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Personality Trait Changes in Athletic Training Students during Their University Career: Effects of Academic Stress or COVID-19 Pandemic?

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Abstract: Studies about personality traits have shown a link between emotional stability and coaches' success. The aim of this study was to explore the effect of university education period on the big five personality traits in sports training students according to gender and the type of sports practice chosen for their vocational training process as sport coaches. Method: A total of 146 Sports Training students completed the adapted NEO-FFI reduced version assessment twice: first semester in August 2018 and at the beginning of the eighth semester in February 2022 (COVID-19 pandemic appeared during this period). Results: Comparing the scores obtained for the different personality traits, it was observed that the level of neuroticism increased in the last semester (Mpost = 8.12 vs. Mpre = 5.77), while the level of extroversion (Mpost = 14.40 vs. Mpre = 15.97) and consciousness ($Mpos_t$ = 18.14 vs. Mpre = 19.18) decreased. On the other hand, female students showed higher scores in kindness (15.90 ± 0.87) than men (13.58 ± 0.56) (p = 0.029) at the end of their academic semester. Finally, analysing sport discipline chosen by students, team sports showed a higher score in trait neuroticism (post = 10.47 ± 1.43 vs. pre = 7.73 ± 1.11, p = 0.047) and lower scores in extroversion (post = 13.33 ± 1.01 vs. pre = 16.27 ± 1.17, p = 0.009) than individual sports at the end of the academic semester. Conclusions: Academic stress during the last semester of their bachelor's degree, as well as the consequences of the COVID-19 pandemic could be factors that influenced students' personality traits concerning neuroticism, extroversion, and consciousness or responsibility.

Keywords: personality traits; university studies; training coach

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1. Introduction

The study of personality characteristics in sport has become a very popular research topic in recent decades [1,2]. According to Castro-López et al. [3], personality is the characteristic behavioural manifestation of an individual that emerges as a consequence of environmental stimuli and is configured during growth and maturation. In this line, Eysenck [4] (p. 9) stated that personality is "a more or less stable and enduring organisation of a person's character, temperament, intellect and physique that determines the unique adaptation to the surrounding environment. In this context, the study of the coaches and their personality is of great importance, since, within the sporting practice and the relational binomial established between coach and athlete, there are certain social factors of the environment that condition the performance, motivation, well-being, and participation of the athlete [5–7]. When developing this type of research on the coach role, the current scientific literature focuses on the two major motivational theories, such as achievement goal theory (AGT) and self-determination theory (SDT) [5,6,8–10]. In line with the above,

Torregrosa et al. [8] suggest that a large part of the motivational climate perceived by the athlete falls on the role of the coach. Within the field of psychology, these two theories state that the coach's behaviour strongly influences the motivational climate experienced by the athlete, thereby negatively or positively affecting their performance [5,6,9–11]. Depending on the coach's approach, the athletes may perceive more or less control over their actions and results, which, in turn, influences the athlete's motivation and the attitude towards the sport [12,13]. AGT explains how athletes perceive achievements in their sporting context and, from this perspective, there are two ways of perceiving performance: the so-called task-oriented goal, which implies that the athlete orients the progress towards self-improvement, and, on the other hand, the ego-oriented goal, where the athlete sets success on the athlete's ability to beat others [14,15]. Hence, the problem lies in the motivational climate influencing whether the athletes focus the goal towards the task or the ego; in other words, since the coaches are strongly responsible for the motivational climate, their work will have an impact on the athlete's perception of the goal to be achieved, as well as in their behaviour and cognition [13,16]. In this line, a negative social cohesion, elevated levels of anxiety, worry, and mismatched coping strategies of the athletes have been found to occur when coaches focus success towards the ego [17–19]. On the other hand, SDT offers a well-established theoretical framework to explain the different psychological processes that mediate the relationships that arise between the coach and the athlete, as well as the behavioural, cognitive, and emotional consequences derived from it [10,11,20]. SDT postulates that individuals have multiple motives for performing an activity and these motives can be differentiated according to their degree of internalisation or self-determination [10,11]. In other words, a higher level of internalisation is associated with intrinsic motivation (IM), where playing the coaching role, in this case, would be associated with factors such as the personal enjoyment obtained from it, while, in the second case, the existence of extrinsic motivation (EM) is a clear reflection of the commitment to perform the activity as a consequence of the external results expected to be achieved [7,10,11,20]. SDT provides a theoretical model capable of explaining the coach's influence on athletes, since it proposes that an environment that satisfies the individual's innate needs for autonomy, competence, and affiliation will lead to high and self-determined motivation towards physical activity and sport, with positive cognitive, emotional, and behavioural consequences. Finally, SDT is considered a macro-theory consisting of six mini-theories. Among them, specific reference should be made to the third one, called causality orientations theory (COT) [10,20], representing how people view themselves as self-determined and how they orient themselves towards their environment [10,20,21]. According to Ryan and Deci [21], there are three different orientations that guide the process of a person's interaction with the environment: autonomy, impersonal, and control. More precisely, an autonomy orientation is related to a person who has a high degree of initiative, as well as an ability to regulate their own behaviour independently. Secondly, the impersonal orientation is related to people who see their behaviour and actions as out of control, so that they often feel incompetent, or, in other words, the subject does not know the origin of their behaviour and, consequently, the results are not a consequence of their actions. Finally, a control orientation represents decision making depending on the controls experienced within the environment, i.e., reinforcement by means of rewards or punishments. Thus, an individual will act based on the actions that should be performed according to protocols or events in the surrounding environment [10,20,21]. Likewise, the behaviours mentioned in the causality orientations theory may be influenced by interpersonal conditions and social environments. Hence, the research literature has postulated that the coach can build empowering climates, characterised by task-oriented achievement, autonomy, and social support. But, similarly, the coach can also produce discouraging climates for the athletes, understood as ego- and control-oriented achievement [5,20]. As a consequence, it would be necessary to study the coach's personality and its relationship with the athlete's performance [9].

For authors such as Pérez [22] or Moreno-Arrebola et al. [23], the coach's personality can influence the behaviour and way of acting of their athletes. For these reasons, the

coach's work requires not only theoretical knowledge related to methodological aspects of physical activity and sport, biomedicine, biomechanics, pedagogy, and psychology; it also requires a psychological profile of leadership and mastery of interpersonal and intrapersonal intelligence [22].

In discussing coach personality, the literature has identified certain common traits in successful coaches [22,24,25]. The traits highlighted by these studies are those related to high emotional stability, sociability and social skills, kindness, tenacity, discipline, openness to experience, responsibility, critical professionalism, and creativity. It should be noted that the coach's personality will be influenced by factors such as age, the level at which they are coaching, their sporting experience, and the coach–athlete relationship [22,24–26].

In addition, another aspect to be considered is gender and its relationship with the traits that determine a coach's personality. More specifically, scientific evidence suggests that women tend to have higher scores in personality traits identified with kindness than men, with the sectors of professional development chosen by women being those more oriented towards education or the humanities [27,28]. Based on this, it would be interesting to know whether gender is a factor to be considered in the sectors related to sports management and training, since, although biological theories establish that the differences in personality traits by gender are pre-set, psychosocial theories postulate that the gender roles established by a society influence personality traits [29].

Likewise, when referring to personality, it is important to highlight that it is influenced by self-image and this, additionally, is influenced by the environment [30]. In this respect, the appearance of the COVID-19 virus at the end of 2019 caused significant changes in the lifestyles of the population worldwide, completely changing the scenario or environment of personal development [31], including the educational sector, where the functioning was severely affected and deterioration in mental and physical health was reported in various sectors of the population [31,32]. In the specific case of Mexico, in mid-March, when the World Health Organisation declared COVID-19 a global pandemic, the closure of nonessential activities was imposed, including the immediate cancellation of on-site teaching in all educational levels [33]. Thus, a potential question remains as how the atypical circumstances of the COVID-19 pandemic influenced the students' personality.

Regarding the consequences of the COVID-19 pandemic, several hypotheses suggest that the confinement of citizens may cause mental health problems. Aspects such as the sudden change in academic routine, distance from loved ones, uncertainty in obtaining economic resources, as well as fear of contagion are factors that could generate stress, anxiety, or depression [34]. Some studies have reported that the brief confinements in 2003 and 2012 due to SARS and MERS viruses, respectively, generated episodes of severe distress in citizens. Regarding COVID-19, a study in 59 countries found that pandemic conditions produced moderate to severe effects on anxiety and depression in 9083 individuals [35]. Furthermore, prolonged periods of isolation have been found to cause more negative effects on mental health, such as worsening post-stress disorders, boredom, loneliness, and depression [36]. It has also been reported that young people who overthink about the problems associated with the COVID-19 virus and the pandemic are at high risk of psychological problems [37].

As described above, the unexpected events produced by COVID-19 could influence people's psychological stability, as reflected in the analysis of personality traits [38]. However, it should not be forgotten that other stress factors can impact on the population's behaviour and, therefore, the study of personality is multifactorial [39].

Thus, academic stress, defined as the student's relationship with all the stressors in the school environment, as well as the student's approach and response to such circumstances [40], can lead to changes in behaviour [41]. Some authors have related academic stress to the individual's physical and mental deterioration, and this may be caused by the pressures and demands that students experience in their academic life [42,43]. Under these circumstances, if the subject perceives low achievement, then emotions such as stress,

anxiety, anger, or frustration may be experienced. This can be revealed by analysing the subject's personality traits [44,45].

Psychology has relied on various models to study personality, and one of the most widely used nowadays is the Big Five personality model by McCrae and Costa [46], known as the Big Five [22,24]. This theory states that personality traits are grouped into five factors: neuroticism, extroversion, openness to new experiences, kindness, and responsibility. Based on these elements, the characteristics of thoughts, emotions, and behaviour are structured [47]. Thus, through the analysis of these variables, differences in the individuals' psychological states in different sectors of the population can be predicted [48]. These traits have been assessed using various instruments, such as Goldber's Big Five Markers [46], Hogan's Personality Inventory [46], or McCrae and Costa's NEO Personality Inventory-Revised [40].

Using these instruments could help to identify the most predominant personality traits in various sectors of the population. Consequently, knowing the personality traits of undergraduate students in sports training may help to identify how university education period influences the personality of future coaches [49]. Therefore, the aim of this study was to explore the effect of university education period on the Big Five personality traits in sports training students, according to gender and the sport discipline developed during their vocational training as sport coaches.

2. Materials and Methods

2.1. Research Design

The present study consisted in a descriptive and longitudinal design, where the sample was selected through non-probabilistic (by convenience) sampling [50,51].

2.2. Participants

A total of 142 university students in the process of obtaining a bachelor's degree in Sports Training participated in this study. The mean age of the participants was 25.73 years old (SD = 3.68). Further details on the specific characteristics of the sample can be found in Table 1 below.

Table 1. Descriptive data of the sample according to gender.

	Total	**Male**	**Female**	
	M ± SD	**M ± SD**	**M ± SD**	***p***
	(*n* = 142)	**(*n* = 95)**	**(*n* = 47)**	
Age	25.73 ± 3.68	25.91 ± 3.40	25.39 ± 4.16	0.26
Sports practice				
Football (*n*, %)	15 (16.5%)	9 (9.9%)	6 (6.6%)	0.882
Basketball (*n*, %)	10 (11%)	6 (6.6%)	4 (4.4%)	
Volleyball (*n*, %)	7 (7.7%)	5 (5.5%)	2 (2.2%)	
Athletics (*n*, %)	9 (9.9%)	5 (5.5%)	4 (4.4%)	
Swimming (*n*, %)	16 (17.6%)	9 (9.9%)	7 (7.7%)	
Wrestling (*n*, %)	5 (5.5%)	4 (4.4%)	1 (1.1%)	
Taekwondo (*n*, %)	12 (13.2%)	7 (7.7%)	5 (5.5%)	
Karate (*n*, %)	6 (6.6%)	5 (5.5%)	1 (1.1%)	
Gymnastics (*n*, %)	8 (8.8%)	5 (5.5%)	3 (3.3%)	
Cycling (*n*, %)	3 (3.3%)	3 (3.3%)	0 (0%)	
Sport practice by modality				
Individual (*n*, %)	59 (64.8%)	38 (41.8%)	21 (13.2%)	0.516
Team (*n*, %)	32 (35.2%)	20 (13.2%)	12 (13.2%)	

Note: *n* = number of subjects; M = mean; SD = standard deviation; % = percentage; *p* = significance level.

Sample size calculations were performed using G*Power 3.1.9.4 software. The significance level was set at =0.05. Consequently, the sample size (power analysis) revealed that 76 participants would obtain a power of 95% [52]. To avoid possible deletion of the

recorded data due to the detection of an abnormal response or dropout, we decided to recruit a larger number of participants, so that the initial study sample consisted of a total of 142 subjects.

2.3. Materials

Personality traits were measured by using the reduced version of the Neo-Five Factor Inventory NEO-FFI) questionnaire, adapted by Meda, Moreno-Jiménez, García, Palomera, and Mariscal de Santiago [53]. This instrument was composed of a total of 30 items to assess each of the five personality factors identified as: neuroticism (N), extroversion (E), openness to experience (OE), kindness (K), and responsibility (R). All items were rated on a Likert scale, with scores ranging from 1 to 5, where 1 is defined as "strongly disagree" and 5 as "strongly agree". This instrument has been used before, and the validation adjustment scores were optimal, with reliability values for Cronbach's alpha coefficients (α) for personality traits of: 0.74 for neuroticism, 0.66 for extroversion, 0.76 for openness to experience, 0.66 for kindness, and 0.76 for responsibility.

2.4. Procedures

The NEO-FFI questionnaire was administered twice to the same student group. The first time was at the beginning of the first semester in August 2018 (vocational training), while the second time was set at the beginning of the 8th (last) semester of the bachelor's degree training in February 2022 (COVID-19 pandemic appeared during this period, specifically by the end of 2019) [54]. The online questionnaires were administered through different electronic devices. The average time spent filling in the questionnaires was 30 min approximately. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki [55–57], also taking into consideration the latest literature reviews on these types of research procedures, concerning ethics in sport and exercise science research [58]. In addition, it was approved by the university's ethics committee (Code: NO. DI-F1-RP-12). All students were informed about the study characteristics, as well as the possible benefits and potential risks. Subsequently, a consent form to voluntarily participate in the study was fulfilled and signed.

2.5. Data Analysis

The descriptive data for the different variables are presented as mean (M) and standard deviation (SD). The Kolmogorov–Smirnov test and the Levene test were used to check the data normality and homogeneity of variance, respectively. Subsequently, a 2-factor repeated measures factor analysis (between-subjects, type of Sports Practice Chosen for Their Training (SPCTT); within-subjects, time of measurement (pre–post)) was performed in order to analyse the scores obtained on each NEO-FFI questionnaire dimension. In addition, to explore significant differences between each of these conditions, the Bonferroni post hoc test was applied. Where necessary, the Chi-squared test ($\chi 2$) was also applied, depending on the normality assumption. A post hoc comparison for the 2xn tables was applied (statistic contingency coefficient), including statistic value and p-value. Finally, a receiver operating characteristic (ROC) curve analysis was performed to determine the cut-off point for the different dimensions of the NEO-FFI questionnaire, as well as the classification of the students according to their clustering by gender and SPCTT. Classification accuracy for each set of cut-off points was assessed by calculating weighted statistics, sensitivity, specificity, and the area under the ROC curve (AUC). An area of value 1 represents perfect classification, while an area of 0.50 represents an absence of classification accuracy. ROC-AUC values of >0.90 are considered excellent, 0.80-0.89 good, 0.70–0.79 moderate, and <0.70 poor [59]. Data analysis was performed by using SPSS software (IBM Corp., Armonk, NY, USA) for Windows, version 24.0, as well as MedCalc 14.12.0 (Mariakerke, Belgium). The statistical significance level was set at $p < 0.05$ for all statistical comparisons.

3. Results

The data recorded according to age, as well as the sport discipline chosen for coaching are shown in Table 1, both at a general level and subdivided according to gender.

Moreover, Table 2 presents the data obtained for each dimension of the NEO-FFI questionnaire, both at the general level (F1 = 6.975; $p = 0.000$; $\eta P^2 = 0.096$) and according to the gender of the Sports Training students (F4 = 0.969; $p = 0.014$; $\eta P^2 = 0.089$).

Table 2. Mean values obtained by dimensions for the NEO-FFI questionnaire according to gender.

		General		Male		Female	
		M ± SD	***p***	**M ± SD**	***p***	**M ± SD**	***p***
Neuroticism	Pre	5.77 ± 0.53	0.002 **	5.90 ± 0.57	0.014 *	6.40 ± 0.88	0.072
	Post	8.12 ± 0.76		7.77 ± 0.78		8.50 ± 1.21	
Extroversion	Pre	15.97 ± 0.59	0.002 **	15.67 ± 0.60	0.042 *	17.00 ± 0.93	0.001 **
	Post	14.40 ± 0.51		14.58 ± 0.53		14.15 ± 0.84	
Openness_experience	Pre	14.74 ± 0.42	0.917	14.56 ± 0.45	1.000	14.30 ± 0.69	0.798
	Post	14.68 ± 0.52		14.56 ± 0.55		14.50 ± 0.85	
Kindness	Pre	14.61 ± 0.47	0.120	14.65 ± 0.50	0.083	15.90 ± 0.78	1.000
	Post	13.73 ± 0.54		13.58 ± 0.56		15.90 ± 0.87	
Responsibility	Pre	19.18 ± 0.45	0.028 *	18.77 ± 0.48	0.448	19.05 ± 0.74	0.153
	Post	18.14 ± 0.42		18.40 ± 0.43		17.95 ± 0.67	

Note: Pre = average values for the 1st semester; Post = average values for the 8th semester; M = mean; SD = standard deviation; p = significance level; * = $p < 0.05$; ** = $p < 0.01$.

The results show that the neuroticism, extroversion, and responsibility dimensions revealed significant differences when comparing the scores at the first and eighth semester ($p < 0.05$). More specifically, neuroticism reported higher values in Sports Training students in the eighth semester (Mpost = 8.12 vs. Mpre = 5.77), while the dimensions of extroversion (Mpost = 14.40 vs. Mpre = 15.97) and responsibility (Mpost = 18.14 vs. Mpre = 19.18) had a decrease in their mean value in the eighth semester. On the other hand, when comparing the scores in each NEO-FFI questionnaire dimension according to gender, significant differences were observed in the mean values obtained ($p < 0.05$). Specifically, neuroticism was found to be significantly higher for men in their last semester of training (Mpost = 7.77 vs. Mpre = 5.90; $p = 0.014$), while extroversion was significantly lower (Mpost = 14.58 vs. Mpre = 15.68; $p = 0.042$). In addition, women had significant differences in extroversion as well (Mpost = 14.15 vs. Mpre = 17.00; $p = 0.001$).

The following Table 3 shows the mean values obtained by dimensions for the NEO-FFI questionnaire according to the sport discipline selected by the students ($F_{36} = 7.49$; $p = 0.071$; $\eta P^2 = 0.119$).

The results showed significant differences in the mean scores for the extroversion and kindness dimensions for basketball coaches in vocational training, being lower in both dimensions in the eighth semester compared to the first (Mpost_extroversion = 13.33 ± 1.51 vs. Mpre_extroversion = 17.67 ± 1.76, $p = 0.005$; Mpost_kindness = 13.17 ± 1.61 vs. Mpre_kindness = 16.83 ± 1.40, $p = 0.03$). On the other hand, when comparing the means obtained for the volleyball coaches in vocational training, significant differences were found for neuroticism and kindness ($p < 0.05$). On this occasion, students recorded higher mean values in the eighth semester for neuroticism (Mpost = 10.00 ± 2.71, $p = 0.032$), whereas, for kindness, these mean scores decreased in this same semester (Mpost = 11.00, $p = 0.012$). Finally, the swimming coaches in vocational training, only registered significant differences in the mean values for extroversion in the eighth semester, being lower than those in the first semester (Mpost_extroversion = 14.17 ± 1.07 vs. Mpre_extroversion = 17.33 ± 1.25, $p = 0.003$). Similarly, when grouping the sports practices according to their classification as TS or IS, the dimensions of neuroticism and extroversion showed significant differences in TS students, so that the mean neuroticism values were higher in the eighth semester compared to the first semester (Mpost_neuroticism = 10.47 ± 1.43 vs.

Mpre_neuroticism = 7.73 ± 1.11, p = 0.047). Likewise, the mean extroversion values were higher in the eighth semester as well (Mpost_extroversion = 13.33 ± 1.01 vs. Mpre_extroversion = 16.27 ± 1.17, p = 0.009) (Table 3).

Figure 1 below shows the results according to whether they are considered as TS or IS.

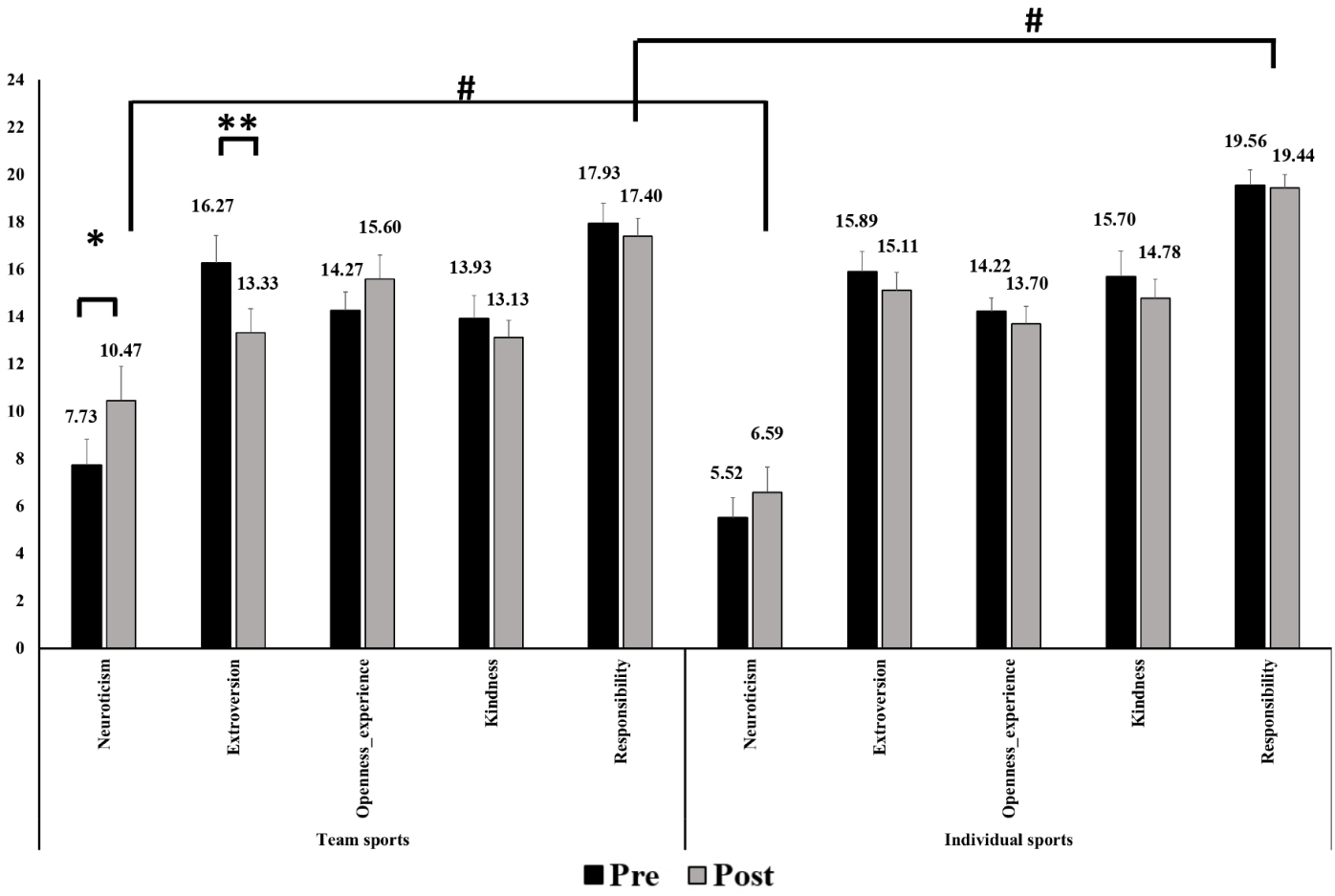

Figure 1. Comparison of the mean values obtained by dimensions for the NEO-FFI questionnaire according to the grouped sport practice chosen for the students' training. Note: * = differences by dimensions within the same gender; * = $p < 0.05$; ** = $p < 0.01$; # = differences by dimension when comparing scores by sport discipline; # = $p < 0.05$. Data presented as mean ± SD.

As shown in Figure 1, when comparing according to the discipline chosen as individual or team, significant differences were found in the eighth semester for the neuroticism and responsibility dimensions ($p < 0.05$). Specifically, the neuroticism scores were higher in students who chose TS (Mpost_individual = 6.59 ± 1.07 vs. Mpost_team = 10.47 ± 1.43, p = 0.036). Meanwhile, for the mean responsibility values had a different behaviour, with higher mean scores in students who chose IS (Mpost_individual = 19.44 ± 0.57 vs. Mpost_team = 17.40 ± 0.76, p = 0.036).

Finally, through the ROC curves analysis, the cut-off point for the different NEO-FII questionnaire dimensions was determined according to the sport discipline chosen by the students and their classification according to gender. The AUC cut-offs, as well as the scores obtained, are shown in Table 4.

Table 3. Mean values obtained by dimensions for the NEO-FFI questionnaire according to the discipline chosen to become a trainer.

		Neuroticism		Extroversion		Openness_Experience		Kindness		Responsibility	
		M ± SD	**p**	**M ± SD**	**p**	**M ± SD**	**p**	**M ± SD**	**p**	**M ± SD**	**p**
F	Pre	6.15 ± 1.05	0.674	15.15 ± 1.20	0.701	13.62 ± 0.86	0.638	16.00 ± 0.95	0.682	17.46 ± 0.91	0.326
	Post	6.77 ± 1.54		15.54 ± 1.03		14.08 ± 1.06		16.46 ± 1.09		18.39 ± 0.86	
B	Pre	3.17 ± 1.54	0.092	17.67 ± 1.76	0.005 **	16.67 ± 1.26	0.490	16.83 ± 1.40	0.03 *	20.33 ± 1.34	0.335
	Post	6.84 ± 2.27		13.33 ± 1.51		15.67 ± 1.56		13.17 ± 1.61		19.00 ± 1.26	
V	Pre	4.25 ± 1.89	0.032 *	14.00 ± 2.16	0.890	15.00 ± 1.54	0.481	16.25 ± 1.22	0.012 *	19.75 ± 1.16	0.058
	Post	10.00 ± 2.71		13.75 ± 1.86		3.75 ± 1.91		11.00 ± 1.39		16.50 ± 1.09	
A	Pre	7.63 ± 1.33	0.385	14.50 ± 1.53	0.054	15.00 ± 1.09	0.320	15.63 ± 1.22	0.794	18.38 ± 1.16	0.530
	Post	9.25 ± 1.97		12.00 ± 1.31		13.75 ± 1.35		15.25 ± 1.39		17.63 ± 1.09	
S	Pre	5.25 ± 1.09	0.362	17.33 ± 1.25	0.003 **	14.670.89	0.195	15.08 ± 0.99	0.138	19.17 ± 0.95	0.797
	Post	6.75 ± 1.61		14.17 ± 1.07		16.00 ± 1.10		13.33 ± 1.14		18.92 ± 0.89	
W	Pre	5.67 ± 2.18	1.000	16.33 ± 2.49	0.204	16.00 ± 1.78	0.416	13.00 ± 1.98	0.569	21.67 ± 1.90	0.091
	Post	5.67 ± 3.21		13.67 ± 2.14		14.33 ± 2.20		14.33 ± 2.27		18.33 ± 1.79	
T	Pre	6.50 ± 1.33	0.285	16.25 ± 1.53	0.494	13.75 ± 1.09	0.618	13.75 ± 1.22	0.727	18.38 ± 1.16	0.601
	Post	8.50 ± 1.97		15.375 ± 1.31		13.13 ± 1.35		14.25 ± 1.39		19.00 ± 1.09	
K	Pre	5.75 ± 1.89	0.258	16.00 ± 2.16	0.407	15.75 ± 1.54	0.888	14.50 ± 1.72	0.326	20.75 ± 1.64	0.186
	Post	8.75 ± 2.78		14.50 ± 1.86		16.00 ± 1.91		12.50 ± 1.97		18.50 ± 1.55	
G	Pre	9.71 ± 1.42	0.616	17.14 ± 1.63	0.298	12.57 ± 1.17	0.669	14.71 ± 1.30	0.515	18.57 ± 1.24	0.265
	Post	10.71 ± 2.10		15.71 ± 1.40		13.14 ± 1.44		15.71 ± 1.49		17.14 ± 1.17	
C	Pre	3.67 ± 2.18	0.158	15.33 ± 2.50	0.749	14.33 ± 1.78	0.195	10.33 ± 1.98	0.669	17.33 ± 1.90	0.732
	Post	8.00 ± 3.21		16 ± 2.14		17.00 ± 2.20		11.33 ± 2.27		18.00 ± 1.79	
		Clustering of the different sports disciplines									
TS	Pre	7.73 ± 1.11	0.047 *	16.27 ± 1.17	0.009 **	14.27 ± 0.78	0.092	13.93 ± 0.96	0.50	17.93 ± 0.87	0.538
	Post	10.47 ± 1.43		13.33 ± 1.01		15.60 ± 1.00		13.13 ± 0.72		17.40 ± 0.76	
IS	Pre	5.52 ± 0.83	0.285	15.89 ± 0.87	0.333	14.22 ± 0.58	0.373	15.70 ± 1.07	0.297	19.56 ± 0.65	0.863
	Post	6.59 ± 1.07		15.11 ± 0.76		13.70 ± 0.74		14.78 ± 0.80		19.44 ± 0.57	

Note: Pre = mean values in 1st semester; Post = mean values in 8th semester; M = mean; SD = standard deviation; F = football; B = basketball; V = volleyball; A = athletics; S = swimming; W = associated wrestling; T = taekwondo; K = karate; G = gymnastics; C = cycling; TS = team sports; IS = individual sports; p = significance level; * = $p < 0.05$; ** = $p < 0.01$.

Table 4. ROC analysis according to gender for the different NEO-FFI questionnaire dimensions by the type of SPCTT.

	Type of SPCTT										
	Kindness			**Openess**			**Neurot.**	**Kindness**		**Extroversion**	
	GNR	**TS**	**IS**	**F**		**T**	**V**			**A**	
	Post	**Post**	**Post**	**Pre**	**Post**	**Post**	**Post**	**Pre**	**Post**	**Pre**	**Post**
	Ms	**Ms**	**Ms**	**Ms**	**Ms**	**Ms**	**Ms**	**Ms**	**Ms**	**Ms**	**Ms**
AUC	0.66	0.55	0.71	0.89	0.83	0.83	0.90	1.00	1.00	0.83	0.85
SE	0.06	0.11	0.08	0.11	0.10	0.13	0.10	0.00	0.00	0.16	0.14
95% CI	0.55 to 0.76	0.37 to 0.73	0.57 to 0.82	0.61 to 0.99	0.56 to 0.97	0.51 to 0.98	0.47 to 0.99	0.63 to 1.00	0.66 to 1.00	0.43 to 0.99	0.47 to 0.99
p	0.009 **	0.60	0.001 **	<0.000 **	0.001 **	0.01 **	<0.000 **	<0.000 **	<0.000 **	0.033 *	0.011 *
YI	0.35	0.22	0.48	0.89	0.56	0.51	0.80	1.00	1.00	0.60	0.60
C_P	≤16	≤17	≤16	≤14	≤12	≤13	≤12	≤15	≤16	≤12	≤10

Note: only significant results are presented. N = number; Pre = scores in the 1st semester; post = scores in the 8th semester; * = significance level $p < 0.05$; ** = significance level $p < 0.01$; CI = confidence index; YI = Youden index; SE = standard error; AUC = area under the curve; F = football; B = basketball; V = volleyball; A = athletics; S = swimming; W = associated wrestling; T = taekwondo; K = karate; G = gymnastics; C = cycling; TS = team sports; IS = individual sports; GNR: general; Ms = male; C_P= cut-off point.

These values range from 10 to 17, depending on the dimension and type of sport discipline chosen by the students. Generally speaking, the cut-off point for kindness in the eighth semester is 16 in order to discriminate according to the gender of the student. In relation to TS and IS, the values are 17 and 16, respectively. For the openness, neuroticism, kindness, and extroversion dimensions, the values for various sport disciplines were established in the range 10–16.

4. Discussion

The aim of this study was to explore the effect of the university education period on the students' personality traits according to gender and the type of sports discipline chosen during the vocational training. When comparing these personality traits, significant differences were observed in the dimension scores obtained according to the time frame (first and last semester). These changes were most notably recorded in the neuroticism dimensions (increased level in the last semester), and the extroversion and responsibility dimensions (decreasing their level when comparing first and eighth semester). These variations could be due to the academic background itself, which can be identified as a possible factor modifying personality traits, as external influences (such as cultural norms, life events, or situations) interact with an individual's adaptive capacity [60]. Hence, the COVID-19 pandemic occurred in the time interval between the two measurements of our study, causing an atypical situation in the regular academic cycle. Therefore, this caused the results to be analysed from two perspectives: the effects of academic stress and, secondly, the effects of the COVID-19 pandemic.

These results open up a long-standing debate. Vedel et al. [27], after reviewing the connection between personality and university academic performance, formulated the question: "Are personality traits the product of socialisation in a particular faculty, or are they pre-established before entry to higher education?" However, the same author [27], based on the study by Lievens et al. [61], stated only a few years later that the traits are not the product of socialisation at university but are already pre-established.

Furthermore, when talking about the sports students' personality profiles, it must be considered that this type of training and subsequent professional development is oriented towards interaction with people. According to the literature, there seems to be a preference to select subjects that are more related to an orientation towards interacting with people when higher levels of neuroticism are observed in students [62,63]. The findings of this research seem to be in line with these previous studies, as Sport Science students tend, in their professional careers, to hold jobs that require continuous contact with people, whether from the perspective of education, coaching, or sport management. In fact, these results agree with the study developed by De Fruyt and Mervielde [63], who also showed high levels of neuroticism in Education Science students, while responsibility was reduced, as observed in our study. These low levels of responsibility may be related to sport education and coaching students who are more focused on aspects such as communication or leadership in their field of work. Thus, as mentioned above, personality traits vary in relation to the university career and, therefore, the prevalence of responsibility or another trait may not be fundamental for performance in an academic discipline and may be compensated by other individuals' actions or strategies [24,50].

However, Clariana [28] found certain differences compared to our results. Specifically, the author found higher scores for neuroticism and responsibility. The differences between these findings and those presented in this research are related to the student profile, since, in the research by Clariana [28], the participants were students of pedagogy and education. Although both student profiles are similar, since their professional activities are oriented to interacting with people, the pedagogue is geared towards a mentoring role, both at an educational and professional level, and directly related to families. So, their apparent motivations are characterised by an altruistic profile with a socio-community and participatory-citizen emphasis [64]. However, regarding our results, it could be stated that the coaches should have a leadership profile, and, therefore, motivating and developing

the athletes' skills to achieve competitive success would be one of their priorities [24]. Based on the above, the motivational climate produced by the coach influences the athletes' perception of their achievements, with the youth having more positive experiences and well-being when the climate is task-oriented, whereas when the coach focuses the climate on the ego, the athletes report more feelings of tension, anxiety, and antisocial behaviour [6,18,65].

Regarding the high levels of neuroticism found in this research, some studies indicate that this may be associated with emotional exhaustion [66]. In this regard, the last semester of the university career among sports students could generate fatigue in the students' mood and, therefore, explain the neuroticism levels found. In this context, university students with academic stress and suicide thoughts have been found to have high levels of neuroticism, as well as low levels of engagement and extroversion [41]. It should not be forgotten that stress in academic life can lead to anxiety, depression, as well as behavioural problems [40]. Thus, it is not uncommon for 25% of the university population worldwide to have problems with depression [66], with higher levels of neuroticism being reported in students with more academic stress [67]. This implies that neuroticism, the last variable mentioned and experienced by our study subjects, is linked to negative emotions [68].

Another factor that could increase the neuroticism levels is the expertise time. In this line, García-Neveira and Ruíz-Barquín [24] found a direct relationship between neuroticism levels and the number of years dedicated to vocational training, so that the greater the number of years, the higher the neuroticism levels. These findings coincide with the results found in our research, where the greater the experience acquired by the students as coaches, the greater their neuroticism.

Likewise, the increased neuroticism can also be caused by the constant stressful situations experienced by the coach. In fact, scientific evidence suggests the existence of a positive correlation between stress and the neuroticism trait [69]. Consequently, the increase in this trait in sports students could be due not only to the inherent demands of the final years of university studies, but also to the beginning of their work experience as assistant coaches. Similarly, it has been shown that stress can negatively influence the individual's commitment level. Specifically, several studies reported low engagement and high neuroticism levels when subjects are stressed [70]. This is consistent with our results.

On the other hand, the emergence of COVID-19 led to significant changes in lifestyles around the world [31,71]. This may have influenced the results of the second data collection in our study. Therefore, it remains an open question whether the results would have been the same or different under non-pandemic conditions.

However, when reviewing personality traits with high levels of neuroticism and low levels of extroversion and engagement, as found in our study, such a picture has been associated with depressive symptoms [72].

Actually, current research shows that circumstances such as those experienced during the COVID-19 pandemic could lead to a deterioration in people's mental health, resulting in depression and anxiety symptoms and conditions [73,74]. Circumstances such as confinement and sudden disruption of daily activities can lead to feelings such as emotional distress, boredom, anxiety, or loneliness [75]. Among other data, studies in China showed that the COVID-19 pandemic produced moderate to severe symptoms of depression, anxiety, and stress in their population. Likewise, students and teachers in Venezuela showed similar symptoms during the COVID-19 pandemic [76].

This information coincides with more clinical reports finding increasing depression and anxiety rates associated to the COVID-19 pandemic [77]. However, this can be approached from different perspectives, since, while some may have felt helpless and had negative feelings during social isolation, others found opportunities for personal development, although the latter were the least reported cases [36]. In relation to prolonged quarantine times, it has been shown that such stressful circumstances can produce prolonged negative effects on psychological health [78]. This could explain why the subjects in our study had a detriment in their psychological state, as already demonstrated in a study with a Mexican population, who reported suffering from psychological disorders,

depression, and anxiety only one week after the implementation of the confinement measures [79]. Other consequences of confinement were acute and chronic insomnia, as well as the prevalence of post-traumatic stress disorder [80,81].

Given the high prevalence of people psychologically affected by quarantine, several studies have recommended post-COVID-19 mental health care programmes and resilience strategies [82,83]. However, although there is evidence to suggest that the personality profile of our students could be influenced by the circumstances of the COVID-19 pandemic, it would be necessary to support these results with other psychological tests to corroborate the stress and depression states in the students.

Based on that, the stress of the last academic cycle suffered by the students, together with the atypical circumstances caused by the COVID-19 pandemic, could be the factors that caused the scores shown in the personality traits of neuroticism, extroversion, and commitment or responsibility in the students. Indeed, as some studies have shown using the Big Five to diagnose stress and anxiety for the COVID-19 pandemic, traits such as extroversion and responsibility have been negatively correlated with anxiety, while neuroticism has shown positive correlations with anxiety and depressive symptoms [84,85]. The high susceptibility of people with high levels of neuroticism to suffer episodes of anxiety and depression [86] is due to the fact that this personality trait represents the tendency to feel frustrated and have negative affectivity [46]. On the other hand, extroversion is the opposite of neuroticism, being associated with sociability, assertiveness, and positive emotionality [47,87]. Thus, low scores are related to depressed subjects, although these data are not as conclusive as with neuroticism [88]. Finally, commitment is another trait negatively correlated with neuroticism, since one of its main characteristics is planning, goal setting, and discipline [48,89]. Therefore, low levels of this trait imply lower levels of self-care, which, in turn, may increase symptoms of depression [90].

When examining the relationship between personality, gender, and academic career, our study showed a significant increase in the neuroticism levels and a decrease in extroversion for males, whereas these extroversion levels dropped even more for females when comparing first and eighth semester scores. The overall results showed a higher kindness level in women compared to men, maintaining those level across the complete vocational training period. From biological theories, the female gender, due to evolutionary adaptability, tends to show greater traits of kindness for reasons such as pregnancy, childbirth, breastfeeding, and childcare [29]. Consequently, the conclusion could be clear: the academic trajectory seems to cause a greater deterioration of mood in male students, possibly due to their tendency to handle situations in an avoidant way and, therefore, to perceive greater stress [91]. These results are inconsistent with other research, such as Silva and Astorga [92], where men were more resilient in adverse situations. However, Peña and Naomi [93] found a greater capacity for coping with difficult situations in women. These same authors affirm that a possible explanation could be based on some cultures where women are more willing to express their problems and, therefore, find more potential sources of solutions. Also, communication styles vary according to gender and these differences are often influenced by social stereotypes [94]. Given these variations in the data, it seems necessary to further investigate the socio-cultural context where the study is taking place.

On the other hand, Clariana [28] studied personality traits according to different university degrees. The conclusions concerning the differences by gender were evident, since different profiles in the choice of the professional career were found, as well as observing variations in the scores obtained for the different personality traits. Moreover, in this same study, the results for female gender showed that the predominant degrees were those related to education and the humanities, obtaining higher scores in the personality traits identified with kindness and responsibility. These data are consistent with the higher levels of kindness found in our study when comparing students by gender in the eighth semester. One possible explanation for these differences may be that women are generally more friendly than men [95] and, consequently, may be less affected in this trait by external factors, such as the pandemic or the demands of the last year of their studies.

Finally, when considering the academic trajectory variable or SPCTT, differentiating between IS and TS, it was observed that there was an increase in the neuroticism levels and a decrease in the extroversion scores in the students who chose the TS practice. Along the same lines, when comparing TS vs. IS students in the eighth semester, higher responsibility levels were found in students identified with IS, while, for those who chose TS, the highest levels were those related to neuroticism. A possible explanation for these higher neuroticism levels and lower extroversion scores in TS students could be the constant exposure to stressful moments or situations experienced by TS coaches [96]. In this respect, a coach may experience a high stress level as a consequence of interacting with other people. Based on this statement, stress can provoke pressure states in the individual, affecting negatively their performance [97]. Although the subjects of our study are still students, their practices are oriented towards their professional field, which increases the exposure to stress.

In accordance to the literature, high kindness and openness to experience trait scores could be determinant in the coach's performance [24]. The ease of having positive feedback with the athletes and a motivating environment will strongly depend on the actions established by the coach [12], so the coach's personality traits should be in line with the demands of the environment. If we take into consideration that the ROC curve analysis showed a cut-off point for kindness trait in the last period (eighth semester, both in general and in IS according to gender), the evidence found would be in apparent agreement with this statement. More specifically, for kindness, the discipline of athletics showed a discriminant value both before (cut-off point <15) and after (cut-off point <16) the vocational training process of the students depending on their gender, allowing us to discriminate before and during the process on the basis of this personality trait identified as a determinant in the performance of a sports coach [24]. Additionally, for the sports disciplines of football and taekwondo, this analysis revealed differences in the scores obtained according to the students' gender for openness to experience trait, thus allowing us to establish and discriminate previous access profiles according to these cut-off points in view of the apparent importance of this trait for the coach's performance [24]. Furthermore, if these analyses are observed, it could be noted that, after completing the process in both cases, a differentiation can be made between male and female students, providing valuable information regarding what happens in the vocational training processes of these professionals.

Along the same lines, in the first and eighth semesters, individual sport practice identified with athletics showed cut-off points that would allow us to differentiate profiles for the extroversion personality trait previously and subsequently according to the student's gender. Indeed, that point for discriminating on the basis of gender decreased in the eighth semester, dropping from <12 to <10, representing a clear decrease in the levels shown for this personality trait. Considering that the coach's behaviour is one of the main factors in the vocational training of youth [98], reported changes in extroversion should not be neglected, as this trait is strongly related to ease of social contact and optimism [24].

However, when studying the sporting practice identified with volleyball, the analyses revealed gender differences in the eighth semester for neuroticism. This should be studied further, since it is related to stress and depression, as mentioned above [73,74].

To our knowledge, this is the first study to define such cut-off points for personality traits before starting and after finishing this process to become sports coaches. For the general group and IS, the AUC value is close to or above 0.70, and this may invalidate the results of the diagnostic test at the clinical level given the potential repercussions of misclassification in relation to the pre-existence or absence of disease. Nevertheless, both tests showed acceptable levels of specificity for such discrimination and classification [58,99]. In addition, the NEO-FFI instrument for recording personality traits is not a clinical diagnostic test; thus, the results obtained would be considered adequate for the differentiation of personality trait levels based on this classification by gender according to the type of SPCTT.

Hence, analysing the predictive values of the coach's personality traits can help to identify behavioural patterns outside or within the coach's profile, and thereby provide psychological intervention to improve the student's health [100].

The aim of the study was to identify changes in personality traits in sports coaching students during their academic career. Unfortunately, between the first and the second measurement of the personality traits, COVID-19 was declared a worldwide pandemic on 11 March 2020. As a result, several changes in the population's lifestyles were implemented in Mexico and other countries [33]. Consequently, preliminary results of some studies showed mental health impairments due to COVID-19, such as fear of disruptive life changes, fear of illness, economic instability, and increases in stress, depression, and anxiety due to quarantine. However, further long-term studies are needed to establish more conclusive consequences [101,102]. On the other hand, university academic life itself represents changes in habits and aspects, such as fear of failure, leading to stress, anxiety, or depression in students [103]. This makes it quite complicated to identify whether the personality traits of neuroticism, extroversion, and engagement were affected by academic stress, the COVID-19 pandemic, or both.

Finally, although the NEO-FFI questionnaire has proven to have sufficient validity and reliability to be used in different populations and contexts, as was the case in our study [45,53,104], the present research is not without limitations. Therefore, the use of a larger number of questionnaires to assess psychological aspects and the assessment with this type of university population in various contexts and countries could have further enriched the results of the study, increasing the existing scientific evidence on the subject.

5. Conclusions

This study is the first one to consider the scores obtained in the different personality traits for the sport discipline chosen to be sports coaches according to their gender. These cut-off points could be very useful to establish previous profiles of personality traits. This would allow the adaptation and design of vocational training plans according to these findings, clearly oriented to enhance those personality traits pre-established as determinants for the successful professional performance of sports coaches. Furthermore, they could be used to make these same adjustments after the end of the vocational training periods, since the results found in this research indicate that personality traits undergo significant alterations or modifications after the education period. However, this information must be interpreted carefully, considering that it is based on the characteristics and/or responses of a specific population or culture, and must be adapted to the characteristics of the educational system of the target population if similar work is to be developed.

Moreover, our findings seem to evidence that the academic stress and the circumstances generated by the COVID-19 pandemic could be factors that influenced the changes in the students' neuroticism, extroversion, and responsibility trait scores. The above reinforces the hypothesis of the need to predict or identify these scores and profiles in order to adapt the vocational training process with greater possibilities and guarantees of success for future sports coaches. In fact, beyond the particular circumstances that occurred during the students' university cycle, this study highlights the need to monitor the psychological health of coaches during their training period.

The personality trait values mentioned suggest tendencies towards depression in eighth semester students; however, it would be essential to use more psychological instruments to ratify these patterns. In addition, it should be highlighted that the vocational training of these students was undertaken in atypical conditions, as a consequence of the COVID-19 pandemic, suggesting the need for further research along these lines in order to establish with more clarity the external factors that could influence this university education and the associated personality traits that have been found.

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