



The Importance of Transversal Competencies in University Education: Self-efficacy for Entrepreneurial Leadership in Health Sciences


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ENG Abstract: Introduction: The mastery of transversal competencies in university education has become increasingly relevant within the framework of the European Higher Education Area (EHEA). In the field of Health Sciences, attention has been predominantly directed towards the development of specific competencies, while transversal competencies have been underestimated, despite their critical importance in the comprehensive training of professionals. This study aims to analyze self-efficacy in entrepreneurial leadership among students of different degrees in Health Sciences, specifically in the degrees of Nursing, Physiotherapy and Physical Activity and Sport Sciences (CAFYD). **Method:** A quantitative study was conducted with a sample of 101 students enrolled in different Spanish universities during the academic year 2022-2023, whose ages ranged from 19 to 31 years (22.57 ± 1.80). For the measurement of self-efficacy, the Spanish adaptation of the Entrepreneurial Competence Scale in Higher Education (ECHE) was used. **Results:** The results indicate that students of the Bachelor's Degree in Physical Activity and Sport Sciences report a significantly higher perception of self-efficacy in entrepreneurial leadership compared to their peers in Physiotherapy and Nursing. **Discussion:** These findings highlight the urgent need to incorporate leadership training into the curricula of Physical Activity and Sport Science undergraduate programs.

Keywords: Leadership; Health; Innovation; University; Competence.

ES La importancia de las competencias transversales en la educación universitaria: autoeficacia para el liderazgo emprendedor en Ciencias de la Salud

Resumen: Introducción: El dominio de competencias transversales en la formación universitaria ha adquirido una relevancia creciente en el marco del Espacio Europeo de Enseñanza Superior (EEES). En el ámbito de Ciencias de la Salud, la atención ha estado predominantemente dirigida hacia el desarrollo de competencias específicas, mientras que las competencias transversales han sido subestimadas, a pesar de su importancia crítica en la formación integral de los profesionales. Este estudio tiene como objetivo analizar la autoeficacia en liderazgo emprendedor entre los estudiantes de distintas titulaciones de Ciencias de la Salud, específicamente en los grados de Enfermería, Fisioterapia y Ciencias de la Actividad Física y del Deporte (CAFYD). **Método:** Se realizó un estudio cuantitativo con una muestra de 101 estudiantes matriculados en diferentes universidades españolas durante el curso académico 2022-2023, cuyas edades oscilan entre 19 y 31 años ($22,57 \pm 1,80$). Para la medición de la autoeficacia, se utilizó la adaptación española de la Escala de Competencias Emprendedoras en la Educación Superior (CESE). **Resultados:** Los resultados indican que los estudiantes del Grado en CAFYD reportan una percepción significativamente mayor de autoeficacia en liderazgo emprendedor en comparación con sus pares de Fisioterapia y Enfermería. **Discusión:** Estos hallazgos destacan la necesidad urgente de incorporar la formación en liderazgo dentro de los planes de estudio de los grados en Ciencias de la Salud, para fomentar la innovación, el espíritu empresarial y la colaboración interdisciplinaria, aspectos esenciales para la mejora de la salud pública en general.

Palabras claves: Liderazgo; Salud; Innovación; Universidad; Competencia.

Sumario: 1. Introduction. 2. Objectives. 3. Method. 3.1. Desing. 3.2. Participants. 4. Results. 5. Discussion. 5.1. Practical Implications. 6. Conclusions. 7. Limitations and Future Research. 8. Bibliographical References.

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1. Introduction

In recent decades, university education in Health Sciences has taken on a strategic role in preparing professionals capable of responding to the growing challenges of modern healthcare systems and the emerging demands of health systems (Gómez, 2023; Martínez et al., 2020).

With the implementation of the European Higher Education Area (EHEA), the development of cross-cutting skills, such as teamwork, effective communication and critical thinking, has become increasingly important (Gómez, 2023). These skills are essential for adapting to changing and complex work environments, complementing the specific technical training of each degree programme.

The mastery of transversal skills reflects a transition towards more comprehensive educational models, where adaptation to the demands of the labour market and the development of interpersonal, communication and problem-solving skills are essential for professional success (Del Valle et al., 2022).

In the field of Health Sciences, considerable effort has been made in recent years to identify the professional skills that must be acquired, ensuring that university education is aligned with the requirements of professional practice. This includes not only technical mastery, but also the ability to collaborate in multidisciplinary teams, leadership and innovation (Cejas et al., 2019; García-Rodríguez et al., 2018). These students are in a privileged position to identify emerging needs and problems in the field of healthcare, such as population ageing, digital transformation and the sustainability of health systems (Fernández-Luque et al., 2023).

In this context, according to Bandura's Social Cognitive Theory (1997), perceived self-efficacy is a fundamental determinant of human behaviour, influencing students' behaviour and motivation. In particular, entrepreneurial self-efficacy is one of the most consistent predictors of entrepreneurial intention and innovative behaviour in university contexts, influencing the willingness to take on leadership roles, coordinate teams and manage the uncertainty associated with innovative projects (Newman et al., 2018; West et al., 2015).

Likewise, gender can modulate the perception of self-efficacy (Zhao et al., 2005), although the differences are usually small and dependent on the educational context and training opportunities received (Ndofirepi, 2022; Shinnar et al., 2018). Therefore, understanding how entrepreneurial self-efficacy varies according to degree and gender is essential for designing educational strategies that promote equal opportunities and the comprehensive development of future health professionals (Pereyra et al., 2018).

A key component of entrepreneurship in the health sector is interdisciplinary collaboration, which requires the integration of knowledge from various areas and is essential for maximising collective competencies and generating more robust and innovative solutions (Pérez-Vallejo, 2023).

In this context, leadership tools such as strategic planning, conflict resolution and change management are key to ensuring efficient performance. These management techniques enable future healthcare professionals to effectively apply their strengths in clinical practice, thus contributing to leadership that promotes both team well-being and quality patient care (Ayuso-Murillo and Herrera-Peco, 2017; Fayolle & Gailly, 2015).

Fluency in the use of these skills will be decisive in improving healthcare services and ensuring quality care that responds to the needs of today's society, characterised by increasing organisational complexity, digital transformation and the need to optimise efficiency and quality of care. In this context, effective leadership is associated with the ability to lead multidisciplinary teams, promote continuous improvement processes and create organisational environments geared towards innovation (Fernández-Luque et al., 2021).

Likewise, several studies have pointed out that, despite having highly qualified professionals from a technical point of view, healthcare systems sometimes face difficulties related to motivation, professional commitment and organisational change management, factors that directly influence the implementation of improvements in clinical practice and healthcare management (Amaiquema et al., 2021; Barbado-Solorzano and Martínez-Moreno, 2022). In this regard, the development of leadership skills during university training can help strengthen the ability of future professionals to drive innovation and adaptation processes in their work environments.

Despite its relevance, research in health degrees has traditionally prioritised clinical and technical skills, relegating the systematic analysis of cross-cutting skills linked to leadership and entrepreneurship. In particular, there is a shortage of studies that comparatively analyse self-efficacy for entrepreneurial leadership among different degrees in the health field, especially in the Spanish university context. This lack of evidence limits our understanding of how the specific educational context of each discipline can influence the development of entrepreneurial and leadership skills in future healthcare professionals (Blanco-Mesa et al., 2023; Marulanda-Valencia and Valencia-Arias, 2019).

In this context, it is pertinent to analyse how self-efficacy for entrepreneurial leadership is configured in students from different Health Sciences degree programmes and whether there are gender-related differences. Addressing this issue allows for a deeper understanding of the role played by the educational context

in the development of entrepreneurial skills within the healthcare field. Likewise, this study contributes to expanding the existing empirical evidence by offering a comparative analysis between Health Sciences degrees in the Spanish university context, providing relevant information for the design of educational strategies aimed at strengthening leadership and innovation in healthcare training.

2. Objectives

Based on the above background, the main objective of this study is to analyse the perceived self-efficacy for entrepreneurial leadership in students from different degree programmes related to Health Sciences.

Specifically, the following objectives are proposed:

1. To examine possible differences in self-efficacy in entrepreneurial leadership depending on the degree programme (Nursing, Physiotherapy and Physical Activity and Sports Sciences-PASS).
2. To analyse the existence of differences based on gender in the different dimensions of the ECHE scale.

The analysis of these variables will allow us to understand the extent to which the educational context and gender can influence the development of entrepreneurial skills in the health field.

3. Method

3.1. Desing

A quantitative, non-experimental, cross-sectional, comparative study was conducted based on an ex post facto natural group design (Ato et al., 2013). The study analysed differences in self-efficacy for entrepreneurial leadership based on the university degree studied and the gender of the participants.

3.2. Participants

The sample for this study consisted of 101 students (60 female and 41 male) enrolled in different degrees related to Health Sciences at various Spanish universities during the 2022-2023 academic year. The ages of the participants ranged from 19 to 31 years, with a mean age of 22.57 years (± 1.80). Non-probability convenience sampling was used, selecting participants based on their accessibility and availability (Table 1).

Table 1. Degrees/Subjects of study

Degrees	Gender	Subject	Course	Quarter	Area of Knowledge	Academic Year	University
Nursing N= 44 (43,5%)	M= 11	Nursing Administration and Management	4°	1°	Nursing	2022-2023	Pontifical University of Salamanca
	W= 33						
Physiotherapy N= 34 (33,6%)	M= 16	Public Health and Healthcare Administration	3°	1°	Preventive Medicine and Public Health	2022-2023	University of Salamanca
	W= 18						
PASS N= 23 (22,7%)	M= 14	Sports Companies	3°	1°	Physical Education and Sports	2022-2023	University of Valladolid
	W= 9						
TOTAL N= 101	M= 41						
	W= 60						

Note: Own elaboration.

3.3. Instruments

The Spanish adaptation of the Entrepreneurial Competence Scale in Higher Education (ECHE), developed by Moriano et al. (2012), was used. It consists of 26 items based on the work of Ehrlich et al. (2005). Participants responded to each item using a 7-point Likert scale, where 1 represents 'not at all effective' and 7 represents 'completely effective'.

The scale assesses eight dimensions (Table 2):

- **Create and lead the team (BLT)**: 3 items (e.g., 'Establish a collaborative and team-oriented approach to carry out a new project').
- **Create an innovative environment (BIE)**: 3 items (e.g., 'Create a work environment where your team members feel free to express creative ideas').
- **Facing unexpected challenges (FUCH)**: 3 items (e.g., 'Be flexible in the face of internal and external changes in the environment').

- **Developing autonomous strategic behaviour (DASB):** 5 items (e.g., ‘Sell the idea to multiple levels of management’).
- **Defining key objectives (DOP):** 3 items (e.g., ‘Develop a vision that inspires others to support a new business project’).
- **Developing products and market opportunities (DPOM):** 6 items (e.g., ‘Create products that meet unmet consumer needs’).
- **Launch products or services (LPS):** 6 items (e.g., ‘Conduct periodic reviews to evaluate product performance and make modifications if necessary’).
- **Lead others (LO):** 6 items (e.g., ‘Generate a perception of success in the early stages of a project’).

To assess the reliability of the instrument, Cronbach’s alpha coefficient was used, whose psychometric properties showed acceptable levels of overall reliability ($\alpha = .883$). In addition, each dimension presented reliability coefficients ranging from .842 to .876, indicating adequate internal consistency. These results reflect that the scale is a valid and reliable instrument for measuring self-efficacy in entrepreneurial leadership in the context of higher education in Health Sciences.

Table 2. ECHE scale dimensions

BLT $\alpha=.865$, 3 ítems	BIE $\alpha=.868$, 3 ítems	FUCH $\alpha=.876$, 3 ítems
1. Build and lead the team. This refers to the importance of establishing a team within the organisation that could include members who are sceptical about the project idea. In addition, it is essential that senior and middle managers are collaborative and able to keep team members focused on the project even though they may have other responsibilities within the organisation.	2. Building an innovative environment. This factor focuses on the ability of managers and middle managers to stimulate creativity, initiative and responsibility in the people who work with them (De Noble et al., 1999; Ehrlich et al., 2005).	3. Facing unexpected challenges. This refers to the belief in the ability to work under uncertainty. Developing and managing new innovative projects, leaving behind the comfort of working according to standardised procedures and tasks, requires managers and middle managers to be able to tolerate ambiguity and adapt to change.
DASB $\alpha=.842$, 5 ítems	DOP $\alpha=.867$, 3 ítems	DPOM -LPS $\alpha=.876$, 6 ítems
4. Develop autonomous strategic behaviour. This factor focuses on the political awareness and skills of executives and middle managers to build coalitions and obtain the necessary resources to develop new innovative projects within the organisation (Hisrich, 1990).	5. Define the main objectives. Senior and middle managers must create a vision for the new project that unites the members of the organisation around a common goal and inspires them to achieve it (Baum et al., 1998). However, it is still the workers who have to translate and realise the vision in order to bring the new project to fruition.	6. Developing products and market opportunities. The ability to create new products or services that meet unmet customer needs is relevant to both entrepreneurs and intrapreneurs. In fact, recognising opportunities is a key dimension highlighted by various authors in research on entrepreneurial self-efficacy (Chen et al., 1998; Krueger & Dickson, 1994).
	LQ $\alpha=.867$, 6 ítems	
	8. Leading others. This factor encompasses classic leadership skills relevant to facilitating teamwork, motivating others, cultivating relationships, and recognising achievements (Ehrlich et al., 2005).	7. To launch products or services. Launching products or services. This factor focuses on the different skills required to market new products or services, such as establishing distribution channels or calculating potential revenues.

Note: Own elaboration.

3.4. Procedure

The research was approved by the Ethics Committee of the Pontifical University of Salamanca, thus complying with the standards established in the 1964 Declaration of Helsinki and the Belmont Report. The voluntary, anonymous, and confidential participation of the students was guaranteed, as they had previously signed an informed consent form before completing the questionnaire.

To ensure consistency in data collection, a specific protocol was implemented. The principal investigator contacted the various university centres in advance to explain the purpose of the study. Once approval had been obtained from the degree coordinators, the idiosyncrasies of the study were presented to them, which allowed the online questionnaire to be sent through them. In this way, the principal investigators did not send the questionnaire directly to potential participants.

Upon accessing the questionnaire, participants were provided with an informed consent form authorising their participation in the research. This consent form included detailed information on the purposes of the

study and the confidentiality of the processing and dissemination of the data obtained, in accordance with the ethical requirements established by the American Psychological Association (APA, 2020). Those subjects who agreed to participate spent between 10 and 12 minutes completing the questionnaire.

This approach ensures that research is conducted ethically and rigorously, protecting the rights of participants while seeking to obtain meaningful data for the study.

3.5. Data analysis

Statistical analyses were performed using IBM SPSS Statistics (version 28.0). The significance level was set at $p < .05$, and 95% confidence intervals were reported when relevant.

To examine differences based on level of study, a multivariate analysis of variance (MANOVA) was performed. The assumptions of independence, normality, and homogeneity of the covariance matrices were verified using Box's test. Given that Pillai's statistic is more robust to possible deviations from the assumptions, the multivariate effects were interpreted mainly based on Pillai's Trace statistic. When the overall effect was significant, post hoc comparisons were made using Dunnett's procedure, adjusting the error for multiple comparisons.

Differences according to gender were analysed using Student's t-test for independent samples, after checking the homogeneity of variances using Levene's test. In case of non-compliance with this assumption, Welch's correction was applied.

The effect size was estimated using partial eta squared (η_p^2) in multivariate analyses and Cohen's d in bivariate comparisons. The magnitude of the effects was interpreted according to conventional criteria (small, moderate, and large), complementing the interpretation based exclusively on statistical significance.

4. Results

Study 1. Assessment of Self-Efficacy for Entrepreneurial Leadership according to the Degree study

First, the normality of the data was analysed. Given that the sample exceeds 50 subjects ($N=101$), Kolmogorov Smirnov data was used as a reference, determining that the assumptions of normality were not met.

It can be concluded that there is no univariate normality in all variables, so we cannot speak of multivariate normality either. However, given the sample size of the subgroups, we can trust in the robustness of this technique in the face of the violation of this assumption.

Regarding the assumption of homogeneity of covariance matrices, Box's test was not statistically significant ($M = 76.234$; $p = .175$). Therefore, the assumption of homogeneity of covariances at the multivariate level is not rejected, allowing for the application of multivariate analysis.

Table 3 presents the variables in which significant differences were detected between the groups and those in which no differences were observed. Statistically significant differences were found in all variables related to ECHE, except for Creating an Innovative Environment (BIE), $F(2) = 1.784$, $p = .174$. For this variable, the effect size was small ($\eta_p^2 = .040$) and the observed power relatively low (3.57). Overall, ECHE showed a small to moderate effect on the other variables, being most notable in Developing advanced entrepreneurial competencies (DASB), $\eta_p^2 = .142$.

Table 3. Tests of Between-Subjects Effects by Population Group

ECHE Variables	f_i	p	η_p^2	df	Post-hoc power
BLT	4.120	.020	.088	2	8.240
BIE	1.784	.174	.040	2	3.569
FUCH	4.831	.010	.102	2	9.661
DASB	7.032	.001	.142	2	14.065
DMO	3.292	.042	.072	2	6.583
DPMO-LPS	3.782	.027	.082	2	7.563
LO	5.475	.006	.114	2	10.949

Note. Own elaboration. **BLT**= Build and lead the team. **BIE**= Building an innovative environment. **FUCH**= Facing unexpected challenges. **DASB**= Develop autonomous strategic behaviour. **DMO**= Define the main objectives. **DPMO-LPS**= Developing products and market opportunities- To launch products or services. = Leading others. f_i = Absolute frequency. p = Significance. = Partial eta squared. df = Degrees of freedom.

Furthermore, Table 4 presents the post hoc comparisons between groups using Dunnett's C test, with the aim of identifying specific differences between degree programs across the various dimensions of the Entrepreneurial Leadership Self-Efficacy (ECHE) scale.

Participants in the PASS student group reported significantly higher scores in Building and Leading Teams (BLT) compared to Physiotherapy students (PASS-Physiotherapy = -2.06, SE = .648, 95% CI [-3.34, -.780]). Regarding the dimension of Facing Unexpected Challenges (FUCH), PASS students showed statistically significant differences relative to the other two groups (PASS-Nursing = -1.72, SE = .577, 95% CI [-3.17, -.273]; PASS-Physiotherapy = -2.00, SE = .641, 95% CI [0.68, 1.90]). Moreover, PASS students demonstrated significantly higher Autonomous Strategic Behavior (DASB) compared to both groups (PASS-Nursing = -2.64, ES = .877, 95% CI [-4.84, -.449]; PASS-Physiotherapy = -4.11, ES = .985, 95% CI [-6.58, -1.64]).

Additionally, dimensions such as Defining Main Objectives (DMO) (PASS-Physiotherapy = -1.74, ES = .664, 95% CI [-3.04, -.440]), Developing and Launching New Products or Services (DPMO-LPS) (PASS-Physiotherapy = -3.87, SE = 1.44, 95% CI [-7.53, -2.47]), and Leading Others (LO) (PASS-Physiotherapy = -2.46, ES = .688, 95% CI [-4.19, -.730]) showed significantly higher scores for PASS students in comparison to Physiotherapy students.

Overall, the observed differences reveal a consistent pattern in which PASS students exhibit higher levels of self-efficacy in strategic and leadership dimensions, suggesting a potential influence of the specific educational context of this degree program.

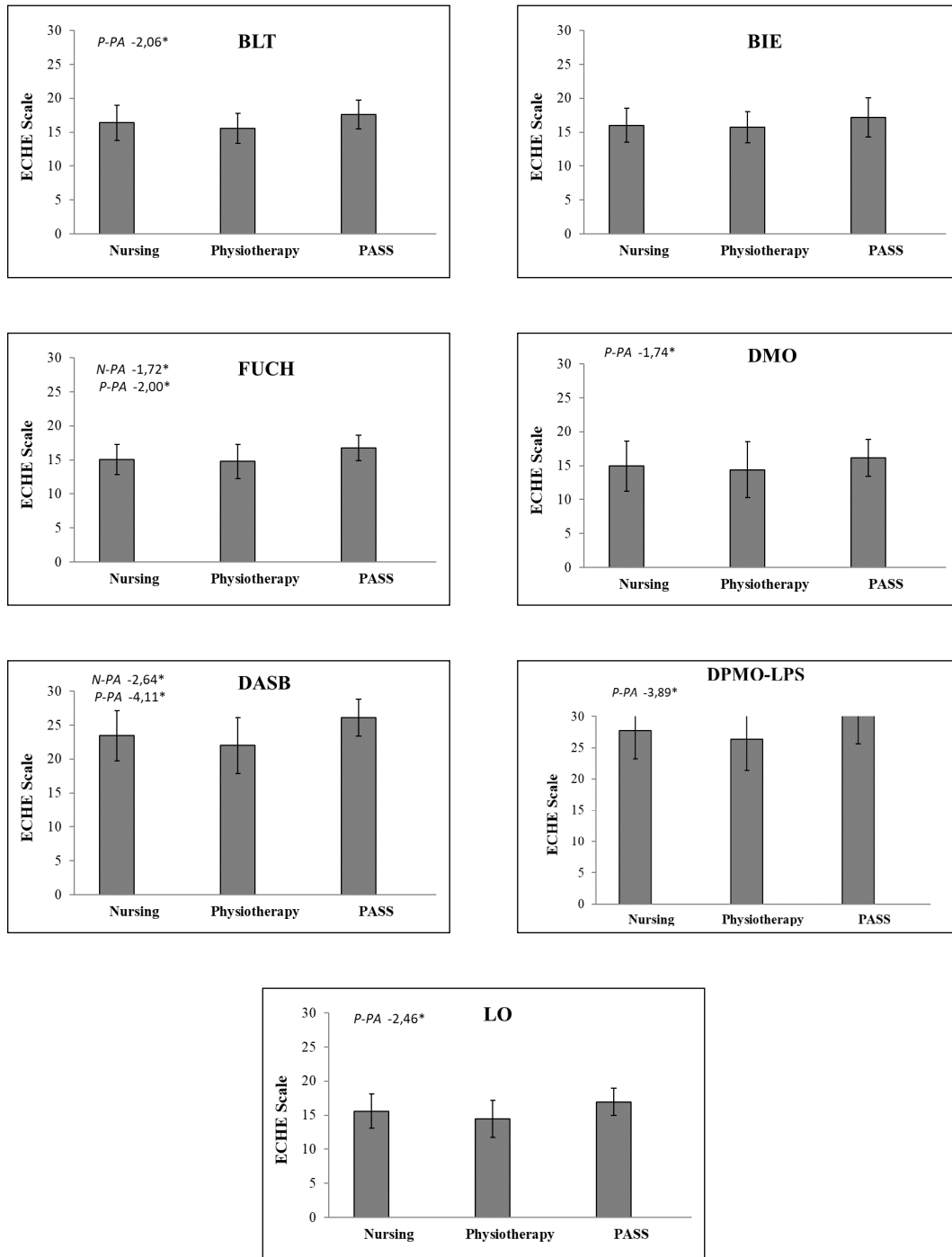
Table 4. Multiple comparisons

Variable	(I) Population group	(J) Population group	Mean Difference (I-J)	SE	CI (95%)	
					Lower Bound	Upper Bound
BLT	Nursing	Physiotherapy	.836	.585	-5.99	2.27
		PASS	-1.22	.668	-2.90	.453
	Physiotherapy	PASS	-2.06*	.648	-3.34	-.780
BIE	Nursing	Physiotherapy	.251	.591	-1.19	1.70
		PASS	-1.14	.798	-3.16	.811
	Physiotherapy	PASS	-1.39	.810	-3.44	.663
FUCH	Nursing	Physiotherapy	.277	.576	-1.13	1.69
		PASS	-1.72*	.577	-3.17	-.273
	Physiotherapy	PASS	-2.00*	.641	-3.61	-.388
DASB	Nursing	Physiotherapy	1.46	.951	-.873	3.79
		PASS	-2.64*	.877	-4.84	-.449
	Physiotherapy	PASS	-4.11*	.985	-6.58	-1.64
DMO	Nursing	Physiotherapy	.555	.565	-.833	1.94
		PASS	-1.19	.626	-2.77	.386
	Physiotherapy	PASS	-1.74*	.664	-3.04	-.440
DPMO-LPS	Nursing	Physiotherapy	1.38	1.16	-1.47	4.24
		PASS	-2.50	1.33	-5.88	.867
	Physiotherapy	PASS	-3.89*	1.44	-7.53	-.247
LO	Nursing	Physiotherapy	1.10	.636	-0.62	.720
		PASS	-1.35	.637	-1.47	-.170
	Physiotherapy	PASS	-2.46*	.688	-4.19	-.727

Note. Dunnett's C test was used. * Significant differences; **SE**, Standard error; **CI**, Confidence interval; **BLT**= Build and lead the team. **BIE**= Building an innovative environment. **FUCH**= Facing unexpected challenges. **DASB**= Develop autonomous strategic behaviour. **DMO**= Define the main objectives. **DPMO-LPS**= Developing products and market opportunities- To launch products or services. = Leading others.

Furthermore, Figure 1 illustrates that all dimensions show higher values among PASS students compared to the other student groups (Nursing and Physiotherapy).

Figure 1. Entrepreneurial Leadership Self-Efficacy scores across population groups (PASS, Nursing, and Physiotherapy)



Study 2. Analysis of Entrepreneurial Leadership Self-Efficacy by Gender among Students in Health Science Degrees.

Independent samples t-tests were conducted to examine differences in Entrepreneurial Leadership Self-Efficacy dimensions between males and females (Table 5). The results showed minimal and non-significant differences. Mean scores were generally similar, with only slight trends observed: males scored slightly higher in FUCH, DASB, and DPMO-LPS, while females scored marginally higher in BLT and LO. Effect sizes were small to moderate, with Cohen’s d ranging from -0.26 to 0.38.

Table 5. Comparison of ECHE Dimensions by Gender.

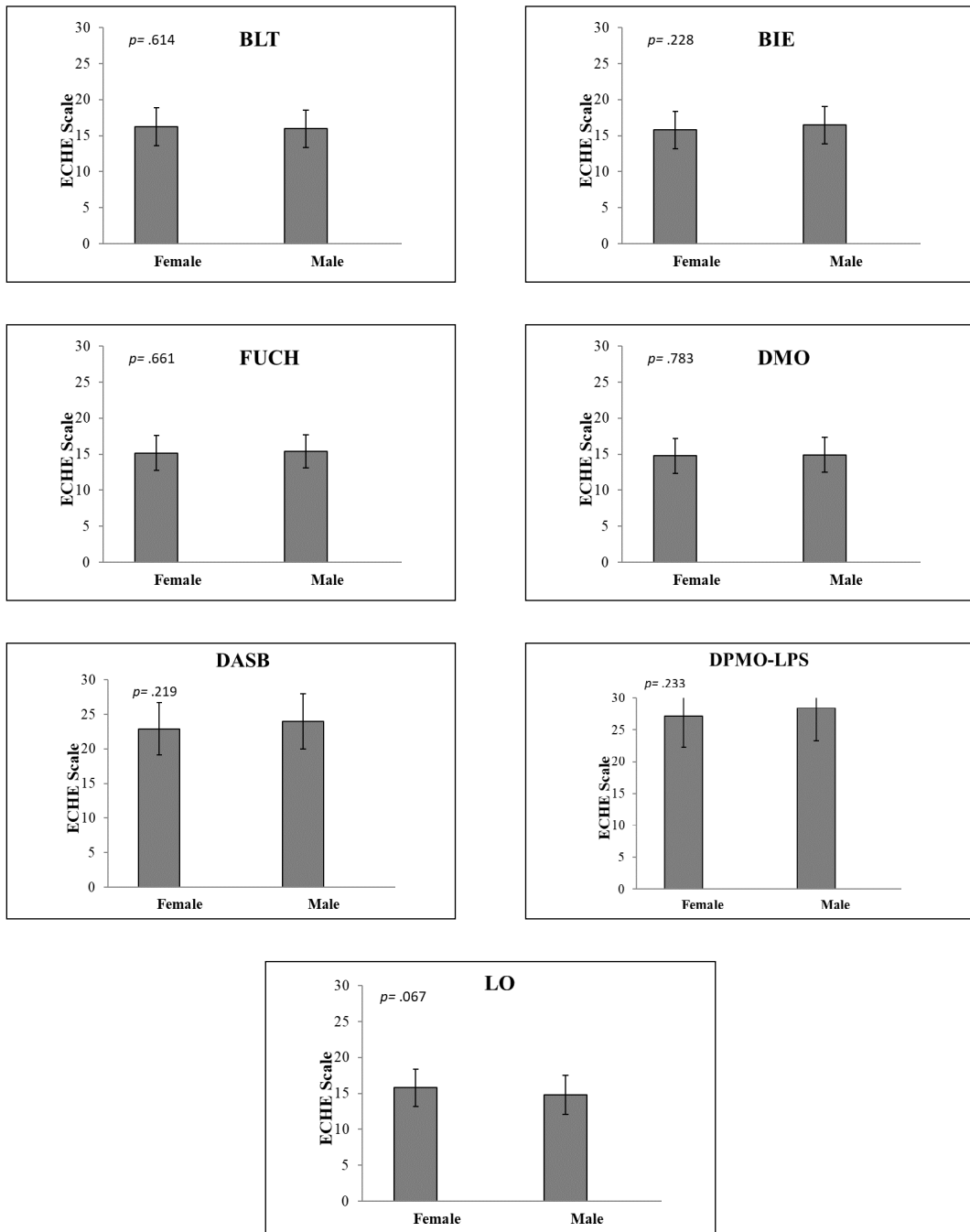
	Female (n=60)	Male (n=41)	Mean Difference	CI 95%	df	p	d
BLT	16.25 ± 2.66	15.97 ± 2.64	0.28	[-0.81, 1.36]	.51 ₍₉₉₎	.614	0.11
BIE	15.81 ± 2.68	16.47 ± 2.62	-0.66	[-1.74, 0.42]	-1.21 ₍₁₀₀₎	.228	-0.25

	Female _(n=60)	Male _(n=41)	Mean Difference	CI 95%	df	p	d
FUCH	15.17 ± 2.46	15.39 ± 2.38	-0.22	[-1.21, 0.77]	-0.44 ₍₉₉₎	.661	-0.09
DASB	22.98 ± 3.88	24.00 ± 4.01	-1.02	[-2.64, 0.61]	-1.23 ₍₉₇₎	.219	-0.26
DMO	14.78 ± 2.45	14.92 ± 2.49	-0.14	[-1.14, 0.86]	-0.28 ₍₁₀₀₎	.783	-0.06
DPMO-LPS	27.17 ± 4.90	28.41 ± 5.11	-1.24	[-3.27, 0.81]	-1.19 ₍₉₉₎	.233	-0.25
LO	15.81 ± 2.66	14.79 ± 2.72	1.02	[-.007, 2.11]	1.84 ₍₉₉₎	.067	0.38

Note. Own elaboration. **BLT**= Build and lead the team. **BIE**= Building an innovative environment. **FUCH**= Facing unexpected challenges. **DASB**= Develop autonomous strategic behaviour. **DMO**= Define the main objectives. **DPMO-LPS**= Developing products and market opportunities- To launch products or services. = Leading others. **Mean. Dif.**= Mean Difference. **IC**= Confidence Interval. **df**= Degrees of freedom. **p**= Significance. **d**= Cohen's d.

In Figure 2, although no statistically significant differences were found, it is noteworthy that all dimensions showed higher scores among males, with the exceptions of Building and Leading Teams (BLT) and Leading Others (LO), which were slightly higher among females.

Figure 2. Mean scores across ECHE dimensions: A gender-based comparison



The present study analyzed perceived entrepreneurial leadership self-efficacy among students in Health Science degrees (PASS, Nursing, and Physiotherapy), examining differences by degree program and gender using the ECHE Scale, in line with the need for transversal competencies highlighted by the European Higher Education Area (EHEA) (Gómez, 2023; Torres, 2016). The results reveal significant differences by degree, with PASS students showing higher scores across several dimensions. No significant differences were observed regarding gender, although certain descriptive trends were identified.

Regarding the first objective of this study, which focused on analyzing perceived entrepreneurial leadership self-efficacy based on the degree program, it is worth noting the need to adopt an integral approach that combines key aspects such as academic training, mentoring, practical experiences, and the promotion of innovation (Del Valle et al., 2022). This approach has the potential to strengthen the entrepreneurial self-efficacy of Health Science students, preparing future professionals to take on leadership and entrepreneurial roles. Training students in these competencies is not only essential for their academic development but is also critical for their professional performance. Providing them with the necessary tools during their university education can foster their ability to generate a positive impact in the healthcare field, contributing to innovation and the improvement of healthcare systems through entrepreneurial leadership (Pérez-Vallejo, 2023).

These results can be interpreted in light of Bandura's Social Cognitive Theory (1997), according to which self-efficacy is constructed from four main sources: mastery experiences, vicarious learning, social persuasion, and emotional regulation. From this perspective, educational contexts that favor active participation, decision-making, and the management of complex situations can contribute to strengthening entrepreneurial competence beliefs. This approach is consistent with the EHEA competency-based framework, which promotes active methodologies oriented toward the development of transversal skills (Del Valle et al., 2022; Gómez, 2023).

Students with high self-efficacy are significantly more motivated to identify emerging trends, develop innovative solutions, and excel in competitive markets (Newman et al., 2018). The literature confirms that the educational context plays a decisive role, generating greater opportunities for mastery experiences in PASS. In this program, training planning, group management, and decision-making in dynamic contexts are regular components of the learning process, which could explain the differences compared to more protocol-based clinical degrees (García-Rodríguez et al., 2018; Silva-Piñeiro, 2020).

Various authors have noted that, in the healthcare field, university education has historically prioritized technical competencies over transversal skills, despite the increasing need for innovation and organizational adaptation within healthcare systems (Fernández-Luque et al., 2023; West et al., 2015). In this context, the results obtained reinforce the relevance of structurally integrating content related to entrepreneurial leadership into Health Science curricula.

Although Nursing and Physiotherapy do not differ significantly, Physiotherapy shows a slight superiority in entrepreneurial capacity, consistent with studies documenting higher transformational leadership in this degree (Martínez et al., 2020). This suggests that self-efficacy and entrepreneurial capacity may vary according to the healthcare specialty. Nevertheless, the development of leadership competencies is essential in student training and must be reflected in curricula and extracurricular activities, which is key to preparing professionals to lead in their respective fields (Cejas et al., 2019; García-Rodríguez et al., 2018).

It is established that a lack of knowledge or experience can negatively influence students' self-efficacy. Therefore, it is essential that these future professionals have the opportunity to interact with successful healthcare entrepreneurs prior to their external internships. Interaction with entrepreneurial role models has proven to be a significant factor in the development of entrepreneurial self-efficacy and entrepreneurial intention among university students (Alonso et al., 2020; Ayuso-Murillo & Herrera-Peco, 2017; Fayolle & Gailly, 2015).

Regarding the second objective of this work, despite the lack of statistically significant differences across all dimensions of the ECHE Scale, it is noteworthy that scores were higher among males in most dimensions, except for Building and Leading Teams (BLT) and Leading Others (LO), where females scored higher.

Regarding the gender-based analysis, the absence of statistically significant differences aligns with recent studies indicating that gender gaps in entrepreneurial self-efficacy tend to narrow in educational environments where learning opportunities and exposure to role models are similar (Ndofirepi, 2022; Newman et al., 2018). Although previous research has identified slightly higher levels of entrepreneurial self-efficacy in males (Shinnar et al., 2018; Zhao et al., 2005), more recent evidence suggests that these differences may be mediated by contextual, cultural, and educational factors rather than by gender variables *per se*.

Furthermore, it is important to emphasize that self-efficacy is a dynamic construct susceptible to educational intervention (Bandura, 1997). From this perspective, the university environment can play a compensatory role by providing structured experiences that reinforce the perception of competence equitably among students, regardless of sex (Pereyra et al., 2018).

From an applied perspective, the results of the present study suggest the desirability of more systematically incorporating training programs oriented toward the development of entrepreneurial leadership within Health Science degrees. The integration of active methodologies, interdisciplinary projects, and problem-based learning (PBL) experiences could foster the development of entrepreneurial self-efficacy, contributing to the training of professionals capable of leading innovation processes in the healthcare field.

Taken together, the findings of this study highlight that university education in Health Sciences should not be limited to the development of specific clinical competencies but must systematically incorporate the strengthening of transversal skills related to leadership, innovation, and entrepreneurial initiative. In a healthcare context characterized by digital transformation, healthcare pressure (workload), and the need for

organizational sustainability, entrepreneurial leadership self-efficacy emerges as a key psychological resource for navigating complex and changing professional environments.

5.1. Practical Implications

Based on the results obtained in the present study, which demonstrate differences in entrepreneurial leadership self-efficacy depending on the degree program, the relevance of strengthening transversal competency development in Health Science education is clearly evidenced. In particular, systemic competencies such as critical thinking, problem-solving, decision-making, and teamwork are essential for future professionals to navigate interdisciplinary challenges and increasingly complex and changing professional environments (Martínez et al., 2020).

In this regard, university education should more systematically promote learning experiences oriented toward the development of leadership, entrepreneurial initiative, and innovation within the healthcare sector. Although the importance of these competencies has begun to be recognized in Health Science curricula in recent years, their integration remains limited and, in many cases, is addressed only transversally or implicitly, hindering their effective development (Alonso et al., 2020).

From an educational perspective, the results of this study suggest the desirability of incorporating specific training strategies aimed at developing entrepreneurial leadership within Health Science degrees. These strategies could include active learning methodologies, interdisciplinary projects, healthcare management simulations, mentoring programs with industry professionals, or university entrepreneurship initiatives. These types of educational experiences allow students to develop leadership skills, enhance their perceived self-efficacy, and acquire the tools necessary to face the professional challenges inherent to the healthcare field (Barbado-Solorzano & Martínez-Moreno, 2022; Del Valle et al., 2022).

6. Conclusions

While these results should be interpreted with caution due to the cross-sectional design and limited sample size, the study provides relevant empirical evidence on the importance of strengthening entrepreneurial self-efficacy in healthcare higher education.

The findings of the present study highlight the existence of significant differences in entrepreneurial leadership self-efficacy depending on the university degree, with PASS students showing higher scores across several dimensions of the ECHE scale. In contrast, no statistically significant differences were observed based on gender, suggesting a relatively homogeneous perception of competence between male and female within the analyze context.

These results reinforce the hypothesis that the specific educational context of each degree plays a relevant role in shaping entrepreneurial self-efficacy, likely through learning experiences, exposure to practical leadership situations, and the nature of curricular activities. In this regard, the study provides empirical evidence underlining the need to explicitly and structurally integrate the development of transversal competencies linked to leadership, innovation, and entrepreneurial initiative into Health Science curricula.

In a healthcare environment characterized by organizational transformation, clinical workload pressure, and the demand for sustainable innovation, strengthening entrepreneurial leadership self-efficacy is not merely a training supplement; rather, it constitutes a strategic element for the comprehensive preparation of future healthcare professionals.

7. Limitations and Future Research

The present study has several limitations that should be considered when interpreting the results. First, the convenience sampling and limited sample size restrict the generalizability of the findings to the broader population of Health Science students. Second, the cross-sectional design precludes establishing causal relationships between the analyzed variables and limits the analysis of how entrepreneurial self-efficacy evolves throughout the educational process. Furthermore, the participation of a small number of universities may affect the representativeness of the results, as pedagogical approaches and training opportunities can vary significantly between institutions.

Future research should incorporate longitudinal designs to analyze the evolution of entrepreneurial leadership self-efficacy across the academic trajectory. Similarly, it would be pertinent to include additional variables, such as prior professional experience, participation in specific entrepreneurship programs, socioeconomic context, or exposure to entrepreneurial role models. Additionally, the development and evaluation of structured educational interventions—such as mentoring programs, business simulations, or specific leadership training modules—would allow for a more robust examination of the impact of these strategies on entrepreneurial self-efficacy among healthcare students.

Advancing in this direction will contribute to consolidating an educational model that equitably integrates technical and transversal competencies, fostering the preparation of professionals capable of leading innovation processes in complex and dynamic healthcare systems.

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