies, such as Liñán and Chen (2009) who have stated that entrepreneurship is conditioned and favored by the social environment; since its influence makes it carried out in a better way. These findings support the notion that the performance of female entrepreneurs is positively affected when they have a favorable social environment, as has been observed in previous research (Liñán & Chen, 2009; Roos, 2019; Stephan *et al.*, 2020).

5. CONCLUSIONS

This study aimed to analyze AEWUS's performance from the perspective of cognitive variables such as vigor and affective commitment and contextual variables such as the social and university environment. To address the above, we conducted a multilevel regression analysis. The results revealed significant findings that contributed to our understanding of entrepreneurship in this demographic group.

The study's findings show a significant influence of the cognitive factors under study (vigor and affective commitment) on the performance of female university entrepreneurship. This result is consistent with what previous literature has emphasized: this interaction improves business performance (Budiningsih *et al.*, 2018; Hemsworth *et al.*, 2020; Kundi *et al.*, 2021; Tasnim *et al.*, 2014).

This influence remains significant when these cognitive variables interact with each other. Furthermore, the results indicate that when the university environment moderates this relationship, entrepreneurship performance is better, as is the case of the social environment; this has a more significant impact on the relationship between the interaction of vigor and affective commitment and the business performance of women's businesses, conclusion that is reinforced by previous studies (Stephan *et al.*, 2020).

Our findings significantly support the need to promote the link between cognitive and contextual factors and the performance of university female entrepreneurship. This finding demonstrates the need to care for and promote cognitive and contextual links that would translate into more favorable results for business performance, conclusion that preceded by what was suggested in Hemsworth *et al.* (2020).

The results of this study have important theoretical implications that can enrich the understanding of the relationships between the variables studied and contribute to the existing body of knowledge. First, the results support the importance of vigor, which includes energy and enthusiasm, as essential for entrepreneurial success, coincident with Shir *et al.* (2019), driving motivation and performance in entrepreneurship. The same is true for affective commitment, as the entrepreneurs reflect a deep personal connection to the business, a passion for solving problems, and a lasting meaning in their careers, lined with Dawson *et al.* (2014). This result strengthens the theory of entrepreneurial behavior by highlighting the relevance of psychological and emotional aspects in the entrepreneurial process of university women.

As a second theoretical implication, the theories related to female entrepreneurship are enriched when considering the importance of individual factors in women's business success. Finally, confirming the interactions between vigor, affective commitment, and the university and social environment suggests the need for a more elaborate theory on interactions in the business context.

This study also has several practical implications for universities. Firstly, in terms of public policy, guide support for female entrepreneurship from the social environment can be proposed to understand and promote initiatives that strengthen this environment. Specific actions can be considered, such as support for university students through support programs that include the accompaniment of mentors, institutional actions, specific support policies for networks, financial support, and capacity building.

Secondly, it is relevant for the social actors in the university ecosystem to promote support and accompaniment to current entrepreneurs' actions. Links between graduates who have been successful in entrepreneurship and support networks fostered and organized from within the university can create the exchange of experiences, support between ventures, and support networks, among others.

Specifically, it is suggested that both the university and social environments consider enhancements to better support female entrepreneurship. These include: providing opportunities for experiential learning such as internships and research projects focusing on entrepreneurship, establishing support networks among students, faculty, and entrepreneurs to foster the exchange of experiences and knowledge, hosting networking events for student entrepreneurs to connect with business owners, investors, and industry experts, promoting the formation of support networks to bolster student entrepreneurs' projects, facilitating connections between students and the local business community to receive feedback on their projects and access collaboration opportunities, among other initiatives.

As a limitation, this study focuses only on two cognitive and two contextual factors; future studies could emphasize other contextual factors, such as governmental and cultural ties. Additionally, it is advisable to study the links in depth through case studies to delve deeper into the elements that influence each link and the recommendations that can emerge from experienced active entrepreneurs. Moreover, a longitudinal approach could allow for a more detailed analysis of how these relationships evolve as entrepreneurs advance in their trajectories. Finally, a potential avenue for future research is to explore how cultural factors, varying by country or geographic region, affect the interplay between cognitive and contextual variables and the business performance of university students, particularly in the realm of female entrepreneurship. Such investigation would enable us to pinpoint and analyze disparities and parallels in each country's cultural, economic, and educational contexts and their implications for the entrepreneurial success of university women.

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APPENDIX

Table A.1
Detail of the study sub-sample taken from GUESSS 2018

Country	Sample	Total Answer Percentage
Albania	20	0,30%
Argentina	238	3,51%
Austria	30	0,44%
Chile	346	5,10%
China	1440	21,24%
Colombia	772	11,39%
Costa Rica	292	4,31%
Czechia	38	0,56%
Ecuador	188	2,77%
England	49	0,72%
El Salvador	11	0,16%
Estonia	85	1,25%
France	101	1,49%
Germany	32	0,47%
Greece	193	2,85%
Hungary	142	2,09%
Indonesia	17	0,25%
Ireland	123	1,81%
Japan	74	1,09%
Jordan	99	1,46%
Korea	17	0,25%
Liechtenstein	43	0,63%
Lithuania	228	3,36%
RepNorthMaced	59	0,87%
Mexico	33	0,49%
New Zealand	153	2,26%
Pakistan	10	0,15%
Panama	50	0,74%
Peru	15	0,22%
Poland	78	1,15%
Portugal	87	1,28%
Saudi Arabia	99	1,46%
Slovakia	161	2,37%
Slovenia	550	8,11%
South Africa	67	0,99%
Switzerland	16	0,24%
Turkey	19	0,28%
Ukraine	13	0,19%
Total	6779	100,00%

Note: Sample distribution by country; it shows the number answers, the answer percentage value.

Source: Based on Sieger *et al.* (2018).