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Student-athlete advancement: Influence of personality on academic performance and entrepreneurial intention through creative potential

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The present study analysed how the personality of athletes affect their academic performance and sports entrepreneurial intention through sports imagination and creativity. A total of 633 Taiwanese student-athletes aged 15–25 years were recruited for the analysis. The results revealed that both the traits of agreeableness and conscientiousness increased the athletes' academic performance, whereas initiating sports imagination decreased this performance. Under the mediating effect of initiating sports imagination, most traits, except neuroticism, negatively affected academic performance. The results consistently indicated that the trait agreeableness decreased the athletes' sports entrepreneurial intention, whereas sports originality creativity and initiating sports imagination increased this intention. Sports originality creativity and initiating sports imagination enhanced the effect of most personality traits on participants' entrepreneurial intention. Finally, academic performance and sports entrepreneurial intention exhibited a weak negative correlation. With student-athletes being at a disadvantage relative to peers who purely focus on academics and with societal development in mind, we devised three measurement tools and proposed a research framework for the examination of athletic creative potential and sports entrepreneurship in schools or sports institutes.

KEY WORDS: Academic performance; Athlete personality; Sports creativity; Sports entrepreneurial intention; Sports imagination; Student-athlete.

1. Introduction

In the 19th Summer Olympic Games held in Mexico in 1968, Dick Fosbury adopted a revolutionary new back-first high jump style; by abandoning

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most of the previous jumping methods of belly or straddle rolls, Fosbury achieved a height of 2.24 m, earning him the gold and a new Olympic record. Fosbury broke all the rules with his large arc approach and diagonal back jump and with the manner in which he approached the bar head-first, thereby etching his name in history. As a result of his extraordinary innovation, the Fosbury Flop subsequently became the standard technique in the sport (Dapena, 1980). Fosbury pushed the limits and attained world-class achievements with his imaginative creativity by changing his movement and engaging in rigorous practise. After retirement, Fosbury continued to devote himself to providing public services through sports by, for example, serving on the executive board of the World Olympians Association and working with 53 other famous elite athletes in the Champions for Peace, which is a group committed to working toward world peace. Fosbury was also as an entrepreneur; he leveraged his creativity to establish a nonprofit organisation named World Fit in collaboration with fellow Olympians; through this organisation, he held youth fitness activities and promoted Olympic ideals (Welch, 2018).

Sports entrepreneurship is a crucial topic in terms of its positive impact on public health, social development, and particularly its valuable contribution to the global economy (Cardella et al., 2021). Sports entrepreneurship researchers have also highlighted the necessity of investigating the entrepreneurial intention and academic performance of athletes and considering how to activate this intention, so that sports talent can be transformed into entrepreneurial actions (Pellegrini et al., 2020; Teixeira & Forte, 2017). Academic performance represents the depth of individuals' engagement and the extent of their achievement in schools (Comeaux & Harrison, 2011). Entrepreneurial intention and success denote individuals' passion for their particular careers (Steinbrink et al., 2020). Creative potential refers to sports imagination and creativity. Studies have revealed that creative potential can be enhanced through training, and adaptive variability is at the core of sports creativity. Novel affordances and creative movements are promoted by interventions that motivate exploration by manipulating a series of constraints (de Sa Fardilha & Allen, 2020; Orth et al., 2017; Vaughan et al., 2017). The creative potential, academic performance, and entrepreneurial intention of athletes depend on individual characteristics, particularly personality traits (Orth et al., 2017; Pervun et al., 2022).

Related research tends to focus on the effects of athlete personality on sports performance, and the questions regarding the roles of athlete personality and creative potential in entrepreneurial intention and academic performance remain unanswered (Orth et al., 2017; Terry et al., 2020). In addition,

research on methods for evaluating athletes' creative potential is scant (de Sa Fardilha & Allen, 2020), and most such research has focused on large sport businesses, overlooking smaller athletic ventures (Shilbury, 2011). To address these research gaps, in this study, we developed scales to measure athlete creative potential and sports entrepreneurial intention; we subsequently tested the proposed model to reveal the mediating role of creative potential in the relationship of personality traits and entrepreneurial intention in Taiwan. The findings can inform talent recruitment and development strategies for student-athletes, especially in terms of cultivating the athletes' intrinsic attributes and creative potential.

2. Literature Review

2.1 Academic performance and entrepreneurial intention

Student-athletes face several challenges pertaining to time commitment, competency development, identity solidification, relationship building, value establishment, support systems, academic performance, and career decisions (Gomez et al., 2018; Lenahan et al., 2022). Relative to general students, student-athletes experience greater stress and are at a disadvantage because of their distinct academic characteristics. This stress is caused by the demands from coaches and institutions as well as the obligations to train and perform (Stambulova, 2000). Athletic participation tends to be exhausting, with injury being a constant threat for most student-athletes. Rigid schedules also tend to hinder their academic performance; however, maintaining a balanced athletic, academic, and social life is still crucial for student-athletes' overall success (Vidal-Vilaplana et al., 2022). Accordingly, for student-athletes, creativity can be applied as a life capacity that can enable them to manage their multiple roles (Van Raalte et al., 2017). Moreover, student-athletes can apply creativity to maintain a healthy balance between academic and athletic performance during university life, which in turn can transform them into educated and proactive individuals who are able to face their diverse careers with confidence (Palumbo et al., 2021; Vidal-Vilaplana et al., 2022).

The popularity of both fitness and social media has prompted the emergence of numerous sports entrepreneurs focusing on different areas. Unlike large companies such as Nike or Puma, these budding entrepreneurs thrive in a challenging economy by leveraging their strategic thinking and innovative action; particularly, during the COVID-19 pandemic, these small enterprises learned to be resilient, regulate control resource consumption, and navigate

new situations (Hammerschmidt et al., 2022). For example, to reduce transmission risk, online fitness programmes have been developed, and internet coaches have become popular (Ruth et al., 2022). Sports businesses can be initiated by diverse entities, such as government agencies, public organisations, local community groups, or commercial enterprises (Bjärsholm, 2017). Because of the low entry barriers, flexible operations, and the possibility for driving societal change (Ratten & Jones, 2020), sports entrepreneurship has become a promising career path for student-athletes and led to greater research interest in the intention to establish sports microenterprises.

Sport entrepreneurship is a promising research area, with academic legitimisation of this field still pending (Shilbury, 2011). Entrepreneurial decision-making is usually driven by entrepreneurial intention. Sports entrepreneurial intention refers to an individual's belief in their ability to establish a new business and to perform the related conscious preparation and planning (Thompson, 2009). Many of the microentrepreneurs who emerged during the pandemic were former student-athletes or individuals who majored in sports science. Studies have also indicated that athletes have stronger entrepreneurial intention than do the general public, and the psychological characteristics of professional athletes match those associated with entrepreneurial success (Hindle et al., 2019; Steinbrink et al., 2020). However, only a few studies have examined the conditions that might generate entrepreneurial intention and have empirically tested a sports entrepreneurship construct with academic performance (Hammerschmidt et al., 2022). In addition, most studies on sport entrepreneurship have focused on European and American regions, with few related studies targeting Asian settings (Senne, 2016).

2.2 Creative Potential

Sports entrepreneurship involves innovation. The sports industry can be transformed through the development of new products, activities, services, and even sports (Ratten, 2010). Innovation can be realised through individual creative potential. The creative potential of a sports entrepreneur is facilitated by sports imagination and sports creativity. Agbim et al. (2013) reported that creativity strongly influences students' entrepreneurial intention, which increases with age. According to de Sa Fardilha and Allen (2020), sports creativity is a trainable ability. Creative movements and novel affordances (opportunities and invitation for action) are encouraged by interventions that promote exploration by manipulating design constraints (Orth et al., 2017; Vaughan et al., 2017). In the sports industry, entrepreneurship acts

as a driver of change and innovation, and through creativity and invention, an entrepreneur can discover novel business opportunities (Ratten & Jones, 2020). Cardella et al. (2021) highlighted that an entrepreneurial approach in sports provides new opportunities that can create societal value and stimulate economic growth.

Imagination is a mental construct that merges individual memories and experiences into a cohesive reality that is unlike anything from the past or present and can be used to simulate the possible future (Vygotsky, 2004). Human imagination can be categorised into three types: initiating, conceiving, and transforming imagination. Initiating imagination refers to the ability to generate original ideas; conceiving imagination refers to the ability to produce effective ideas; and transformational imagination refers to the ability to apply knowledge across fields (Liang & Chia, 2014; Liu & Noppe-Brandon, 2009). Most research on sports imagination has focused on mental imagery because of the lack of precise definitions for the aforementioned concepts (Williams & Cumming, 2011). However, imagination differs from mental imagery. Mental abilities such as perception, guesswork, assumption, simulation, and foresight involve imagination (Thomas, 2014), whereas mental imagery typically involves scrutinising the content of individual vision and space (Kim et al., 2022; Lovell & Collins, 2001). In the current study, sports imagination refers to the mental capability to initiate, conceive, and transform thoughts for enhancing sports performance. We developed a tool for evaluating sports imagination and used it to test our proposed theoretical model.

Imagination is the antecedent and foundation of creativity. Imagination differs from creativity in terms of the performance of action (Lin et al., 2014). Imagination is a thinking process for matters that do not exist yet, whereas creativity involves action and output on the basis of what is imagined. Creativity can be classified into two dimensions: originality and usefulness (Runco & Jaeger, 2012). Both originality and usefulness involve the generation of thoughts, behaviours, and works, with originality focusing on novelty and usefulness focusing on effectiveness and appropriateness, as recognised in a given sociocultural context (Chang et al., 2015; Lin et al., 2014). Therefore, sports creativity can be defined as the originality and usefulness of ideas employed by people to advance their sports performance (Bosselut et al., 2020; Smith & Green, 2020). Sports creativity involves not only predicting opponents' subsequent actions but also conceiving novel but appropriate actions to surprise them (Memmert et al., 2013; Vaughan et al., 2019). Because of the lack of robust scales for sports creativity in the field (Memmert, 2010), we devised a tool for assessing sports creativity and empirically tested the proposed theory for student-athlete development.

2.3 Athlete Personality And Its Effects

Entrepreneurs share some common intrinsic characteristics such as resilience, high levels of internal locus of control, and high needs for achievement, with sports entrepreneurs (Kang et al., 2016). Personality is at the core of these characteristics (Jones et al., 2020). Because of its stability and persistence, personality has become the focus when assessing individual potential, psychology, and behaviour (Costa & McCrae, 2010). The five-factor model is widely adopted for assessing personality traits (McCrae & Costa, 2003); the model includes the following dimensions: extraversion, openness to experience, conscientiousness, agreeableness, and neuroticism. Research has also suggested that athletes as a group tend to exhibit high extroversion and conscientiousness, average openness to experience and agreeableness, and low neuroticism (Allen et al., 2013; Brinkman et al., 2016). However, limited research has investigated the influence of personality traits on creative potential, academic performance, and entrepreneurial intention among novice athletes, particularly student-athletes who have initiated seriously learning certain sports (Latella et al., 2019).

Regarding the influence of personality traits on creative potential, studies have indicated that athletes' creative actions and solutions are rooted in their personality, which thus plays a substantial role in future success (Orth et al., 2017; Top & Akil, 2018). Previous studies have also indicated that certain personality traits can affect cognitive development and academic outcomes (Bradley et al., 2013; Liang & Lin, 2015). In addition, prior research has determined that the level of risk-taking behaviour in sports depends on athlete personality (Olivier, 2006), and sports entrepreneurship is a typical risk-taking action demanding innovative, goal-oriented, and opportunity-driven behaviour (Senne, 2016). These potential effects are reviewed in detail in the following section.

2.4 Hypothesis Development

On the basis of the five-factor model (Costa & McCrae, 2010; McCrae & Costa, 2003), research results have revealed that personality traits such as conscientiousness and neuroticism are predictors of cognitive skill development and successful academic outcomes (Brinkman et al., 2016; Rhodes & Smith, 2006). Previous studies have also reported that student-athletes playing individual sports academically outperformed those playing team sports, indicating the higher levels of conscientiousness and agreeableness in indi-

vidual-sport and team-sport participants, respectively (Bradley et al., 2013; Chen et al., 2021). However, the exact nature of the complex relationship among athlete personality, creative potential, and academic performance remains unclear, explaining why promising strategies to optimise the relationship are rare.

Furthermore, a meta-analysis revealed that most five-factor dimensions were associated with entrepreneurial intention, except for the trait of agreeableness (Zhao et al., 2010). Scholars have argued that sports offer an ideal environment for the advancement of entrepreneurial theory because athletes and entrepreneurs share the same set of personality traits that are beneficial to career success (Boyd et al., 2021; Jones et al., 2020), most notably high conscientiousness and low neuroticism (Steinbrink et al., 2020). Another study observed higher entrepreneurial intention in those participating in individual sports than in those participating in team sports, and being a celebrated athlete strongly promoted the likelihood of entrepreneurial action (Pervun et al., 2022). Consequently, the following two hypotheses were proposed:

H1. Among student-athletes, the personality traits of neuroticism, conscientiousness, and agreeableness are positively associated with academic performance, whereas the personality traits of extraversion and openness to experience are negatively associated with academic performance.

H2. Among student-athletes, the personality traits of extraversion, openness to experience, neuroticism, and conscientiousness are positively associated with sports entrepreneurial intention, whereas the personality trait of agreeableness is negatively associated with sports entrepreneurial intention.

Regarding the relationship between creativity and personality traits, individuals with high creativity have been shown to exhibit high degrees of extroversion, openness to experience, and neuroticism but low degrees of agreeableness and conscientiousness (Chang et al., 2015; Prabhu et al., 2008). Little empirical research has examined how athlete personality is associated with creative potential (Top & Akil, 2018), the reason for which is the lack of precise definitions and measurement tools for sports imagination and sports creativity (De Sa Fardilha & Allen, 2020; Memmert, 2010). To address this shortcoming, the present study developed scales for assessing the creative potential.

According to imaginative capacity theory (Liang & Chia, 2014), both conceiving and transforming imagination can enhance the academic performance of students (Liang & Lin, 2015; Lin et al., 2014). Scholars have also suggested that cognitive capability could be improved through physical creative thinking and activity participation, with usefulness creativity notably promoting overall learning success (Lin et al., 2014; Palumbo et al., 2021).

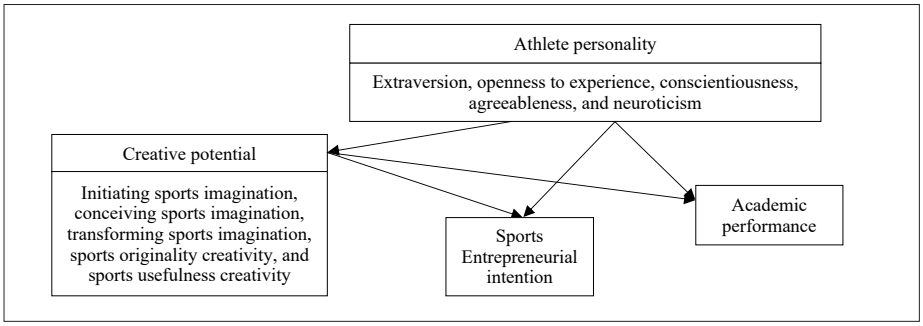

Figure 1. The research mode.

Furthermore, studies have revealed that imagination, particularly initiating imagination, has a positive influence on students' entrepreneurial intention (Chang et al., 2016; Huang et al., 2022), and that a positive association exists between creativity and entrepreneurial intention (Ip et al., 2018; Ratten & Jones, 2020; Steinbrink et al., 2020). Therefore, the following four hypotheses and the research model were proposed:

H3. Among student-athletes, personality traits enhance academic performance through conceiving and transforming sports imagination.
H4. Among student-athletes, personality traits enhance sports entrepreneurial intention through initiating sports imagination.
H5. Among student-athletes, personality traits enhance academic performance through two types of sports creativity
H6. Among student-athletes, personality traits enhance sports entrepreneurial intention through two types of sports creativity.

3. Data and Methods

3.1 Data Collection

The current study recruited 741 student-athletes from five senior high schools and six universities across Taiwan who either majored in sports-related fields or were members of a varsity team. Participation was voluntary and anonymous, and participants reserved the right to withdraw from the study at any time. We excluded 108 questionnaires that were incomplete or completed in less than 5 minutes, yielding 633 valid questionnaires. Descriptive statistics revealed that the majority (60.03%) of the participants were male; 34.44% were high-school students, 28.12% were university freshmen or sophomores, 32.7% were university juniors or seniors, and 4.74% were graduate students.

3.2 Survey Instrument

We adapted the International English Big-Five Mini-Markers (Thompson, 2008) to assess personality traits; slight modifications were made to the wordings, and the items with the highest loadings were used. The final scale consisted of three items for each of the five personality traits. Additionally, because robust tools for assessing sports imagination, sports creativity, and sports entrepreneurial intention are unavailable in the literature, we derived a 23-item assessment for sports imaginative capability, a 10-item assessment for sports creativity capability, and a 5-item assessment for sports entrepreneurial intention respectively based on the Imaginative Capability Scale (Liang & Chia, 2014), the Creativity Capability Scale (Chang et al., 2015), and the entrepreneurial intention scale (Wang et al., 2016); we revised items from the three original scales for the sports context.

All items were scored on a 6-point Likert scale ranging from 6 (*strongly agree*) to 1 (*strongly disagree*). Finally, because of participant anonymity and confidentiality concerns, self-reported academic performance was included in the survey on a 5-point Likert scale ranging from 5 (*very good*) to 1 (*very bad*). The respondents were required to complete answering each question before they could move to the next, thereby minimising missing data. To warrant initial validity, 5 sports experts and 10 athletes completed the questionnaire and provided revision feedback. Most experts focused on clarifying descriptions of items related to training versus competition scenarios, relationships with coaches and teammates, and creativity as it relates to moves, tactics, or strategies. The athletes mainly focused on the semantics and phrasing of the items. The questionnaire was revised according to their suggestions.

4. Results

The descriptive statistics and confirmatory factor analysis (CFA) indicated that all factors had adequate standard deviation and moderate skewness and kurtosis values, suggesting a normal distribution (Tables I & II).

We conducted partial least square structural equation modelling (PLS-SEM) because of the model complexity and improved prediction assessment (Sabol et al., 2023). The measurement model was validated by evaluating individual item reliability, constructs' internal consistency reliability and convergent validity, and the model's discriminant validity. All standardised item-factor loadings exceeded 0.6 and were statistically significant, demonstrating satisfactory individual item reliability (Table II). Additionally, all constructs have CR exceeding 0.7 (ranging from 0.89 to 0.96) and AVE exceeding 0.5 (ranging from 0.55 to 0.83), demonstrating satisfactory internal consistency reliability and acceptable convergent validity, respectively (Henseler et al., 2009).

The discriminant validity of the measurement model was tested using both the Fornell–Larcker criterion, requiring that the square root of the AVE of a construct be greater than its correlation with any other construct, and the heterotrait–monotrait (HTMT) ratio of correlations, where the HTMT

TABLE I
Confirmatory Factor Analysis (N = 633)

Factor/Item	SL	Mean	SD
Extraversion		2.52	.97
I am talkative.	.91	2.31	.97
I am outgoing.	.91	2.73	1.12
I am energetic.	.92	2.54	1.10
Open to experience		2.75	.88
I am imaginative.	.90	2.57	.97
I am creative.	.91	2.79	1.00
I am intellectual.	.86	2.89	.99
Neuroticism		3.43	1.05
I am emotional.	.80	3.50	1.16
I am anxious.	.92	3.34	1.23
I am envious.	.90	3.44	1.20
Conscientiousness		2.75	.79
I am organised.	.87	2.76	.86
I am efficient.	.90	2.74	.91
I am diligent.	.87	2.74	.94
Agreeableness		2.36	.73
I am sympathetic.	.85	2.26	.82
I am warm.	.87	2.46	.88
I am cooperative.	.85	2.37	.83
Initiating sports imagination		2.67	.81
I often come up with different training methods to improve my sports performance.	.78	2.70	.97
I often think about how to improve my sports performance by examining different perspectives.	.85	2.55	.92
I often try nontraditional approaches to improve my sports performance.	.85	2.41	.95
I often have a rich variety of ideas to improve my sports performance.	.89	2.73	1.03
I often have unique ideas to improve my sports performance.	.83	2.73	.95
I often quickly think of ways to improve my movements.	.80	2.89	1.01
Conceiving sports imagination		2.67	.66
I can intuitively guess what my opponent's intentions are.	.71	2.99	.97

(*Continued*)

(*Continued*) - TABLE I

Factor/Item	SL	Mean	SD
I can intuitively sense what my coach wants me to do next.	.74	2.82	.89
I can guess my opponent's next move from their inadvertent expressions.	.73	2.93	.92
I can block out distractions and concentrate on details related to competing.	.70	2.94	.94
Whilst training, I focus on the things I am not good at.	.72	2.57	.85
Before training, I think about the expected results and what my coach will ask of me.	.79	2.54	.86
When encountering training difficulties, I think about how others have resolved them.	.75	2.33	.85
I reflect on my mistakes in the competition to determine the direction of future training.	.79	2.20	.81
Even when I'm not in training, I'm constantly simulating competition situations.	.70	2.72	.97
Transforming sports imagination		2.40	.69
I try different methods to improve my sports performance during training.	.74	2.43	.88
I explore different ways to improve my sports performance by observing others.	.75	2.19	.836
I can relate the content of other subjects to examples in sports.	.78	2.59	.96
I can explain sports principles with concrete examples from daily life.	.81	2.56	.95
I can use specific physical movements to describe sports concepts that are hard to express.	.79	2.44	.90
I can incorporate my coach's comments into ideas to improve my sports performance.	.81	2.28	.82
I can apply the accumulated results of training during official competitions.	.76	2.29	.84
I can transfer my expertise in a certain sport to other sports.	.72	2.37	.96
Sports originality creativity		2.95	.89
I can discover innovative moves, tactics or strategies to improve sports performance during training or competition.	.87	2.70	.95
I often try additional strategies during training to improve my sports performance.	.85	2.77	.97
My innovative moves, tactics or strategies are considered inspiring to other teammates.	.91	2.93	1.03
Coaches and teammates often think that my moves, tactics, or strategies are clever.	.90	3.12	1.01
Coaches and teammates often think that my moves, tactics, or strategies are unique.	.86	3.23	1.07

(*Continued*)

(*Continued*) - TABLE I

Factor/Item	SL	Mean	SD
Sports usefulness creativity		2.75	.80
My moves, tactics, or strategies are within my own abilities.	.84	2.53	.87
My moves, tactics, or strategies are approved by my coach.	.89	2.87	.93
My moves, tactics, or strategies are effective in improving my own or my team's sports performance.	.91	2.76	.92
My moves, tactics, or strategies prompt learning in my teammates.	.87	2.99	.95
I can flexibly adjust my movements, tactics, or strategies for different sports.	.83	2.61	.92
Sports entrepreneurial intention		3.34	1.16
My professional goal is to become a sports entrepreneur.	.92	3.23	1.27
I will make every effort to establish and operate my own sports company (or studio).	.93	3.08	1.32
I will earnestly learn the knowledge and skills required for sports entrepreneurship (e.g. marketing, financing, or management).	.91	2.95	1.25
I plan to open a sports company (or studio) within the next 5 years.	.87	3.91	1.25
I am determined to develop my sports company into a high-growth enterprise.	.90	3.53	1.32

Note: SL, standardised loading; SD, standard deviation.

TABLE II

Esults Of Skewness, Kurtosis, CR, And AVE (N = 633)

Factor/Item	Skewness	Kurtosis	CR	AVE
Extraversion	**.49**	**.09**	**.94**	**.83**
Open to experience	.30	.28	.92	.79
Neuroticism	.05	-.43	.91	.77
Conscientiousness	.23	.17	.91	.77
Agreeableness	.35	.33	.89	.74
Initiating sports imagination	.02	-.41	.93	.70
Conceiving sports imagination	.15	.46	.92	.55
Transforming sports imagination	.29	-.15	.92	.59
Sports originality creativity	.001	-.03	.94	.77
Sports usefulness creativity	.14	.52	.94	.75
Sports entrepreneurial intention	.30	-.47	.96	.82

Note: CR, composite reliability; AVE , average variance extracted.

ratio between any two constructs must be less than 0.90 (Fornell & Larcker, 1981; Henseler et al., 2015). Tables III and IV reveal that both criteria were satisfied. Because our model is purely reflective, RMS_theta can be used as a fit measure to assess the level of correlation between the outer model residuals. RMS_theta values less than 0.12 indicate a well-fitting model (Henseler et al., 2014), and the RMS_theta value of our model was 0.1.

For a high number of items and a large sample size, common method bias should be assessed and controlled for to ensure accurate results. In this study, Herman's one-factor test was used to assess potential bias in the dataset. All variables were loaded into an unrotated factor solution for exploratory factor analysis. This single factor explained less than 50% of the variance, indicating no evidence of common method bias in the dataset (Podsakoff et al., 2003). Additionally, variance inflation factor (VIF) was used to test for multicollinearity, which occurs when the variance of the estimated regression coefficients is inflated due to collinearity among independent variables. All VIF values were less than 3.3, indicating no multicollinearity (TableV; Kock, 2015).

According to Cohen (1988), f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and substantial effect sizes for the influence of independent

TABLE III
Fornell-Larcker Criterion Analysis (N = 633)

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Extraversion (1)	.91											
Open to experience (2)	.41	.89										
Neuroticism (3)	-.15	-.18	.88									
Conscientiousness (4)	.20	.39	-.12	.88								
Agreeableness (5)	.24	.32	.001	.45	.86							
Initiating imagination (6)	.34	.48	-.20	.37	.39	.83						
Conceiving imagination (7)	.19	.44	-.12	.46	.49	.66	.74					
Transforming imagination (8)	.19	.43	-.08	.44	.45	.59	.73	.77				
Originality creativity (9)	.25	.41	-.20	.40	.33	.64	.65	.59	.88			
Usefulness creativity (10)	.12	.40	-.10	.41	.34	.62	.64	.65	.69	.87		
Entrepreneurial intention (11)	.15	.27	-.10	.20	.11	.41	.39	.36	.46	.37	.91	
Academic performance (12)	-.02	.12	.04	.22	.22	.02	.15	.15	.09	.10	-.11	1

Note: Values on the diagonal are square roots of the AVE, whereas the off-diagonals are correlations between constructs.

TABLE IV
HTMT Ratio Of Correlation (N = 633)

	1	2	3	4	5	6	7	8	9	10	11	12
Extraversion (1)	1											
Open to experience (2)	.46	1										
Neuroticism (3)	.15	.20	1									
Conscientiousness (4)	.22	.45	.13	1								
Agreeableness (5)	.28	.38	.06	.54	1							
Initiating imagination (6)	.37	.54	.21	.41	.45	1						
Conceiving imagination (7)	.21	.50	.13	.52	.56	.73	1					
Transforming imagination (8)	.21	.48	.10	.49	.52	.64	.81	1				
Originality creativity (9)	.27	.45	.21	.44	.37	.70	.71	.64	1			
Usefulness creativity (10)	.14	.45	.11	.46	.39	.68	.71	.70	.75	1		
Entrepreneurial intention (11)	.16	.29	.09	.22	.13	.44	.43	.39	.49	.40	1	
Academic performance (12)	.02	.13	.04	.24	.24	.03	.16	.16	.10	.11	.11	1

variables on dependent variables, respectively. Small effect sizes were obtained for the influence of the traits of openness and agreeableness on all variables related to sports imagination and all sports creativity (Table V). The trait of conscientiousness also had a small effect size for all variables related to sports imagination and sports creativity, except for initiating imagination. Additionally, originality creativity had a small effect size for entrepreneurial intention.

SmartPLS bootstrapping (5,000 resamples) was applied to determine the significance of the paths in the structural model. The results (Figure 2) revealed substantial variance for sports imagination (R^2 = .33 for initiating imagination, .37 for conceiving imagination, and .32 for transforming imagination), moderate variance for sports creativity and entrepreneurial intention (R^2 = .27 for originality creativity, .26 for usefulness creativity, and .26 for entrepreneurial intention), and small variance academic performance (R^2 = .09). The traits of conscientiousness and agreeableness were positively associated with academic performance; thus, H1 is partially supported. The trait of agreeableness was negatively associated with sports entrepreneurial intention; thus, H2 is supported.

The Sobel test was conducted to measure the mediating effects of sports imagination and sports creativity (Table VI). For H3 and H4, initiating sports imagination mediated the association between personality traits and academic performance and that between personality traits (except conscien-

TABLE V
Collinearity Statistics (VIF) And Cohen's F^2 For Effect Sizes

VIF/ f^2	Academic performance	Entrepreneurial intention	Initiating imagination	Conceiving imagination	Transforming imagination	Originality creativity	Usefulness creativity
Extraversion	1.32/ 0.005	1.32/ 0.000	1.23/ 0.021	1.23/ 0.002	1.23/ 0.001	1.23/ 0.004	1.23/ 0.007
Open to experience	1.59/ 0.004	1.59/ 0.002	1.41/ 0.091	1.41/ 0.081	1.41/ 0.073	1.41/ 0.051	1.41/ 0.075
Neuroticism	1.10/ 0.002	1.10/ 0.000	1.05/ 0.019	1.05/ 0.004	1.05/ 0.000	1.05/ 0.021	1.05/ 0.001
Conscientiousness	1.50/ 0.015	1.50/ 0.000	1.38/ 0.015	1.38/ 0.052	1.38/ 0.050	1.38/ 0.046	1.38/ 0.057
Agreeableness	1.51/ 0.018	1.51/ 0.017	1.33/ 0.050	1.33/ 0.116	1.33/ 0.081	1.33/ 0.021	1.33/ 0.027
Initiating imagination	2.42/ 0.014	2.42/ 0.014					
Conceiving imagination	3.01/ 0.001	3.01/ 0.005					
Transforming imagination	2.53/ 0.001	2.53/ 0.003					
Originality creativity	2.47/ 0.000	2.47/ 0.039					
Usefulness creativity	2.53/ 0.111	2.53/ 0.000					

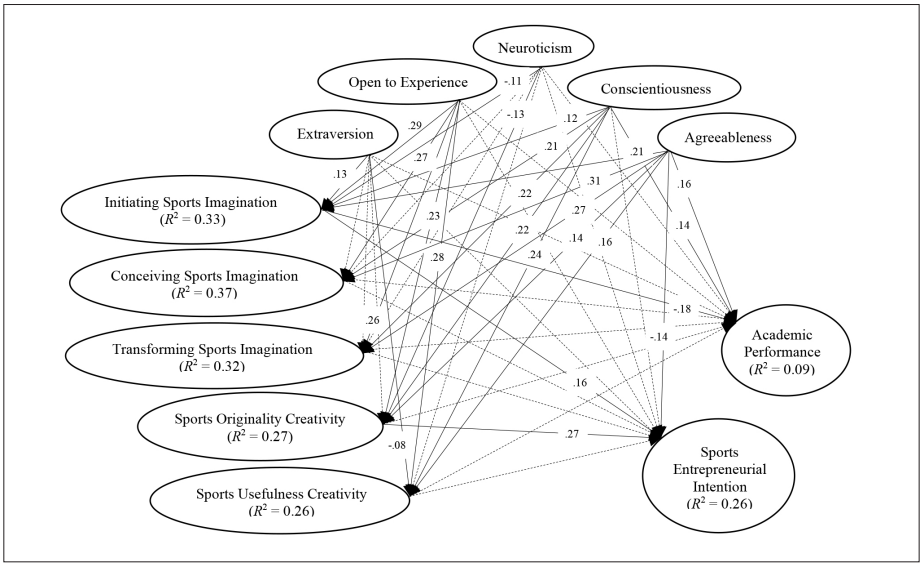

Figure 2. Structural model (n = 633).
Note: Solid lines and dotted lines represent significant and nonsignificant paths, respectively; only significant paths are marked with path coefficients.

tiousness) and sports entrepreneurial intention. Both conceiving and transforming sports imagination had no mediation effects. Therefore, H3 was rejected, and H4 was partially supported. For H5 and H6, originality creativity mediated the path from personality traits (except extraversion) to sports entrepreneurial intention, but not that to academic performance. Usefulness creativity had no mediation effects. Therefore, H5 was rejected, whereas H6 was partially supported.

5. Discussion

The CFA results confirmed the appropriateness of the factor structures of the scales developed in the present study. The results validated the division of athlete personality into five factors: sports imagination into initiating, conceiving, and transforming sports imagination and sports creativity into originality and usefulness creativity. In addition, the results supported a proposed model in which sports imagination and creativity were the mediators of the relationship between academic performance and sports entrepreneurial intention.

TABLE VI
Sobel Test (N = 633)

H	Paths	Coef.	Std. Err.	Sobel's z	p
H3	extraversion → initiating imagination → academic performance	-.02*	.01	-2.35	.02
	open to experience → initiating imagination → academic performance	-.05**	.02	-2.81	.01
	neuroticism → initiating imagination → academic performance	.02*	.01	2.24	.03
	conscientiousness → initiating imagination → academic performance	-.02*	.01	-2.00	.05
	agreeableness → initiating imagination → academic performance	-.04**	.01	-2.63	.01
	five traits → conceiving imagination → academic performance	nonsignificant indirect effects			
	five traits → transforming imagination → academic performance	nonsignificant indirect effects			
H4	extraversion → initiating imagination → sports entrepreneurial intention	.02*	.01	2.10	.04
	open to experience → initiating imagination → sports entrepreneurial intention	.05*	.02	2.41	.02
	neuroticism → initiating imagination → sports entrepreneurial intention	-.02*	.01	-2.03	.04
	conscientiousness→ initiating imagination → sports entrepreneurial intention	nonsignificant indirect effects			
	agreeableness → initiating imagination → sports entrepreneurial intention	.03*	.01	2.29	.02
	five traits → conceiving imagination → sports entrepreneurial intention	nonsignificant indirect effects			
	five traits →transforming imagination → sports entrepreneurial intention	nonsignificant indirect effects			
H5	five traits → originality creativity → academic performance	nonsignificant indirect effects			
	five traits → usefulness creativity → academic performance	nonsignificant indirect effects			
H6	extraversion → originality creativity → sports entrepreneurial intention	nonsignificant indirect effects			
	open to experience → originality creativity → sports entrepreneurial intention	.06***	.02	3.56	<.001
	neuroticism → originality creativity → sports entrepreneurial intention	-.03*	.01	-2.57	.01
	conscientiousness → originality creativity → sports entrepreneurial intention	.06**	.02	3.46	.001
	agreeableness → originality creativity → sports entrepreneurial intention	.04**	.01	2.93	.003
	five traits → usefulness creativity → sports entrepreneurial intention	nonsignificant indirect effects			

Note: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Initiating sports imagination refers to the capability to frequently generate various nontraditional ideas to improve sports performance. Conceiving sports imagination represents the capability to produce effective ideas based on coach suggestions and reflections on mistakes during competitions for improving sports performance. Transforming sports imagination represents the capability to incorporate coach comments to improve sports performance and apply knowledge across fields. Sports originality creativity refers to the capability to generate clever, innovative, and inspiring moves, tactics, or strategies within the sports context. Finally, sports usefulness creativity represents the capability to generate effective and appropriate moves, tactics, or strategies within the sports context.

5.1 Academic Performance

Although studies have suggested that personality traits can predict academic attainment and performance (Conard, 2006; Poropat, 2009), whether these findings are applicable to student-athletes remains unclear because their academic achievement may not have much impact on their career. Our results revealed that both traits of conscientiousness (.14) and agreeableness (.16) directly increased the athletes' academic performance, implying that those who are efficient, diligent, organised, warm, cooperative, and sympathetic are more likely to be academically successful, concurring with prior research findings (Bradley et al., 2013; Rhodes & Smith, 2006). Most of our participants engaged in team sports, explaining the significant effects observed for the trait of agreeableness (Bradley et al., 2013; Chen et al., 2021).

The results also revealed that initiating sports imagination (−.18) decreased their academic performance, implying that student-athletes who often have diverse novel ideas would trail behind peers academically. Many of our participants had just begun learning certain sports; thus, they may have had limited knowledge on safe training approaches and the appropriate means of performing (Latella et al., 2019). Novice athletes must follow their coaches' instructions precisely during training to avoid injury (Latella et al., 2019; Madigan et al., 2018). In addition, sports culture prioritises authority, obedience, and militarism (Bowers et al., 2014), providing additional support to our findings.

The indirect effects of extraversion (−.02), openness to experience (−.052), conscientiousness (−.02), and agreeableness (−.04) on academic performance through initiating sports imagination were minor but negative and significant. These results highlight the importance of novice athletes acquir-

ing the correct training and performance techniques and avoiding injury as well as the authoritarian nature of sports culture. By contrast, the indirect effect of neuroticism (.020) on academic performance through initiating sports imagination was positive. People with high levels of neuroticism tend to experience numerous negative emotions, helping them become acutely aware of future needs. Such people would then intently collect information regarding their needs and options (Sörensen et al., 2008), explaining why those with high levels of neuroticism have higher academic performance.

Sports educators and coaches should consider not only athletic aptitudes but also personality traits when identifying and cultivating talent. Young athletes with both traits of agreeableness and conscientiousness are likely to be highly adaptive to and successful in learning environments requiring continual practice and teamwork. Knowledge about athletes' personality profiles and psychological characteristics can help coaches develop appropriate interventions to maximise sports performance. This is crucial for student-athletes at the beginning of their athletic life who have limited experience with serious training in certain sports. Furthermore, with increased knowledge about athlete personality, athletic administrators, academic advisers, support staff, and even parents can more effectively support student-athletes across their lifespan.

5.2 Sports Entrepreneurial Intention

Most research has highlighted the effects of certain personalities on entrepreneurial intention, with a few studies reaching similar conclusions in the sports context (Boyd et al., 2021; Jones et al., 2020; Steinbrink et al., 2020; Zhao et al., 2010); however, scant research has considered the conditions that would facilitate sports entrepreneurship, particularly the role of athletes' creative potential. Our results revealed that agreeableness (–.14) decreased athletes' sports entrepreneurial intention, implying that those who are warm, cooperative, and sympathetic are less likely to become sports entrepreneurs, a result consistent with prior research results (Zhao et al., 2010). Our participants were mostly engaged in team sports, providing a possible explanation for the negative effect of agreeableness (Pervun et al., 2022).

The results also revealed that initiating sports imagination (.16) increased the athletes' entrepreneurial intention, implying that those who often have miscellaneous new ideas are more likely to establish sports businesses. In addition, sports originality creativity (.27) had a direct effect on entrepreneurial intention, implying that those who are adept at producing innovative moves,

tactics, or strategies have stronger entrepreneurial intention. Our results indicated that creative potential may not improve academic achievement, but if sports performance can be enhanced, athletes' initiating imagination and originality creativity may augment entrepreneurial intention. The predictive validity of originality creativity was stronger than that of initiating imagination, implying that sport emphasises action, and that any innovation should be recognised within the sports context (Chang et al., 2015; Lin et al., 2014); this result can be attributed to the hierarchical nature of sports culture (Bowers et al., 2014) and to the fact that novice athletes must follow their coaches' instructions precisely to learn the correct techniques and avoid injury (Latella et al., 2019; Madigan et al., 2018).

Furthermore, the indirect effects of neuroticism (−.02, −0.03) on entrepreneurial intention through initiating imagination and originality creativity were negative. As mentioned in the earlier text, people with high levels of neuroticism tend to be more aware of future needs and to prepare in advance for these needs (Sörensen et al., 2008), allowing them to overcome general difficulties in creating and maintaining a sports business, which could have hindered their entrepreneurship ability. By contrast, most of the indirect effects of the remaining traits through initiating imagination and originality creativity were positive but modest. These results imply that the capability to frequently generate various, innovative, and inspiring ideas, moves, tactics, or strategies recognised within the sports context for improving sports performance is the key to activating sports entrepreneurial intention for most student-athletes, except for those with high levels of neuroticism. This notion has received limited research attention and should be considered in future studies.

Creativity might appear inconsistent with the traditional values of sports, where single-minded determination, toughness, and trust in coaching dominate (Bowers et al., 2014). However, achieving peak performance by top athletes requires sports creativity, and an increasing number of graduates consider entrepreneurship a promising career because they have observed that upper-level obtained employment in fields not directly associated with their academic training (Rodrigues et al., 2020). To cater to particular talent, sports educators and coaches should consider designing special programmes that emphasise adaptive exploration, divergent learning experiences, physical periodisation, and game-enrichment activity; such programmes along with an encouraging and supportive environment can spark the sports imagination and creativity of student-athletes.

5.3 Academic Performance Versus Sports Entrepreneurial Intention

Studies have found no significant relationship between students' entrepreneurial intention and their academic performance (Castro et al., 2023; Osakede et al., 2017) as well as no significant difference in career guidance activities and employability among students with different academic achievements (Wang et al., 2021). Our result even indicated a weak negative correlation (–0.11) between academic performance and sports entrepreneurial intention. In our sample, academically successful student-athletes favoured the pursuit of professional sports careers, whereas those with lower academic performance favoured other careers. Most of our participants were novice athletes with sports talents and interests who had not yet decided on whether they wished to become professional athletes, which explained our result. Student-athletes should endeavour to maintain a balance between athletic and academic performance, potentially contributing to improved time management, effective learning habits, and reduced stress levels. Academic success is of considerable value throughout an individual's life and career, regardless of whether they choose to become a general employee, a professional athlete, or a sport entrepreneur.

6. Contributions and Suggestions

Student-athletes are a special group on campus. For their overall success in life, such students should carefully manage their time commitments and support systems, and they should aim to maintain a balanced athletic, academic, social, and professional life. Sport entrepreneurship is a crucial topic given its positive impact on social inclusion, public health, socioeconomic development, and intercultural exchange. With the increased recognition of the creative potential of student-athletes, greater proactivity is necessary for supporting them. As a result of the pandemic and given the ubiquity of social media, the popularity of online fitness programmes and coaches has grown strongly, promoting the emergence of various sports entrepreneurs. However, researchers should consider how intention can be transformed into tangible entrepreneurial action and how sports entrepreneurial intention can be stimulated; the research gap pertaining to sports entrepreneurship in the Asian region also merits attention.

The present study contributes to the sports, management, and psychology literature in at least three aspects. First, our results validated a structural model of sports entrepreneurial intention, with athlete personality as an antecedent and sports imagination and creativity as mediators, highlighting the theoretical foundation of sports entrepreneurship and advocating for a

balance between athletic and academic performance. Second, we developed and validated three measurement tools for the assessment of the personality traits and creative potential of student-athletes, an area gaining increased research attention. Our tools can facilitate the integration of attributes, motivations, and entrepreneurial passion to drive the transition from athletes to entrepreneurs. Finally, our results highlight the need for continually exploring the underdeveloped athletic creative potential and sports entrepreneurship in schools or sports institutes; out findings also contribute to the debate about the effective means of helping student-athlete development. Our results are valuable for sports managers, educators, and coaches and can be applied in scouting, recruitment, and talent development, particularly for valuable transitions from authoritarian traditions to unrestricted innovation.

Student-athlete development is a complex topic with much left to be explored. Our study has several limitations which present opportunities for further research on athlete development. First, the five-factor model was the only model adapted for evaluating the athletes' personality in the current study. Second, the predictive validities for sports entrepreneurial intention and academic performance were not particularly high. Third, we did not compare different sports or investigate coach opinions. Fourth, we did not comprehensively examine the factors affecting sports creative potential. In future studies, other personality theories (i.e. biological, behavioural, psychodynamic, and humanist) and alternative models of trait theory should be used to expand the current findings. Additional variables such as family background, prior experience, self-efficacy, support system, and socioeconomic conditions should be added for in-depth analysis. Future studies should examine differences in sports backgrounds, academic profiles, and the perspectives of coaches. The antecedents, mediators, and moderators of sports imagination and creativity should also be investigated. Finally, considering the power of governmental policy and sport as a tool for social change, increased research efforts should be devoted to governmental actions and how sports ventures create social value.

Preliminary research such as this invariably raises diverse academic issues and research questions. Much further research on student-athlete development is warranted; the present study merely represents one part of the complex picture.

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