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Original article

Considerations on environmental pressures influencing table tennis performance

Consideraciones sobre las presiones ambientales que influyen en el rendimiento del tenis de mesa

Considerações sobre as pressões ambientais que influenciam o desempenho do tênis de mesa

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ABSTRACT

The work presented is part of one of the researches contained in the institutional project "Table tennis for the integral development of the human being, systematization from the subject Physical activity, sport and recreation: school sports massification". This research aims to assess, through a diagnostic study, if environmental pressures affect the practice of table tennis in students of the Technical University "Luis Vargas Torres" in Esmeraldas. After carrying out a theoretical analysis on some background related to environmental pressures in sport, a group of surveys, interviews, documentary review and tests were applied to verify the presence of environmental pressures in direct relation to psychological and physical pressures. It was concluded that the pressures related to the public, the time limit and the scoreboard were the most significant and as a consequence, measures must be taken to prevent their impacts, as well as considering their inclusion in the methodological guidelines for tennis training. table.

Keywords: Environmental pressures, table tennis.

RESUMEN

El trabajo que se presenta forma parte de una de las investigaciones contenidas en el proyecto institucional "El tenis de mesa para el desarrollo integral del ser humano, sistematización desde la materia Actividad física, deporte y recreación: masificación deportiva escolar". Esta investigación tiene como objetivo valorar, mediante un estudio diagnóstico, si las presiones ambientales afectan la práctica del tenis de mesa en estudiantes de la Universidad Técnica "Luis Vargas Torres", de Esmeraldas. Después de realizar un análisis teórico sobre algunos antecedentes referidos a las presiones ambientales en el deporte, se aplicó un grupo de encuestas, entrevistas, revisión documental y test, para constatar la presencia de presiones ambientales en relación directa con las presiones psicológicas y físicas. Se concluyó que las presiones referentes al público, al límite de tiempo y el marcador fueron las más significativas y como consecuencia, se deben tomar medidas para la prevención de sus impactos, así como ponderar su inclusión en las orientaciones metodológicas para el entrenamiento del tenis de mesa.



Palabras clave: Presiones ambientales, tenis de mesa.

RESUMO

O trabalho apresentado faz parte de uma das investigações contidas no projeto institucional "Tênis de mesa para o desenvolvimento integral do ser humano, sistematização a partir da disciplina Atividade física, esporte e recreação: massificação do esporte escolar". Esta pesquisa tem como objetivo avaliar, por meio de um estudo diagnóstico, se as pressões ambientais afetam a prática do tênis de mesa em estudantes da Universidade Técnica "Luis Vargas Torres", Esmeraldas. Depois de realizar uma análise teórica de algumas informações básicas sobre as pressões ambientais no esporte, foi aplicado um conjunto de pesquisas, entrevistas, revisão documental e testes para confirmar a presença de pressões ambientais em relação direta com as pressões psicológicas e físicas. Concluiu-se que as pressões relacionadas ao público, ao limite de tempo e ao placar foram as mais significativas e, como consequência, devem ser tomadas medidas para prevenir seus impactos, bem como considerar sua inclusão nas diretrizes metodológicas para o treinamento de tênis de mesa.

Palavras-chave: Pressões ambientais, tênis de mesa.

INTRODUCTION

Studying the elements in basic training and training methodologies, in order to control the influences that allow the athlete to be successful, have been the main objectives that researchers have set themselves. At least it has been so, since the beginning of the last century; however, the question still persists, how is it possible that an athlete with an ideal biotype for a sport or a team with the best coaches, facilities and technologies available fail to obtain Olympic medals and significant prizes.

There are many who have declared that the performance of a team does not always reward the result of the preparation and investment of resources allocated to it and occasionally, they attribute these causes to training failures. Only a few experts on the subject state that



there are pressures that can seriously affect the course of a career or sportsmanship towards victory.

Vega (1994) and Valladares (2019) suggest that when a sport is practiced as a hobby, it is more enjoyable than professional sport, in which status an adequate management of emotional and social life is important, since it can generate a fatal depressive state that ends with the psychological stability of the athlete.

Williams *et al.* (2002) propose a test to demonstrate that the anxiety produced by environmental pressures, among other factors, is capable of significantly affecting the efficiency of table tennis results. Fredline (2005) reveals in his proposal that the relationship between the player and the spectators can equally activate or harm the psychological state of a team. Already in the work of Thibault *et al.* (1999), (cited by Gómez *et al.*, 2008) other environmental pressures are mentioned that must be taken into account by coaches "(...) environmental pressures and the organizational network determine the organization, and both are necessary to achieve objectives and acquire scarce sources" (p.12).

In this way, it is confirmed that environmental pressures not only have a naturalistic component, but also a psychological and social one. López (2009) proposes a group of psychological skills in the sport of table tennis, to counteract the onslaught of the pressures that are coming and are not always caused by environmental influences, but are conditioned by the way in which the psyche reacts to them. These authors generally mention the existence of environmental pressures, but do not characterize or define this type of pressure.

This procedure changes when the work of Iglesias (2010) is imposed, in the scientific field, who presents a group of codes that refer to different types of determining environmental pressures during the competitions and were obtained as a result of scientific observation of work sessions of fencing and Taekwondo athletes (Table 1).



Table 1. - Coding of the criteria used in the ad hoc fencing and taekwondo instruments.

1	PRESS	Obvious pressure at the beginning of action
2	INITIATING	Initiative in action
3	DPREP	Preparation of the shooter on the right
4	DACC	Action of the shooter on the right
5	IACC	Left shooter action
6	IPREP	Preparation of the left shooter
7	CLUE	Area of the track where the action takes place
8	TIME	Time remaining to conclude the round
9	PERIOD	Assault period
10	MARC	Imbalance on the scoreboard
11	EFFECT	Action effectiveness

Source. Iglesias (2010).

On the other hand, Corahua (2011) focuses on controlling environmental pressures to enhance the practice of basic table tennis strokes and find higher levels of balance, spatiotemporal structuring and laterality, in children from 7 to 12 years of age. League of the Abancay district, Peru.

Florean (2012) for his part, mentions the role of pressure in sport; however, the connotation more than environmental is of a psychological nature whose responsibility is attributed to the referee, since he is the one who must check if the pressures are well controlled before starting a match. For this researcher, the pressures that should worry the most are the characteristics of the team, the advice, the ranking and the age.

Pradas *et al.* (2012) dedicated themselves to developing a computerized instrument, based on an observation made to table tennis matches recorded with highly specialized cameras that facilitated the assessment of the characteristics and techniques in this sport. In the criteria they used, environmental pressures are not evident; only the relationship of athletes with space, not weighted or branched into the different instances in which this relationship can be classified, namely:

Ten criteria were considered for analysis (player, laterality, racket grip, style of play, start, end, hit, technique, bounce zone and field rotation) including in each one of them between 2 and 7 categories based on the principles of the game, structure of the game, technique of the players and relations with the playing space. (p.258)



Despite the fact that environmental pressures have been recognized by various authors, they have not yet been identified with sufficient detail in the articles consulted; However, the influence that these can have on the formation of depressive states that determine the permanence of satisfactory results in athletes is considered notable, as expressed by García (2016):

Therefore, in view of the above, it seems reasonable to conclude that although physical exercise practiced regularly and without environmental pressures can be considered as a healthy behavior, being framed within the so-called healthy lifestyles, the same cannot be said. when said physical exercise is practiced professionally. (p.326)

An aspect that should not be missing in this research and that is common, both in table tennis and in other sports, is public pressure. This pressure undoubtedly establishes a link with the environment, since it is in the public context where people from different ecosystems, cultures and traditions meet with the aim of enjoying, observing and drawing conclusions during the match.

When considering whether the pressure from the public is eminently environmental, Acosta (2016) values that this criterion is much broader than it seems, because if the athlete has members in the public such as their parents, friends, relatives and, above all, tutors, this environmental pressure can transcend into psychological pressure; however, if in order to give a better impression to the public the athlete uses overtraining, then the environmental pressure becomes physical pressure.

For those who understand that environmental pressure is a sum of various challenges, fears and concerns, it is highly recommended to consult the work of Acosta (2016) where some of the pressures that most characterize an athlete are exemplified:

(...) pressure and fear are the essential factors at the primordial moment of performance. The results obtained with the football players of the Sevilla Club of Spain and the clubs of Argentina and Paraguay showed that the demands are similar, because, in all athletes, the fear of getting injured stands out, the fear of



failure and, in Argentina and Paraguay, in addition of these, fear for the country's economic situation. (p.139)

Table tennis has the characteristic of being practiced around a table, so neither the translation distance is very noticeable nor the endurance in the duration of the games, nor is excessive strength or flexibility frequent. However, there are other sports where the geographical location together with the athlete's genetic predetermination could encounter crucial challenges:

Boys and girls from 9 to 14 years of age in the municipality of Buey Arriba, Cuba, have underlying patterns of physical-motor development capable of explaining a significant percentage of the total variance (...) Although it is a population located in a mountainous region, where the so-called "gene pool-environmental pressures" that affect patterns of strength-flexibility and strength-speed are generated. Here endurance was the pattern with the lowest variance generated, perhaps because the altitudes of the municipality do not reach the threshold height for the release of erythropoietin induced by hypoxia. (Sancesario, *et al.*, 2020. p 265)

After analyzing the references on environmental pressures in sports and specifically, in table tennis, uncertainty emerges as to whether environmental pressures really influence the performance of athletes in this sport. That is why the proposed objective is to assess, through a diagnostic study, if environmental pressures affect the practice of table tennis in students of the " Luis Vargas Torres" Technical University, of Esmeraldas.

MATERIALS AND METHODS

This research was developed at the "Luis Vargas Torres" Technical University, in Esmeraldas, Ecuador, in 2021. The research actions were carried out as part of the institutional project "Table tennis for the integral development of the human being, systematization from the subject Physical activity, sport and recreation: mass school sports. The subject that provided the context for the research was Physical activity, sport and recreation: mass school sports.



A total of 59 students participated for 100 % of the enrollment who were studying the 7th level.

As part of the characterization of the sport under study, it was possible to establish that it is among the most popular that make up general physical recreation, hobbies, and serious or professional sports. Over the last two decades, table tennis has gained more and more followers and has gone from being a minority sport (pingpong) to being known worldwide, especially due to the impetus given by Asia and Europe. Only in China there are currently 20 million registered players. This diffusion has reached schools and institutes, which raises the need to establish its teaching and educational practice.

Table tennis is an Olympic sport considered one of the fastest. Commonly known as ping pong, its practice implies a rigorous physical and mental preparation and the level of complexity in its execution is high in terms of the effects produced on the ball and the reaction capacity required of each athlete, therefore you need to learn special game techniques and tactics that adhere to an official rulebook.

Table tennis can be played individually or in doubles, it moves away from idle and unproductive practices, helps the development of psychomotor coordination and concentration, improves physical condition in aspects such as resistance, circulation and breathing; In addition, it exercises the brain and eyesight.

Methodology

The environmental pressures that appear have been selected in correspondence with the challenges, fears and limits present in sports and established. To guarantee the success of the research, several empirical methods were used and, at the end, the information was triangulated.

A documentary review of the study plan and the methodological orientations of the subject was carried out to find common points between environmental pressures, the contents and the priorities of the curriculum. Surveys were applied to athletes and interviews to coaches to obtain the degree of knowledge they have about environmental pressures, with emphasis on the practice of table tennis. It is important to highlight that the athletes had to argue the



answers in the indicators (Pressures) that they consider to be the most serious. To assess the involvement of environmental pressures in the context of table tennis, the following factors were considered (Table 2).

Table 2. - Indicators to obtain information through the survey and the interview

Code	Environmental pressure
PP	Public Pressure
pc	Weather Pressure
PLT	Time Limit Pressure
P.M	Marker Pressure
PR	Racket Pressure
PE	Pressure Equipment

The grid test was applied, which allowed assessing the level of concentration that the student-athletes had. In this way, it was possible to perceive if the athlete was properly concentrated to face a situation and a tactic in the game until victory was achieved. Below is the grid table and the instruction to operate on it (Table 3).

Instructions. Starting from 00, go dialing each of the numbers in the appropriate sequence (from lowest to highest).

Table 3. - Table of Grids

84	27	51	78	59	52	13	85	61	55
28	60	92	04	97	90	31	57	29	33
32	96	65	39	80	77	49	86	18	70
76	87	71	95	98	81	01	46	88	00
48	82	89	47	35	17	10	42	62	3. 4
44	67	93	11	07	43	72	94	69	56
53	79	05	22	54	74	58	14	91	02
06	68	99	75	26	15	41	66	20	40
fifty	09	64	08	38	30	36	45	83	24
03	73	21	23	16	37	25	19	12	63

Evaluative mode that was adopted in the method. According to the time that each athlete took to order the elements of the grid, this was the margin of concentration or deconcentration that they had before facing the competition. The test can be applied in this context orally or in writing.



To complement this test, the Frester test was also used, which was designed to find out what are the pressures or overloads that an athlete normally has before or after a game. The theory that supports this test, together with others that are very useful for this type of work.

However, due to the theme that is developed in this work, it was decided to apply the Frester test, which is directly linked to environmental pressures that, directly or indirectly, show environmental elements within a psychological approach. The type of model test that was applied is shown below (Table 4), although adjustments were proposed in relation to the type of sport diagnosed.

Table 4. - Original model of the Frester 1972 test Please mark the appropriate box with an X.

Factors and conditions that influence performance	1	2	3	4	5	6	7	8	9
1. Unsuccessful actions at the beginning									
2. Competition Postponements									
3. excessive nervousness									
4. Difficulty falling and staying asleep									
5. favorite role									
6. Excessively high performance goals									
7. Previous defeats									
8. Feeling of physical weakness									
9. Disagreements with the coach, with teammates or with the family									
10. Unexpected good returns from opponents									
11. Poor performances in previous training and competitions									
12. Unknown opponents									
13. Reproaches during the competition									
14. Demonstrates superiority of the opponent									
15. Being wronged by judges									
16. Uncomfortable competition facilities									

The evaluative mode that was adopted in the method was to mark with an X, depending on the severity of these pressures, preferably from minor to major.



RESULTS AND DISCUSSION

In the documentary review, an analysis of the objectives and contents of the subject Physical activity, sport and recreation: school sports massification was carried out and it was found that not enough coincident points were found between environmental pressures and the contents that athletes should receive.

However, it is established that the teaching of this sport cannot be imposed, as proposed by the methodological guidelines, since it can cause rejection as a result of psychological and environmental pressure being exerted at the same time. It is also clarified in these documents that practicing this sport does not depend on the climate or the weather, it is estimated that this is true as long as extreme temperatures or humidity do not affect the health of the athlete.

After tabulating the survey results, the following results were obtained (Table 5).

Table 5. - Results of the survey. Options of the athletes by levels of severity of the pressures

Environmental pressures	High level	Medium level	Low level
PP	42	2	9
pc	15	17	27
PLT	50	6	3
PM	48	8	3
PR	6	3	50
PE	47	4	8

As a relevant aspect, it was observed that most of the athletes considered that the environmental pressures that most affected them were Time Limit Pressure (PLT), Public Pressure (PP) and Marker Pressure (PM), which does not always refer to Time also refers to the difference between the scores of the teams.

The athletes argued that in high-level games, the pressure inevitably grows on them when they know that there is little time left for the match to end and as a consequence, they are concerned about the score, especially when the difference in points is too great to reach the victory. The PP also exerts a considerable influence, since generally in this audience are



friends, family and coaches who commit the athlete to offer the best of himself to achieve victory.

Racket Pressure (RP) turned out to be the least serious according to the athletes' consideration. On many occasions this implement is scarce and expensive, as is its repair; in contrast, there are very good quality rackets that normally give good service and durability.

As a result of the interviews carried out with the coaches, it was confirmed that 100% of them agreed that environmental pressures are important aspects to take into account in this sport, however, they recognized that not enough work has been done to train athletes in order to control themselves in complex situations such as an unfavorable marker or in the presence of relatives and acquaintances who expect the best of them.

On the other hand, 100 % of the coaches considered that they educated the athletes on the basis of keeping the rackets in good condition and maintaining good relationships with their teammates.

When applying the grid test, it was verified that 70% of the athletes took more than two minutes to mark the numbers in the appropriate sequence, this demonstrated that in the bulk of the group, deconcentration prevailed; when searching for the causes, it was determined that that day the athletes were stressed due to the overloads received in the training for the competitions and that some athletes had conflicts in the team and this could predispose them psychologically before the game.

In the results of the Frester Test (1972), it was verified that more than 60% of the group considered that environmental pressures influence, at a high level (from rank five to nine), they considered the following factors and conditions:

- Unsuccessful actions from the beginning.
- Excessive nervousness.
- previous defeats.
- It shows the superiority of the opponent.



On the contrary, it was verified that less than 50% of the group was in the range five to zero, it was chosen as less worrying from five to one.

- Competition postponements.
- Favorite role.
- Feeling of physical weakness.

As results of the methodological triangulation, matching points were determined as:

- All the environmental pressures were presented to athletes and coaches and above all, it was recognized that there were weaknesses in the prevention and treatment of the factors and conditions.
- PP was one of the most influential and as such, its treatment must be considered before the competition.
- Despite the fact that the climate and weather conditions have not been factors identified by the athletes, they must be taken into account by the coaches, especially due to the unpredictable action of nature and climatic changes.
- The creation of a system of actions to avoid the impact of environmental pressures must occupy a significant place in the methodological orientations in the subjects of the Career.
- The incidence of environmental, physical and psychological pressures directly affected the attention concentration of the athletes.
- It is necessary to train the athletes in order to control, in adverse situations, the PLT and the PM.

On challenges and conditions for the development of table tennis, research has been carried out that, in many aspects, coincides with the objective of this study; in this sense, the final purpose is to warn the coaches about the undesired impact that a mismanagement of environmental pressures can cause.



In the same way, the research of Fredline (2005) is useful for trainers who work with vulnerable sectors in the community, as reflected in Rozo (2022). Likewise, the study by Giraldo (2013) on table tennis as a formative sport option, at the Santiago de Cali University, Palmira branch.

On the other hand, mastering the factors that can distract tennis players from achieving good results. It is not only thinking about the physical condition of the athlete, but also about the conditions in which they operate and which ones can affect the tactical plan that is expected to be carried out with them (Jaramillo, 2019). Adapting to extreme conditions is coping with the impact of these pressures, but it is also attributing the dose of resilience necessary to win and show dignity in the sporting event, as Huie *et al.* (2021) and Martínez *et al.* (2021).

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Conflict of interests:

The authors declare not to have any interest conflicts.

Authors' contribution:

The authors have participated in the writing of the work and analysis of the documents



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