Dual career of the student-athlete through sports technology-oriented entrepreneurship: Perception of sport retirement and learning needs according to gender and educational level

La carrera dual del estudiante-deportista a través del emprendimiento deportivo orientado a la tecnología: percepción de la retirada deportiva y necesidades de aprendizaje en función del género y el nivel educativo

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Short title:
Dual career of the student-athlete through sports technology-oriented entrepreneurship

How to cite this article:
Maciá-Andreu, M. J., Yilmaz, S., Grønkjær, A. B., Tinaz, C., Christoforou, A., & Leiva-Arcas, A. (2024). Dual career of the student-athlete through sports technology-oriented entrepreneurship: Perception of sports retirement and learning needs according to gender and educational level. *Cultura, Ciencia y Deporte, 19*(60), 2165. https://doi.org/10.12800/ccd. v19i60.2165

Received: 15 December 2023 / **Accepted**: 16 February 2024

Abstract

This article explores the relationship between student-athletes' dual careers in the field of technology-focused sport entrepreneurship, with an emphasis on gender and educational dissimilarities in retirement perceptions and learning needs. A sample of 205 student-athletes from five countries (United Kingdom, Spain, Sweden, Norway and Turkey), responded to an ad hoc questionnaire in order to understand athletes' perceptions of retirement, future aspirations and learning needs with respect to sports technology-oriented entrepreneurship. The findings reveal significant gender and educational differences on post-sporting life perception and professional career expectations, underlining the importance of targeted educational and support interventions. This study contributes to understanding the complexities of student-athletes' career decisions, especially in the context of the convergence of sport, entrepreneurship and technology.

Keywords: Innovation, long-life learning, high-level athletes, higher education.

Resumen

Este artículo explora la relación entre la carrera dual de los estudiantes-deportistas en el campo del emprendimiento deportivo centrado en la tecnología, haciendo hincapié en las diferencias de género y educación en las percepciones de la retirada y las necesidades de aprendizaje. Una muestra de 205 estudiantes-deportistas de cinco países (Reino Unido, España, Suecia, Noruega y Turquía), respondieron a un cuestionario ad hoc con el fin de comprender las percepciones de los deportistas sobre su jubilación, sus aspiraciones futuras y sus necesidades de aprendizaje con respecto al espíritu empresarial orientado a la tecnología deportiva. Los resultados revelan importantes diferencias de género y educación en la percepción de la vida posterior a la práctica deportiva y las expectativas de carrera profesional, lo que subraya la importancia de las intervenciones educativas y de apoyo específicas. Este estudio contribuye a comprender las complejidades de las decisiones profesionales de los estudiantes-deportistas, especialmente en el contexto de la convergencia del deporte, el espíritu empresarial y la tecnología.

Palabras clave: Innovación, aprendizaje durante toda la vida, deportistas de alto rendimiento, educación superior.

Introduction

The sports career is not a linear path to excellence but a path with ups and downs in which athletic development is strongly linked to social, personal, academic and professional development, whose mutual interaction can condition sporting and post-sporting success (Debois et al., 2012). Stambulova (2000) stated that a sporting career is a sequence of transitions involving a definitive turning point. Later, authors such as Wylleman and Lavallee (2004) or Mateu et al. (2020), distinguished between normative transitions, which are predictable such as sports retirement; and non-normative transitions, which are involuntary and sudden such as an irreversible serious injury. Sports careers can therefore be conceived as a heterogeneous combination of both transitions (Debois et al., 2015) where the sporting and personal success of athletes will largely depend on the athletes' ability to cope with these transitional challenges (Wylleman & Reints, 2010), as well as in the support structures available to them, such as the dual career models (Alfermann & Stambulova, 2007).

In recent years, there has been a growing interest by public authorities to develop initiatives, strategies and policies that promote dual careers through direct subsidies and support for research in this field (Isidori et al., 2017). This has led to an increase in and diversification of dual career development projects in new conceptual frameworks (Capranica et al., 2021) such as, among others, student-athlete entrepreneurship (Maciá-Andreu et al., 2023). In this regard, student-athletes attribute significant importance to entrepreneurial skills in their dual career for a fruitful transition to their post-sports life (Lupo et al., 2018). Studies such as that of Moustakas et al. (2022), have positively assessed the integration of entrepreneurship in the complementary training that student-athletes receive during their dual career. Linked to this, greater knowledge and experience in the field of entrepreneurship guarantees a higher employability rate for retired student-athletes entering the labour market (Ramos et al., 2022).

Sport in this respect is inherently innovative in its ability to adapt, evolve and change according to social, political and technological trends, making it a natural environment for entrepreneurship (Jones et al., 2017; Ratten & Ferreira, 2016), the growth of which is linked to the use of digital technology for competitive reasons (Ratten & Thompson, 2020). As digital technology becomes more embedded in society, it is also slowly becoming integrated in sports entrepreneurship research, especially with regard to digital platforms (Ratten et al., 2021). This is why, in recent years, there has been an increase in studies related to innovation and entrepreneurship in sport, which play a vital role in the development of sport (González-Serrano et al., 2020; Pellegrini et al. 2020; Ratten, 2017; Ratten & Ferreira, 2016; Ratten & Jones, 2020). In this sense, technological entrepreneurship is a valuable framework because it provides a source of economic growth, which can be applied in different areas such as business strategy, product innovation, sport analytics, development of new sport and sustainability and social issues (Hayduk, 2020). This means that it is crucial to develop new avenues of research on entrepreneurship in sport that incorporate the digital technologies that are emerging in the global business environment (Ratten & Jones, 2020).

Recent changes in the global economy have influenced the way sport services are marketed and consumed in the marketplace, shifting the sport industry from being manufacturing-based to becoming digitally oriented as information and communication technologies are integrated into everyday business activity (Dalmarco et al., 2019). In response to digitisation, sports organisations have radically changed their business strategies, rethinking their business practices to incorporate new digital innovations through more digital infrastructures and platforms (Ratten & Jones, 2020). In this sense, technology is becoming one of the most important factors driving the international competitiveness of the sport industry, being included in the agenda of most sport organisations due to its impact on performance (Ratten, 2020). However, while technological advances continue to radically change the way sport is consumed (Szymanski et al., 2020) and human-computer interaction is facilitating new ways of using technology in a sport environment (Kim et al., 2019), some sport organisations are reluctant to embrace it due to a desire to continue with the status quo (Mallen, 2019).

Innovation and entrepreneurship play a crucial role in sport businesses because of the many technological changes taking place in the global business environment (Ratten & Jones, 2020). Subsequently, technology-linked sport entrepreneurship has emerged as an innovative approach to optimise dual career models and respond to these still existing imbalances. For this purpose, the main objectives of this research were: 1) to gain insight into student-athletes' perceptions of their sport retirement, 2) to analyse their future aspirations and learning needs with respect to sports technology-oriented entrepreneurship, and 3) to determine whether there are statistically significant differences based on participants' gender and educational level.

Materials and Methods

The research employed a descriptive and cross-sectional study design, using non-probability convenience sampling. Prior to data collection, participants provided informed consent after being briefed on the research objectives and assured of the confidentiality of their data. The institutional ethics committee conducted a thorough review and granted authorization for the data collection protocol (code: CE032108), in compliance with the World Medical Association's code and the Declaration of Helsinki.

Participants

Participants were selected through non-probability intentional sampling. The inclusion criteria were a) to be at least 18 years old, b) to be currently combining their studies with their sporting career, regardless of the type of education, c) active in sport competition of any sport modality, and d) belong to one of the participating countries (United Kingdom, Spain, Sweden, Norway and Turkey). The final sample consisted of 205 athletes from five countries: United Kingdom (*n* = 52, 16.6%), Spain (*n* = 48, 23.4%), Sweden (*n* = 32, 15.6%), Norway (*n* = 42, 20.5%) and Turkey (*n* = 49, 23.9%). Of these, the majority were male (53.7%) compared to 46.3% female, with an age range mostly between 18 and 25 years old (56.6%) and, related to the highest level of education they were enrolled in, most of them were pursuing a higher education university degree (*n* = 82, 40%) followed by non-university higher education (*n* = 68, 33.2%), Finally, concerning their sporting profile, they mostly competed in individual sport (*n* = 107, 52.3%), had a professional contract and/or competed with the national team (*n* = 160, 78%), and the highest competition they had competed in was mostly international (Olympic/Paralympic Games 28.3%, World Championships/International Tournaments 29.3% and Continental Championships/Tournaments 16.1%). The socio-demographic characteristics of the sample are shown in Table 1.

Table 1
Socio-demographic and sporting characteristics of the sample

Variables		*n*	%
Gender	Male	110	53.7
	Female	95	46.3
Country	United Kingdom	32	16.6
	Norway	42	20.5
	Spain	48	23.4
	Sweden	32	15.6
	Turkey	49	23.9
Age	18-25	116	56.6
	26-30	49	23.9
	31-35	25	12.2
	36-40	12	5.9
	Over 40	3	1.5
Compete in	Individual sport	107	52.3
	Team sport	85	41.5
	Both individual and team sport	13	6.3
Professional contract and/or compete with the national team	Yes	160	78.0
	No	45	22.0
Highest sport competition	Olympic/Paralympic Games	58	28.3
	World Championship/International Tournaments	60	29.3
	Continental Championship/Continental Tournaments	33	16.1
	National Championship/National Tournaments	28	23.4
	Other	6	2.9
Education	Higher education university degree (Bachelor, Master or PhD)	82	40.0
	Non-university higher education	68	33.2
	High school/Basic education	55	26.8

Instruments

For this research, an ad hoc questionnaire was developed in order to understand athletes' perceptions of their retirement from sport and to analyse their future aspirations and learning needs with respect to sports technology-oriented entrepreneurship.

Following the literature review in each of the participating countries, the initial version of the questionnaire was developed in English, addressing both dimensions. This first version was sent to a panel of 10 expert judges for content validity

analysis. This was carried out through the feedback provided by them, through the evaluation of the representativeness and clarity of each of the items, using a scale of 1 to 4 being 1 *not representative/clear* and 4 *very representative/clear*, in addition to a section of open comments (Rubio et al., 2003). As a result, four of the items were rewritten. Subsequently, the new version of the questionnaire was sent to a panel of 10 lay experts for participant judgment, using the same scales and procedure, without resulting in any changes.

The final questionnaire consisted of 23 questions, divided into three different blocks: I) Sociodemographic (9), II) Perception of sport retirement (5) and III) Future aspirations and learning needs (9). The answers in blocks I and II were on a Likert scale ranging from 1 to 5, with 1 being *strongly disagree* and 5 *strongly agree*.

Procedure

Each project participant contacted athletes from their respective countries. Once information about the project was provided, the link to the online questionnaire was shared. The questionnaire was disseminated through onlinesurveys.ac.uk and the participants completed it in 10-15 minutes, individually, and without any academic or competitive pressure. All data was collected anonymously. Participants were required to complete an informed consent form and had the option to withdraw from the study at any time they deemed appropriate.

Statistical Analysis

The normality of the data was assessed using the Lilliefors significance correction of the Kolmogorov-Smirnov test, revealing a non-normal distribution for all analysed variables ($p < .001$). Consequently, non-parametric tests were conducted. The descriptive analysis was carried out through mean values and standard deviations. Mann-Whitney U test for independent samples was performed to analyse the differences depending on gender and Rosenthal's *r* was used to calculate the effect size (*ES*). It has been considered for the interpretation of *r* that a large effect corresponds to ≥ .50, medium ≥ .3 and small ≥ .1 (Cohen, 1988; Coolican, 2009). Kruskal-Wallis H test was performed to analyse the differences depending on level of education. Eta squared ($\eta 2$) was used to calculate the effect size (*ES*), being .01 to .06 (small effect), .06 to .14 (moderate effect) and ≥ .14 (large effect) (Tomczak & Tomczak, 2014). The $p < .05$ value was set to determine statistical significance. The statistical analysis was performed using the SPSS statistical package (v.25.0; SPSS Inc., IL, United States).

Results

Findings are presented below for the student-athletes' perception of their sporting retirement and their future aspirations and learning needs according to gender and educational level.

Student-athletes' perception of their sporting retirement according to gender and educational level

In relation to the descriptive analysis of the variables related to the student-athletes' perception of their retirement from sport, they agreed to a greater extent with "I feel that I have adequate skills to pursue a career after retiring from sport" (4.23 ± 0.79) followed by "I believe my sporting journey has provided me with assets to pursue a professional career" (4.15 ± 0.91). On the contrary, they generally expressed a lower degree of agreement with "I have enough assets if I wanted to invest in business" (2.84 ± 1.23).

Table 2
Student-athletes' perception of their sporting retirement according to gender

Variables	*M* ± *SD*	Gender		*U*	*p*	*ES*
		Female (*n* = 95)	Male (*n* = 110)			
I have an idea of what I would like to do when I retire from sport	3.78 ± 1.02	3.76 ± 1.04	3.79 ± 1.02	5,170.500	.892	-
I have ideas that I would like to develop into a business	3.41 ± 1.03	3.24 ± 1.04	3.55 ± 1.01	4,383.000	.038*	.15
I believe my sporting journey has provided me with assets to pursue a professional career	4.15 ± 0.91	4.12 ± 0.93	4.18 ± 0.90	5,031.500	.624	-
I feel that I have adequate skills to pursue a career after retiring from sport	4.23 ± 0.79	4.38 ± 0.69	4.11 ± 0.86	4,373.000	.030*	.15
I have enough assets if I wanted to invest in business	2.84 ± 1.23	2.84 ± 1.24	2.85 ± 1.24	5,217.500	.985	-

p-value statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$; – no significant differences.
U: Mann-Whitney U; ES: effect size.

With regard to the influence of gender on the variables described, statistically significant differences were observed in "I have ideas that I would like to develop into a business", with male participants showing a higher degree of agreement than females (3.55 ± 1.01 vs. 3.24 ± 1.04; *U* = 4,383.000; *p* = .038; *ES* = .15). On the contrary, females showed a significantly higher degree of agreement with "I feel that I have adequate skills to pursue a career after retiring from sport" than males (4.38 ± 0.69 vs 4.11 ± 0.86; *U* = 4,373.000; *p* = .030; *ES* = .15) (Table 2).

Regarding the influence of educational level, those participants who were attending university studies showed a significantly higher degree of agreement with respect to "I have an idea of what I would like to do when I retire from sport" (3.98 ± 1.01; *H* = 6.785; *p* = .034; *ES* = .02) and "I feel that I have adequate skills to pursue a career after retiring from sport" (4.45 ± 0.69; *H* = 10.055; *p* = .007; *ES* = .04) compared to those enrolled in non-university higher education and those in high school or basic education. However, those attending high school or basic education expressed a higher degree of agreement with "I have enough assets if I wanted to invest in business" (3.11 ± 1.08; *H* = 13.139; *p* = .001; *ES* = .06) (Table 3).

Table 3
Student-athletes' perception of their sporting retirement according to educational level

Variables	*M* ± *SD*	Educational level			*H*	*p*	*ES*
		Higher education university degree (*n* = 82)	Non-university higher education (*n* = 68)	High school/ Basic education (*n* = 55)			
I have an idea of what I would like to do when I retire from sport	3.78 ± 1.02	3.98 ± 1.01	3.66 ± 1.08	3.62 ± 0.95	6.785	.034*	.02
I have ideas that I would like to develop into a business	3.41 ± 1.03	3.55 ± 1.08	3.35 ± 0.97	3.27 ± 1.03	2.922	.232	-
I believe my sporting journey has provided me with assets to pursue a professional career	4.15 ± 0.91	4.26 ± 0.10	4.07 ± 0.93	4.09 ± 0.87	2.836	.242	-
I feel that I have adequate skills to pursue a career after retiring from sport	4.23 ± 0.79	4.45 ± 0.69	4.12 ± 0.80	4.05 ± 0.87	10.055	.007**	.04
I have enough assets if I wanted to invest in business	2.84 ± 1.23	3.02 ± 1.30	2.41 ± 1.17	3.11 ± 1.08	13.139	.001***	.06

p-value statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$; – no significant differences.
H: Kruskal-Wallis H; ES: effect size.

Student-athletes' future aspirations and learning needs of student-athletes according to gender and educational level

The descriptive results related to the future aspirations and learning needs of the student-athletes showed that they most strongly agreed with "I get inspired seeing how former athletes have developed in the business industry" (4.21 ± 0.82) followed by "I would be interested to learn how to use social media for professional purposes (LinkedIn, Twitter, Instagram, Facebook)" (4.12 ± 0.92). On the contrary, they showed a higher degree of disagreement with "I would prefer not working in any sport-related organisation" (2.26 ± 1.11).

Taking as a reference the variable referring to the gender of the respondents, statistically significant differences could be seen with respect to "I am interested in technology and innovation", with male student-athletes showing a higher degree of agreement with this statement than female students (4.10 ± 0.88 vs. 3.67 ± 1.03; *U* = 4,020.000; *p* = .003; *ES* = .21) (Table 4).

Finally, regarding the influence of student-athletes' educational level on their future aspirations and learning needs, those enrolled in non-university higher education showed a significantly higher degree of agreement on "I would like to receive some professional development training" (4.34 ± 0.66; *H* = 15.830; *p* < .001; *ES* = .07), "I would like to learn how I could set up my own business" (4.16 ± 0.78; *H* = 6.519; *p* = .038; *ES* = .02) and "I would be interested to learn how to use social media for professional purposes (LinkedIn, Twitter, Instagram, Facebook)" (4.41 ± 0.76; *H* = 17.374; *p* = <.001; *ES* = .08) (Table 5).

Table 4
Student-athletes' future aspirations and learning needs according to gender

Variables	*M* ± *SD*	Gender		*U*	*p*	*ES*
		Female (*n* = 95)	Male (*n* = 110)			
I would like to receive some professional development training	4.07 ± 0.81	4.11 ± 0.86	4.05 ± 0.77	4,870.000	.364	-
I would prefer to own a business rather working as an employee	3.73 ± 0.94	3.59 ± 1.07	3.85 ± 0.81	4,492.000	.070	-
I would like to learn how I could set up my own business	4.05 ± 0.88	3.93 ± 0.95	4.15 ± 0.80	4,605.000	.116	-
I would like to be able to use my sport knowledge to mentor sport businesses	3.98 ± 0.93	3.94 ± 0.98	4.02 ± 0.89	5,059.000	.678	-
I get inspired seeing how former athletes have developed in the business industry	4.21 ± 0.82	4.18 ± 0.89	4.25 ± 0.77	5,131.500	.811	-
I would be interested to learn how to use social media for professional purposes (LinkedIn, Twitter, Instagram, FB)	4.12 ± 0.92	4.23 ± 0.75	4.02 ± 1.04	4,811.500	.298	-
I am interested in technology and innovation	3.90 ± 0.97	3.67 ± 1.03	4.10 ± 0.88	4,020.000	.003**	.21
I would like to stay and work in the sport industry when I retire from my sport	3.88 ± 0.97	3.74 ± 1.06	4.01 ± 0.87	4,533.000	.087	-
I would prefer not working in any sport-related organisation	2.26 ± 1.11	2.25 ± 1.11	2.27 ± 1.11	5,177.000	.906	-

p-value statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$; – no significant differences.
U: Mann-Whitney U; *ES*: effect size.

Table 5
Student-athletes' future aspirations and learning needs according to educational level

Variables	*M* ± *SD*	Educational level			*H*	*p*	*ES*
		Higher education university degree (*n* = 82)	Non-university higher education (*n* = 68)	High school/ Basic education (*n* = 55)			
I would like to receive some professional development training	4.07 ± 0.81	4.09 ± 0.76	4.34 ± 0.66	3.73 ± 0.93	15.830	< .001***	.07
I would prefer to own a business rather working as an employee	3.73 ± 0.94	3.83 ± 0.94	3.68 ± 0.90	3.65 ± 1.00	1.403	.496	-
I would like to learn how I could set up my own business	4.05 ± 0.88	4.13 ± 0.86	4.16 ± 0.78	3.78 ± 0.97	6.519	.038*	.02
I would like to be able to use my sport knowledge to mentor sport businesses	3.98 ± 0.93	3.99 ± 1.01	4.10 ± 0.77	3.82 ± 0.96	2.618	.270	-
I get inspired seeing how former athletes have developed in the business industry	4.21 ± 0.82	4.33 ± 0.88	4.21 ± 0.76	4.05 ± 0.80	5.841	.054	-
I would be interested to learn how to use social media for professional purposes (LinkedIn, Twitter, Instagram, FB)	4.12 ± 0.92	4.17 ± 0.81	4.41 ± 0.76	3.67 ± 1.09	17.374	< .001***	.08
I am interested in technology and innovation	3.90 ± 0.97	3.89 ± 0.96	4.07 ± 0.92	3.71 ± 1.03	4.114	.128	-
I would like to stay and work in the sport industry when I retire from my sport	3.88 ± 0.97	3.83 ± 1.02	4.10 ± 0.90	3.69 ± 0.96	5.557	.062	-
I would prefer not working in any sport related organisation	2.26 ± 1.11	2.27 ± 1.23	2.13 ± 0.96	2.42 ± 1.08	1.777	.411	-

p-value statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$; – no significant differences.
H: Kruskal-Wallis H; *ES*: effect size.

Discussion

The main objectives of this research were: 1) to gain insight into student-athletes' perceptions of their sport retirement, 2) to analyse their future aspirations and learning needs with respect to sports technology-oriented entrepreneurship, and 3) to determine whether there are statistically significant differences according to the participants' gender and educational level.

Student-athletes' perception of their sporting retirement according to gender and educational level

In terms of student-athletes' perception of sporting retirement based on gender, male participants scored significantly higher on "I have ideas that I would develop into a business" than females. In general, men have been found to have a higher entrepreneurial spirit than women (Santos et al., 2016). Among the reasons behind this are factors such as lack of motivation (Palaniappan et al., 2012), lack of support networks (Piacentini et al., 2013) or lack of successful role models (Marks, 2021). In this sense, sport could be a vehicle to enhance women's entrepreneurial skills by stimulating their entrepreneurial spirit (Costa & Miragaia, 2022). Recent studies have shown that gender can be a factor that positively influences entrepreneurship through previous personal networks and connections developed during their sporting life, which could be used to enhance their business (Ratten & Miragaia, 2020). To reduce this gap, entrepreneurship programmes in higher education, developed in the framework of the dual career, should have a strong gender focus, including as professors leading women entrepreneurs and policy-makers who have promoted policies to foster female entrepreneurship, as shown by previous studies in the area (Puyana et al., 2019).

In contrast, female participants scored significantly higher on "I feel that I have adequate skills to pursue a career after retiring from sport", which can drive entrepreneurial intent by showing self-confidence in one's own ability (Martins et al., 2018; Micozzi & Lucarelli, 2016) and lower fear of failure (Chapman & Phillips, 2022). Nevertheless, this finding contradicts the study by Nikander et al. (2021), which found that female student-athletes in high school showed lower levels of self-esteem and career adaptability compared to their male counterparts. In recent years, there has been a growing interest among women in entrepreneurship (Hechavarria et al., 2019), despite the fact that, traditionally, entrepreneurial intentions are higher in males than for females (Ward et al., 2019). When it comes to entrepreneurship, personal skills have a greater influence on the female than on the male gender (Maes et al., 2014). In this sense, motivation or commitment are determinants for women's entrepreneurial success (Feng et al., 2023), while worry acts as one of the major limiting factors for women compared to men (Nikolić et al., 2020). Against this background, dual careers can strengthen valuable skills such as self-efficacy (Cartigny et al., 2020) or female leadership (Tsiatsos et al., 2018), which can be enhanced by combining it with optimal training in technology-based sports entrepreneurship. Previous studies have found that lower levels of education widen the gender gap in entrepreneurship (Nyakudia et al., 2018). However, it has been shown that traditionally entrepreneurship training tends to benefit self-efficacy and knowledge in men more than in women (Begrman et al., 2011). In view of this, gender-sensitive leveraging and better matching of curricula can reduce gender gaps in entrepreneurship when planning training programmes (Pimpa et al., 2021).

Regarding the influence of the educational level of the participants on their perception of retirement from sport, statistically significant differences were found in "I have an idea of what I would like to do when I retire from sport" and "I feel that I have adequate skills to pursue a career after retiring from sport", being higher in student-athletes attending university studies than those in secondary or compulsory education. In general, athletes who have followed a dual career programme achieve better educational attainment levels than their counterparts who have not followed this methodology, regardless of gender (Barriopedro et al., 2018). Pursuing a dual career not only reduces the dropout rate of professional athletes pursuing university studies (Bellantonio & Tafuri, 2017), but it has also been found that student-athletes at higher educational levels show better organisational skills, a higher degree of commitment to their goals and a higher level of adaptation than athletes who do not pursue a university degree (Abenza-Cano et al., 2020). The acquisition of these soft skills can be a comparative advantage when facing the endeavour of entrepreneurship (Moustakas et al., 2022). Indeed, there is a positive correlation between entrepreneurship education and further entrepreneurial intention among university students (Leonard & Ayatari, 2019). Therefore, greater reference to entrepreneurship in university mission, strategy, policies and procedures, as well as greater support from faculty leadership teams, could enhance student entrepreneurship (Bezanilla et al., 2020).

Concerning the variable "I have enough assets if I wanted to invest in business", those student-athletes enrolled in a lower level of education, either high school or compulsory education, showed a higher score on this item than those in higher education. This could be due to the fact that these students enter the labour market earlier than those who continue their higher education (Donald et al., 2018). This increases the years of professional experience, which has been a factor related to a higher rate of early entrepreneurship (Peltonen & Arenius, 2016). This could be because the longer the work experience, the more confident individuals are in their abilities (Eesley et al., 2016). While it is true that this self-perception is not directly correlated with greater success in entrepreneurship (Rasul et al., 2017). In this regard, in addition to work

experience, advanced education has been found to drive entrepreneurship (Zahra & Ahmad, 2017). Knowledge acquired in universities has been identified as an added value that can be subsequently transferred to business (Mitra, 2008). Especially in technology entrepreneurship where universities can enhance this type of entrepreneurship through research transfer (Yordanova, 2021), the creation of effective support networks (Küttim et al., 2014) or the establishment of bridges with the business community (Niv & Messer-Yaron, 2010). Therefore, greater success in technology entrepreneurship could be achieved when student-athletes reach higher education levels, provided that the design of educational programmes builds on previous successful aspects such as the creation of entrepreneurial mindsets (Shih & Huang, 2017) or self-confidence (Nowinski et al., 2019), which could compensate for the lack of previous work experience.

Student-athletes' future aspirations and learning needs of student-athletes according to gender and educational level

The results related to the future aspirations and learning needs of student-athletes according to gender show how, in terms of the interest shown by participants in technology and innovation (I am interested in technology and innovation), men showed a significantly higher degree of agreement than women. In this sense, although some previous studies did not detect statistically significant gender differences in innovation within the sports sector (Buyrukoğlu et al., 2023), gender, understood in a binary way as male or female characteristics, plays an important role in the ability of entrepreneurs to develop technology companies (Bernardino et al., 2018) and in recent years these individual differences have been used to understand the role of women in the technology industry (Suseno & Abbott, 2021). As a general rule, the tech and sports industry have fewer female entrepreneurs compared to other industries, despite the establishment of quotas by some governments (Ratten, 2022), and masculinity predominates as a technological predictor beyond what may be explained by other factors such as prior computing problems and perceived structural technological support (Huffman et al., 2013). However, while previous research related to the role of women in technology entrepreneurship in sport is scarce, there is evidence that women have certain competitive advantages related to higher levels of intuition and opportunity detection to bring about change (Ratten, 2022) and that gender diversity in the top management team seems to foster a work climate that stimulates the development of new ideas and the use of more effective resources to achieve product and process innovation (Ruiz-Jiménez & Fuentes-Fuentes, 2016).

In this study, statistically significant differences were also found in the item "I would like to learn how I could set up my own business", which was higher in non-university students and high education students than in university students. This finding is consistent with previous studies that have shown that while the university context can help in the development of entrepreneurship, it is in contexts such as Vocational Educational Training (VET) that students are more inclined to start up a business (Bergmann et al., 2016). This may be because VET programmes encourage entrepreneurship to a greater extent through the promotion of the pursuit of self-employment (Kamran et al., 2015), and personal growth (Pereira, 2015), thanks to the enhancement of learning through technical teachings that serve as a stimulus for students to create new ventures (Scott-Kemmis, 2017). However, this may not be sufficient to achieve greater and more reliable entrepreneurial success. Comparative studies have found that there is higher entrepreneurial self-efficacy in skilled than in unskilled university students (Noventa et al., 2016). This could be explained by the fact that university environments foster greater creativity in business (Yao et al., 2020) and a better calculation of risk-taking (Zollo et al., 2017), both of which are important factors in ensuring the success of entrepreneurship (Nieuwenhuizen & Groenewald, 2006).

Finally, non-university and high education students scored higher than university students on "I would like to receive some professional development training" and "I would be interested to learn how to use social media for professional purposes (LinkedIn, Twitter, Instagram, Facebook)". Regarding the latter item, the interest may be due to the demonstrated impact on business growth and performance of social media management during entrepreneurship (Lee & Hallak, 2020). These types of platforms are transforming society, which is why entrepreneurs, especially sports entrepreneurs, are looking to these tools for new ways to develop their business opportunities (Ratten, 2022). Among the advantages of their use are reputation building (Carrillo-Durán & Tato-Jiménez, 2019), better detecting opportunities (Moghaddam & Weber, 2021), or improving strategic decision-making (Rickne et al., 2018). In students, the use of social media can increase the recognition of entrepreneurship opportunities (Nam & Xiong, 2021) and, consequently, increase the intention to start a new business (Huang & Zhang, 2020). This is especially relevant for VET students, as previous studies have shown that learning about entrepreneurship and the use of social media together has a positive influence on students, especially VET students, in undertaking an entrepreneurial venture (Scott-Kemmis, 2017). Hence, a greater commitment to this type of content in the design of digital entrepreneurship training curricula could have a greater impact by increasing student engagement, especially in non-university stages.

Conclusions

Regarding the student-athletes' perception of their retirement from sport, they mainly agreed that they had the right skills to pursue a professional career after retirement from sport and that their sporting career had provided them with

the resources to do so. In contrast, they disagreed that they had sufficient assets to invest in a business. Regarding their future aspirations and learning needs in terms of sports technology-oriented entrepreneurship, student-athletes were mostly inspired by other former athletes who had developed in the business industry and were interested in training related to the use of social media for professional purposes. On the other hand, they mostly disagreed with working in an organisation that was not related to sport. University students were more confident in their ability to think of ideas for post-sports careers and in their ability to acquire the necessary skills. This emphasises how crucial higher education is for giving athletes the commitment and organisational skills they need to succeed as entrepreneurs, especially through dual career programmes.

Finally, with regard to the influence of gender and educational level on the perception of their sporting retirement, as well as on their future aspirations and learning needs, statistically significant differences were found for both variables. In particular, the male gender showed a higher degree of agreement regarding having ideas that they would like to develop in a business as well as a greater interest in training related to technology and innovation. On the other hand, the female gender expressed a higher degree of agreement regarding having the necessary skills to pursue a professional career after retiring from sport. This is consistent with research showing a gender disparity in entrepreneurial spirit and highlights the need for focused interventions to support women entrepreneurs.

In terms of educational level, those student-athletes enrolled in university education were more likely to agree that they had ideas about what to do after retirement and had the necessary skills to pursue a career than those in a lower level of education. In the case of those attending non-university higher education, they significantly agreed on receiving professional training for their development, as well as training related to business creation and development and social networking for professional use. On the other hand, student-athletes in lower educational levels who entered the workforce earlier believed they had enough assets for a business investment. This might be explained by early work experience, suggesting that continued exposure to the professional world could boost self-assurance. The study does raise an indication that there may be no direct correlation between this perception and entrepreneurial success. Finally, participants in high school or basic education stood out from the other levels of education in terms of their agreement with having sufficient resources to invest in a business, compared to those attending higher levels of education.

Ethics Committee Statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee: Universidad Católica de Murcia, UCAM (registration code CE032108, date of approval 22/03/2021).

Conflict of Interest Statement

The authors declare that the funding bodies or institutions had no influence on the design of the study, the analysis of the data or the interpretation of the results.

Funding

This research was funded by the European Commission through the Erasmus+ project: Life After Sports: Athletes as Investors, Mentors and Entrepreneurs (project reference: 623114-EPP-1-2020-NO-SPO-SCP).

Authors' Contribution

Conceptualization S.Y., A.C., A.B.G., C.T. & M.J.M.-A.; Methodology S.Y., A.C., M.J.M.-A & A.L.-A.; Software M.J.M.-A..; Validation S.Y., A.C. & M.J.M.-A.; Formal Analysis A.C., M.J.M.-A & A.L.-A.; Investigation S.Y., A.B.G., C.T. & M.J.M.-A.; Resources A.B.G., C.T. & S.Y.; Data Curation M.J.M.-A & A.L.-A.; Writing – Original Draft A.C., M.J.M.-A & A.L.-A.; Writing – Review & Editing S.Y., A.C., A.B.G., C.T., M.J.M.-A & A.L.-A.; Visualization M.J.M.-A & A.L.-A.; Supervision A.B.G.; Project Administration S.Y., A.B.G, C.T. & M.J.M.-A.; Funding Acquisition A.B.G. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author [mjmacia@ucam.edu].

Acknowledgements

The authors would like to thank all the student-athletes and organisations involved in this research for their collaboration, as without their disinterested help this investigation would not have been possible.

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