

Extrinsic Risk Factors Associated with Training and Lifestyle in College Athletes

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Abstract

Introduction: Physical activity and sport practice are protective factors for non-communicable diseases such as diabetes mellitus, cancer, hypertension, obesity and depression.

Objective: To characterize extrinsic risk factors related to training and lifestyle in college athlete students.

Method: We carried out a cross section descriptive study with 155 college athletes. To identify risk factors during sports, they completed a sociodemographic characteristics and sporting history survey during the first half of 2017, called "Prevention Program COLDEPORTES Plus"; and to measure lifestyle steps 1 and 2 from the STEPS questionnaire were taken as a reference.

Results: In total, 60.6% were male, 56.1% of students were between 21 and 25 years, 64.5% of students reported having suitable sports facilities for practice, while only 30.8% of coaches expressed having proper sports equipment for training. With respect to the warm-up, 48.4% of students always perform it before practice and 60.6% hydrated during training. Additionally, 96.8% consume fruits, vegetables and meats, 49.7% consume alcohol, and 7.7% reported smoking for pleasure.

Conclusion: College athletes have unhealthy behaviors during sport and others that are considered risk factors, which may compromise their health and athletic performance. These findings suggest the creation of educational implementation programs to promote and improve healthy behaviors both in training and in lifestyle would be helpful.

Keywords: *Physical Activity; Sport Practice; Lifestyle; College Athletes*

Introduction

Physical activity and sport practice is a protective factor for non-communicable diseases such as diabetes mellitus, cancer, hypertension, obesity, and depression [1]. Not only the prevention of cardiovascular disease has been associated with active lifestyles or regular sport practice, but also cognitive function, stimulating memory, learning, neurogenesis, and brain plasticity [2,3]. In addition, it is related to better academic performance, since individuals who play sports have higher levels of stress tolerance, self-perception, concentration and sociability, adding training aspects such as commitment, respect, solidarity, and teamwork [4].

Acquiring healthy habits into adulthood is related to physical activity during childhood and adolescence [4]. However, starting college appears to be a critical period that generates health behaviors changes, due to emotional, social, economic, and cultural factors related to an increase in the vulnerability to sedentary behaviors, poor nutritional habits, smoking, and alcohol consumption [5-7].

Lifestyle is closely linked to daily behaviors, being a multidimensional life pattern with positive or negative decisions that directly affect the individual's health; feeding is one of those daily decisions, along with hours of rest, drinking alcohol, smoking, and physical activity levels, among others [8,9]. This attitudes have been linked to athletic performance, discipline, attaining personal wellness, and sports injuries prevention [10].

College athletes must respond to training requirements and academic obligations, demanding greater dedication and effort, dealing with study schedules and sports training. Thus, they should adopt a lifestyle characterized by healthy eating habits, rest, and leisure and free time management that are consistent with their dual responsibility [4]. Constant sports participation can cause injury, restricting their involvement, which in turn affects the psychological, and physiological health of the athlete [11].

College sports in the United States reported in 2009 - 2010 and 2014 - 2015, 3183 serious injuries; the knee and lower leg represented the greatest frequency and contact injury mechanisms were found the more frequent, impacting other players and surfaces [11]. Overuse injuries were higher in women, with a prevalence of 70% for the lower limbs, and with a loss of sport practice for more than 21 days [12].

Given the likelihood of sports injuries, injury prevention is crucial to maximize health benefits of sport practice [13]. These preventive measures should be based on specific interventions, properly implemented and sustained over time, and guided by epidemiological and etiological initial assessment of injuries [14]. Among the etiological variables, there are intrinsic and extrinsic risk factors; the latter are determined by external athlete situations as materials and sports equipment, practice surfaces, environmental conditions, sports facilities, and actions during training [15].

Thus, it is necessary to evaluate the extrinsic etiological variables that could influence sports injuries occurrence, as well to determine college athletes' lifestyle, given the lack of knowledge and the few studies that are related to the subject in this type of athletes.

Aim of the Study

This study aimed to characterize extrinsic risk factors related to training, and behaviors associated with lifestyle in college student athletes.

Methods

A descriptive cross-section study was carried out with college athletes who practiced chess, triathlon, basketball, volleyball, underwater rugby, karate, athletics, futsal, skating, soccer, taekwondo, and tennis, disciplines offered by the Sports and Recreation division of

the University. We used a sample of 155 athlete who met the inclusion criteria: being part of the university, having been selected to participate in national and international university competitions, being active in the academic record for the first half of 2017 and accepting to participate in the study. Exclusion criteria: Voluntary withdrawal from the study, and not properly filling out the questionnaire survey.

Each athlete was told about the study purpose and its methodology, doubts or questions were solved, and then everyone proceeded to sign the informed consent; if the athlete was a minor, the consent form was sent to the parent or guardian for signing the document. Finally, each one of the athletes filled out the survey.

The data collection was performed with an athlete's questionnaire. The survey was conducted to record demographics (age, socioeconomic stratum, gender, origin), and sport characteristics (sport, training schedule, training days, current training phase), and the program they were studying at the university. To identify training camp risk factors (sports facilities, athletes implements, actions during training) the "COLDEPORTES prevention plus training diagnostic format" was used as reference [15]. In addition, to know about the eating habits, smoking and alcohol consumption, sleep habits and stress, the STEPS questionnaire was used as reference; it measures lifestyle risk factors associated with non-communicable diseases development [16,17]. The questions were selected and adjusted to the purpose of the study and adapted for a pilot study sample with 30 people.

The data statistical analysis process was developed with the SPSS statistical software database (Statistical Package for the Social Sciences) version 22. As a descriptive study, continuous variables were expressed as mean \pm standard deviation, and discrete variables were expressed in frequencies and proportions; given the classification variables, no correlations were performed.

This research was approved by the Division of Recreation and Sport ethics committee of the Universidad del Cauca, considering the ethical aspects established in the Helsinki Declaration [18] and the Ministry of Health and Social Protection of the Republic of Colombia's Resolution 8430 of 1993 [19], which constitute the scientific, technical, and administrative standards for health research with humans. The procedures performed were within the safe rating and counted under the framework of privacy and voluntary participation with informed consent duly completed with signature and fingerprint of each participant.

Results

Athletes ($n = 155$) were asked about their sport and diary lifestyle habits. In total, 39.4% (61/155) were female, and 60.6% (94/155) were male. The participants were grouped into age categories: 29.7% were between 15 and 20 years, 56.1% between 21 and 25 years, 12.3% were in the group between 26 and 30 years, and 1.9% were in the group between 31 and 40 years. The athletes' origin areas were the departments of Nariño, Huila, Putumayo, Valle del Cauca, Risaralda, and Cundinamarca, with the majority coming from the department of Cauca, including the city of Popayan (74%). Additionally, 83% of athletes reported their socioeconomic stratum to be 1, 2, or 3.

Regarding university program participation, athletes were enrolled in undergraduate and graduate programs. Undergraduate students were enrolled in Mathematics, Modern Languages, Spanish Language, English and Art, Geography, History, Speech Therapy, Accounting, Geotechnology, Biology, Economics, Philosophy, Physiotherapy, Telematics Engineering, Political Science, Nursing, Civil Engineering, Tourism, Physical Engineering, Agricultural Engineering, Agro-industrial Engineering, Medicine, Physical Education, Business Administration, Automatic Engineering, Law, Systems Engineering, Electronic Engineering, Environmental Engineering, and Music. Doctorate graduate students were enrolled in Telematics Engineering, Master's students were enrolled in Mathematics, Sport and Physical Activity, Electronics and Telecommunications, and Specialization students were enrolled in Education and Disability, and Expertise in Project Management.

University sports include: chess, triathlon, basketball, volleyball, underwater rugby, karate, athletics, futsal, skating, soccer, taekwondo, and tennis. Training schedules were included in blocks of two hours from 5:00 pm until 9:30 pm seven days a week, and the sports training was coordinated by 13 coaches.

In regard to extrinsic factors during practice, we researched both athletes' and coaches' perceptions about sports facilities, tools, and actions during training, which are shown in table 1.

	Coaches N = 13				Athletes N = 155			
	Yes		No		Yes		No	
Sports environment perceptions	N	%	N	%	N	%	N	%
Sports facilities suitable for practice	10	76.9	3	23.1	100	64.5	55	35.5
Adequate lighting	7	53.8	6	46.2	125	80	30	19.4
Adequate ventilation	10	76.9	3	23.1	145	93.5	10	6.5
Suitable sports equipment	4	30.8	9	69.2	98	63.2	57	36.8
Appropriate teaching technical material	8	61.5	5	38.5	132	85.2	2.3	14.8
Appropriate clothing	6	46.2	7	53.8	91	58.7	64	41.3
Proper footwear	10	76.9	1	7.7	108	69.7	29	18.7
Perceptions during sports								
 Warmed-up before	N	%	N	%	N	%	N	%
Always	13	100	75	48.4				
Almost always	-	-	54	34.8				
Sometimes	-	-	16	10.3				
Hardly ever	-	-	4	2.6				
Never	-	-	6	3.9				
 Coach leads the warm-up								
Always	13	100	94	60.6				
Almost always	-	-	39	25.2				
Sometimes	-	-	15	9.7				
Hardly ever	-	-	2	1.3				
Never	-	-	5	3.2				
 Cooled-down after								
Always	-	-	88	56.8				
Almost always	-	-	42	27.1				
Sometimes	-	-	16	10.3				
Hardly ever	-	-	6	3.9				
Never	-	-	3	1.9				
 Hydration during practice								
Always	8	61.5	94	60.6				
Almost always	-	-	31	20				
Sometimes	-	-	16	10.3				
Hardly ever	-	-	5	3.2				
Never	5	38.5	9	5.8				

Table 1: Sports environment perceptions and behaviors during coaches and college athletes training.

With respect to eating habits, 98.1% (152/155) of the athletes, consider it very important to take care of the food; 3.2% ate each hour, 36.8% every 3 hours, 36.1% consumed food at specific times for breakfast, lunch and dinner, while 23% had no regular times. In table 2, college athletes’ eating habits are described.

	Yes		No	
	n	%	N	%
Usually eat breakfast	138	89	17	11
Usually eat a midmorning snack	61	39.4	94	60.6
Usually eat lunch	154	99.4	1	0.6
Usually eat a midafternoon snack	83	53.5	72	46.5
Usually eat dinner	132	85.2	2.3	14.8
Usually eat at odd times	101	65.2	54	34.8
Fruit consumption	150	96.8	5	3.2
Vegetable consumption	150	96.8	5	3.2
Meat consumption	154	99.4	1	0.6
Water consumption/Hydration	153	98.7	2	1.3
Saturated fat intake	152	98.1	3	1.9
Additional salt intake	40	25.8	115	74.2
Sugary food consumption	151	97.4	4	2.6
Fast food consumption	118	76.1	37	23.9

Table 2: University athletes’ nutritional habits.

College athletes’ risk factors related to cigarette smoking, alcohol, stress, and sleep are shown in table 3. Among the participants who consumed alcohol, 49.7% (77/155) reported drinking it occasionally, while 3.9% (6/155) expressed drinking between two and four times a week; for cigarette smoking, 7.7% (12/155) referred doing it for pleasure with fewer than 10 cigarettes/day, and 36.7% (57/155) reported living in smoke-related environments. Concerning sleep habits, 2.4% went to sleep at 9 pm; 29.7% at midnight, and 3.9% at 2 am, while athletes who woke up early did it at 4 am (4,5%), and late at 1 pm (0.6%).

	Yes		No	
	N	%	N	%
Major alcohol intake until drunkenness	2.3	14.8	130	1.3
Cigarette smoking	15	9.7	140	90.3
Sleep well and feel rested at morning	151	97.4	4	2.6
Relax and enjoy leisure time	152	98.1	3	1.9
Able to handle stressful situations and find solutions	152	98.1	3	1.9

Table 3: Risk factors for college athletes.

Discussion

Sports environment perceptions allow us to determine some extrinsic risk factors that may be associated with injury incidence [15]. Few studies relate sports facilities, lighting, and ventilation with performance improvement and development of sports injuries. Kane., et

al. found a relationship between the floor and shoes used in lesions reported by soccer female players [20]. Similarly, Latorre reported sport risk injury from different components like high speed of execution, the participants' age, and environmental conditions.

Regarding sport implement issues, coaches' and athletes' answers were contradictory: while for coaches the implements were not adequate enough, many athletes responded otherwise. About implements, the use of suitable sports shoes showed a footprint control method to decrease the risk of injury, Dols and Sanchez concluded that the sports shoes were related to foot impact reception with the ground [22] and Brund., *et al.* found that the pressure of the shoe can positively modify the risk of injury with a reduction in medial foot pressure during contact, which may favor runner biomechanics [2,3].

Another important aspect is the fact that less than half of the students always warmed up; a concerning fact as stated by Sanchez-Gonzalez and Rodriguez, warming-up is essential for a safe and effective transition between repose and maximum capacity, as well as for the benefits to athletic performance and injury prevention. In this process, coaches should make the effort to regulate these stimuli to get a full and meaningful activation [2,3].

It is widely known in the scientific community that intense sports activity causes changes in fluid balance and electrolytes, causing health impacts, increasing cardiovascular risk, decreasing thermoregulatory processes, cognitive function, and physical development in relation with the dehydration process [24]. While most athletes declared hydration during practice, some coaches say they never see their athletes drink fluids in training, according to Volpe, Poule and Bland in their study, they found low hydration levels in college athletes. This suggests the need to implement more education on correct hydration practices to protect health and athletic performance [25].

As for athletes' nutritional habits, sugary food intake, fast food, saturated fats, and eating at odd times were negative behaviors found in the participants in this study, while most declared eating fruits, vegetables and meat, usually eating breakfast and lunch, and hydrating or drinking water. Abbey, Wright and Kirkpatrick reported that less than 50% of third division college football players consumed fruits and vegetables, presenting high amounts of total fat and saturated fat in their nutritional practices [26]. Hull., *et al.* found that eating behaviors may vary between men and women athletes; for example, weekly fast meals intake before training or competition was higher in male athletes, while women had more nutrition options available, breakfast consumption more times a week, and ate before the morning practice [27]. Proper nutrition allows for better recovery [28], greater physiological adaptation, and post-exercise muscle reconditioning, which leads to more optimal performance. In the nutritional recommendations for recovery and the athlete's health, adequate carbohydrates and protein intake is recommended during post-exercise recovery, increasing fruit and vegetable consumption, reducing antioxidant vitamin deficiencies, and increasing foods rich in calcium, iron, and vitamins C, D and E [29].

In regard to alcoholic beverage consumption, this study shows that a large percentage of student-athletes drink alcohol, and a smaller group reach drunkenness, Howell., *et al.* evidenced that college athletes consume large amounts of alcohol fairly regularly, which is a behavior that represents a risk factor for suffering unintentional injuries related to alcohol [30]. Although Ward and Weinberg found that alcohol consumption in college athletes was lower compared to their non-athlete counterparts, the negative consequences related to drinking were similar between the two groups [31]. On the other hand, social norms and expectations may influence the athlete's decision regarding alcoholic drinks [32]. Therefore, it is necessary to implement educational programs that generate positive changes in this behavior [30-32].

Another important risk factor is smoking, which generates a negative impact on health, being a low percentage of smokers among athletes participating in this study. In relation to this, Gonzalez, Carballo, and Pelegrín found that family education is an influential factor in cigarette smoking; positive experiences, family togetherness, and trust between parents and children seem to be a protective factor against smoking cigarettes, and using other substances [33]. Additionally, sport seems to reduce tobacco smoking [3,4], as dedication and intensive participation is increased [35,36].

Sleep is crucial for optimal recovery and subsequent performance [37]. In this study, no sleep disturbances were found, most participants reported sleep and feel rested at morning, results that differ from those reported by Monma, *et al.* where 46.5% of student athletes had sleeping disorders related to bedtime, part-time work at night, using cell before sleeping, and stressors related to competition [38].

The ability to handle stressful situations and finding a solution is a positive feature that is reflected in the results reported by this study. With respect to this, Chacón-Borrego, *et al.* found that physical activity produces significant psychological changes and increases positive moods, reducing states of sadness, fatigue, and restlessness [39]. Similarly, Reynoso-Sanchez, *et al.* found adequate stress-recovery balance with good adaptation to training and competition, and physical and psychosocial stress in college volleyball players [40].

Conclusion

In conclusion, university student athletes present risk factors during sports activities and lifestyle-related behaviors. Initial diagnoses like the one done with this research create the need to plan and develop education and prevention programs that strengthen behaviors during sport practice, like adequate warming-up and cooling down, hydration before, during, and after training, and reinforcing daily healthy behaviors that benefit long-term athletic performance and health.

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Bibliography

1. Warburton D and Nicol C BS. "Health benefits of physical activity: the evidence". *Canadian Medical Association Journal* 174.6 (2006): 801-809.
2. Gomes Osman J, *et al.* "The effects of exercise on cognitive function and brain plasticity - to trial feasibility". *Restorative Neurology and Neuroscience* 35 (2017): 547-556.
3. M Plowman. "Exercise is brain food: The effects of physical activity on cognitive function". *Health Care, Information* 11.3 (2008): 236-240.
4. Capdevila A and Bellmunt DC. "Lifestyle and academic performance in adolescents: comparison Between athletes and non-athletes". *Challenges New Trends in Physics and Recreation Education* 27 (2015): 28-33.
5. Burriel F, *et al.* "Dietary habits and nutritional assessment in a university population 28.2 (2013): 438-446.
6. Peterson N, *et al.* "Sedentary behavior and physical activity of young adult university students". *Research in Nursing and Health* (2017): 1-9.
7. Escobar M., *et al.* "Changes in self-care enfermería Colombian students during training 2015". *Towards Promoc Health* 22.1 (2017): 27-42.
8. Carrero Suescun- S., *et al.* "Lifestyles in students from a university in Boyacá, Colombia". *Revista de la Facultad de Medicina* 65.2 (2017): 227-232.

9. C Velez D. "Betancourt Lifestyles of school adolescents in a Colombian municipality". *Revista Cubana de Pediatría* 87.4 (2015): 440-448.
10. RIVERA M. "Training Invisible". *Apunts* (2004): 37-47.
11. Kay M., *et al.* "The Epidemiology of Severe Injuries Sustained by National Collegiate Athletic Association Student-Athletes, 2009-2010 Through 2014-2015". *Journal of Athletic Training* 52.1 (2017).
12. Roos K., *et al.* "Epidemiology of Overuse Injuries in Collegiate and High School Athletics in the United States". *American Journal of Sports Medicine* (2015): 1-9.
13. Vriend I., *et al.* "Intervention Strategies Used in Sport Injury Prevention Studies: A Systematic Review Studies Identifying Applying the Matrix Haddon". *Sports Medicine* 47.10 (2017). 2027-2043.
14. Donaldson A., *et al.* "Scientific evidence is just the starting point: A generalizable process for developing sports injury prevention interventions". *The Journal of Sport and Health Science* 5.3 (2016): 1-8.
15. Administrative department of sport recreationaprevechamiento and leisure". *Public Policy Guidelines in Sports Science in Physiotherapy* (2015): 1-349.
16. World Health Organization. Pan American version of STEPS Instrument (core and expanded) (2010).
17. Riley L., *et al.* "The World Health Organization STEPwise approach to noncommunicable disease risk-factor surveillance: Methods, challenges, and opportunities". *The American Journal of Public Health* 106.1 (2016): 74-78.
18. Di Ruggiero M. "Declaration of Helsinki, principles and bioethical values at stake in medical research involving human subjects". *International Journal of Bioethics* 6.1 (2011): 125-144.
19. Republic of Colombia. Ministry of Health. Resolution No. 008430 of 1993, October 4, whereby the scientific and management for health research standards are established techniques (2014).
20. Kane J., *et al.* "Shoe and Field Surface Risk Lower Extremity Factors for Acute Injuries Among Youth Female Soccer Players". *Clinical Journal of Sport Medicine* 26.3 (2016): 245-250.
21. P Latorre. "Methodology for the analysis and evaluation of the safety of school spaces and sports facilities". *Deport Leisure Management and Tur* 3 (2008): 62-70.
22. Dols A and Gómez R. "Biomechanics and psychomotricity of the runner as determinant factors for the forefoot support in the race". *Internal Revenue Podol Sciences* 9.1 (2015): 50-62.
23. Korsgaard R., *et al.* "Medial shoe-ground pressure and specific running injuries: A 1-year prospective cohort study". *Scandinavian Journal of Medicine and Science in Sports* 20 (2017): 830-834.
24. Sees it D., *et al.* "Measured and perceived indices of fluid balance in professional athletes. The use and impact of hydration assessment strategies". *European Journal of Sport Science* (2018).
25. Volpe S., *et al.* "Estimation of Prepractice Hydration Status of National Collegiate Athletic Association Division I Athletes". *Journal of Athletic Training* 44.6 (2009): 624-629.

26. Abbey E., *et al.* "Nutrition practices and knowledge Among NCAA Division III football players". *The International Society of Sports Nutrition* 14 (2017): 1-9.
27. Hull M., *et al.* "Gender differences and access to a sports dietitian influence of dietary habits Collegiate athletes". *The International Society of Sports Nutrition* 13 (2016): 1-16.
28. Beelen M., *et al.* "Nutritional Strategies to Promote Recovery Postexercise". *International Journal of Sport Nutrition and Exercise Metabolism* 20 (2010): 515-532.
29. Reid K. "Performance Food: Promoting foods with a functional benefit in sports performance". *Nutrition Bulletin* 38 (2013): 429-437.
30. Howell S., *et al.* "Athletic Trainer's Exploring the Role in Assisting Student-Athletes With Alcohol-Related Presenting Unintentional Injuries". *Journal of Athletic Training* 50.9 (2015): 977-980.
31. Gallant M., *et al.* "Comparing Weight-Conscious Drinking Among Athletes and nonathletes". *The Journal of Clinical Sport Psychology* 11 (2017): 273-286.
32. Lewis T., *et al.* "Binge-Drinking and Non-Binge-Drinking Student-Athletes: The Role of Proximal Norms, Negative expectancies, and Selected Sociodemographic Variables". *Journal of Child & Adolescent Substance Abuse* 26.2 (2017): 141-151.
33. Gonzalez H., *et al.* "Educational styles perceived by consumers and athletes snuff cannabis". *Psic Thought* 16.1 (2018): 95-105.
34. Primack B., *et al.* "Waterpipe and Cigarette Smoking Among College Athletes in the United States". *Journal of Adolescent Health* 46.1 (2010): 45-51.
35. Ruiz F., *et al.* "Snuff consumption in the southeast Spanish adults and their relationship with physical activity and sport family". *Challenges* 26 (2014): 27-33.
36. Hernandez-Serrano O., *et al.* "Substance use and sport participation amongst college students of health sciences and sport". *Heal Adict* 18.1 (2018): 61-70.
37. Bonnar D., *et al.* "Sleep Interventions Designed to Improve Performance and Recovery Athletic: A Systematic Review of Current Approaches". *Sports Medicine* 48.3 (2018): 683-703.
38. Monma T., *et al.* "Sleep disorder risk factors Among student athletes". *Sports Medicine* (2018).
39. Castañeda Vazquez C., *et al.* "Relation between physical activity, moods and gender in adults". *The European Journal of Futures Research* 3.3 (2017): 163-171.
40. L-Sanchez Reynoso Hernandez-Cruz G., *et al.* "Balance stress-recovery college volleyball players during a Recovery-stress season to season in balance Throughout volleyball university players". *Challenges New Trends in Physics and Recreation Education* 30.2 (2016): 193-197.

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