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EXPERT AGREEMENT ON BOXING SPARRING PROGRAMMING USING A DELPHI TECHNIQUE

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Abstract. A large number of impacts are received to the head during sparring, the accumulation of which throughout a fighter´s career could cause brain injuries with important neuropsychiatric sequelae. Considering the above, this research was developed with the purpose of promoting an agreement among experts on the management and dosage of sparring rounds, in order to establish and promote a safer and more effective practice. A 4-round Delphi technique was used among a panel of 30 boxing expert coaches from Argentina, Mexico, Chile and Ecuador. The criterion of agreement was considered valid as long as a percentage ≥50% consensus was reached in the answers in round 2 and a mean >3 (Likert scale) in round 4. After the submission of Rounds 1 and 2, a consensus was obtained regarding the importance of its practice, the necessary protections, experience and weight/category of the partners, minimum/maximum weekly frequency and the criteria on which the dosage of the number of rounds is based. We also inquired about the number of minimum/maximum rounds, but in this case a consensus was reached only on their dosage in amateur boxing. Similarly, the minimum/maximum recommended intensity was sought, but no consensus could be reached for the minimum in professional boxing, although a consensus was reached for the maximum, and both in amateur boxing. After the submission of rounds 3 and 4, a final agreement was reached among 17 of the experts for all the items on which consensus had been previously reached.

Keywords: Sparring, round, box, boxer, injury, delphi.

ACUERDO DE EXPERTOS SOBRE LA PROGRAMACIÓN DEL SPARRING EN BOXEO UTILIZANDO UNA TÉCNICA DELPHI

Resumen. Durante el sparring se reciben una gran cantidad de impactos en la cabeza, cuya acumulación a lo largo de las carreras de los púgiles podría provocar lesiones cerebrales con importantes secuelas neuropsiquiátricas. Considerando lo antedicho, esta investigación se desarrolló para promover un acuerdo entre expertos sobre el manejo y la dosificación de los rounds de sparring, con el fin de establecer y promover una práctica más segura y eficaz. Se utilizó una técnica Delphi de 4 rounds, entre un panel de 30 entrenadores expertos en boxeo de Argentina, México, Chile y Ecuador. Se consideró como válido el criterio de acuerdo siempre y cuando se

alcanzara un porcentaje de consenso en las respuestas ≥50% en el round 2 y una media >3 (escala Likert) en el round 4. Luego del envío de los Rounds 1 y 2, se obtuvo un consenso en lo que respecta a la importancia de su práctica, las protecciones necesarias, experiencia y peso/categoría de los compañeros, frecuencia mínima/máxima semanal y los criterios con los que se fundamenta la dosificación del número de rounds. También se indagó sobre la cantidad de rounds mínimos/máximos, pero en este caso solo se alcanzó un consenso sobre su dosificación en boxeo amateur. Del mismo modo, se buscó conocer la intensidad mínima/máxima recomendada, no pudiéndose alcanzar un consenso para la mínima en boxeo profesional, aunque si para la máxima y ambas en boxeo amateur. Luego del envío de los rounds 3 y 4, se alcanzó un acuerdo final entre 17 de los expertos para todos los ítems sobre los que se había alcanzado consenso anteriormente.

Palabras clave: Sparring, round, boxeo, púgil, lesiones, Delphi.

Introduction

Boxing is a combat sport in which two opponents face each other for a regulated time, exchanging fist blows with the aim of knocking each other down, or accumulating points that allow them to win the fight (Rezzonico, 2022). The first rules of modern boxing were introduced by Jack Broughton in 1743, and then refined by Marcus Queensbury in 1867, at which time boxing came to be considered a "gentleman's sport" because of the mandatory use of gloves for fights, as well as the protective count after a fall (Förstl et al., 2010; Gambrell, 2007). From 1946 onwards, other protective measures were implemented, including the use of headgear, gloves with more padding and the option for the fight to be interrupted by the fighter, referee or ringside doctor (Förstl et al., 2010). Currently, boxers begin their careers participating at an amateur level, and after a while they may move on to the rental or professional field, facing differences in the number of rounds fought (more in professional boxing), use or not of headgear (no headgear is used in professional boxing), type of bandage (gauze and adhesive tape for professionals, rigid or semi-rigid fabric for amateurs) and glove size (smaller in professional boxing), as well as the number of competitions held per year (as the fighter's experience increases, the number of bouts per year decreases) (Hernández Rivas, 2020; Merlo, 2021).

From a physical aspect, boxing can be characterized as an acyclic activity where high and low intensity sequences alternate, with a ratio that can range from 1:1 to 1:2, and an average duration of the high intensity sequences from one to five seconds (Ľuboslav et al., 2020). This repetition of high intensity gestures interspersed with recovery periods; generate high stress on the aerobic pathway throughout the rounds (Davis et al., 2014; Lopes-Silva & Franchini, 2021). On the other hand, fist strikes can reach velocities at impact of up to 10 m/s, with forces proportional to the weight category that can exceed 5000 N (Förstl et al., 2010). The force applied in striking is linked to the use of the forces exerted by the lower body, upper body, core muscles, technique and experience of the athlete (Lenetsky et al., 2013; Lopez-Laval et al., 2020; McGill et al., 2010). It is for this same reason that it has been postulated that cardiorespiratory function, together with a broad technical-tactical development and increases in power-strength, are determining factors in the preparation of these athletes (Chaabène et al., 2015).

In this context, sparring appears as a training strategy in which boxers face each other in simulated bouts with the objective of promoting technical-tactical learning and the development of the physical capacities necessary for competition (Baum, 2022; Finlay et al., 2020; Follmer et al., 2020). However, such activity can induce considerable damage, inflammation, and risk of injury (Finlay et al., 2022). The most common sites of injury in boxing are the head, neck, face and hands, with brain injuries being one of the greatest risks (Gambrell,

2007) (Gambrell, 2007). Subconcussive impacts caused by blows to the head are an important issue to consider, as they do not manifest with observable clinical manifestations such as those caused during a concussion, but rather individuals are asymptomatic until a certain threshold of damage is reached (Jansen et al., 2021). Prolonged exposure to repeated trauma to the skull can result in chronic traumatic brain injury, also known as chronic traumatic encephalopathy or dementia pugilistica, characterized by structural, cognitive, and behavioral changes (Bailey et al., 2013; Di Virgilio et al., 2019). Although sparring is not usually carried out at the same intensity as combat, it is during this activity that a greater number of blows are accumulated (Baum, 2022).

The rotational forces of impacts to the fighters' heads and the repetition of these impacts throughout their careers are the main risks for long-term brain injury (Gambrell, 2007; Lota et al., 2022; Sethi et al., 2021). In order to reduce the danger of exposure to this practice, limiting the number of sparring rounds performed at medium and high intensity, devoting more time to teaching varied techniques, and reserving this practice for special days have been proposed as alternatives (Stiller et al., 2014), a prior clinical evaluation, education on the identification of a concussion, use of headgear, gloves of at least 16 Oz and mouthguards preferably performed by specialists (Sethi et al., 2021; Tjønndal et al., 2021).

At the moment sparring would be proposed as a common practice in combat sports, although there does not seem to be a unified criterion on how and how much coaches consider it necessary for the development of specific skills of boxers (Baum, 2022; Sethi et al., 2021; Stiller et al., 2014), this could generate discrepancies in the way of preparing them and unnecessary exposure to receive potentially injurious blows. For this reason and considering the demanding physical-technical demands of sport (Chaabène et al., 2015; Ľuboslav et al., 2020) as well as the high risk associated with repeated impacts received to the head during the fighters' races (Bailey et al., 2013; Di Virgilio et al., 2019; Lota et al., 2022; Sethi et al., 2021), the present work has been proposed with the aim of reaching an agreement on sparring programming in amateur and professional boxing among a group of specialist coaches.

Materials and Methods

In order to generate agreement on the described topic, a 4-round Delphi technique was used. It is based on the use of surveys of a group of experts, on whom the results are returned during successive rounds, allowing them to reconsider their opinions in the light of the group responses, to finally conclude whether or not there is agreement among them (Hasson et al., 2000) (Hasson et al., 2000). This methodology is especially used in cases where there is no information available on the subject, or the information is incomplete (Niederberger & Spranger, 2020) as is the case with sparring programming in boxing.

Due to the nature of the method used, this research presents a quali-quantitative character where the results were given by the unanimous opinion of the specialists and the level of consensus/agreement that existed among their answers, analyzing the data statistically through percentages and averages to establish whether or not there was a final agreement (Jones & Hunter, 1995) (Jones & Hunter, 1995).

Criteria for inclusion of the expert panel

The expert panel was composed of a non-probabilistic sample of boxing coaches. In all cases, these were coaches who had trained at least 10 amateur boxers and 5 professional boxers, in addition to having competed with them for a national, continental or world title.

Consensus and agreement criteria

For this study, a percentage ≥50% in the second round responses was used as consensus parameters (Sumsion, 1998) and, for the final agreement, a mean on a Likert-type scale >3 (Table 1) (Dawes, 2008) in the responses of round four. The Likert scale is a measurement instrument where the respondent must indicate his or her degree of agreement or disagreement on a statement/item (Matas, 2018).

Table 1

Likert scale used to assess the degree of agreement among specialists

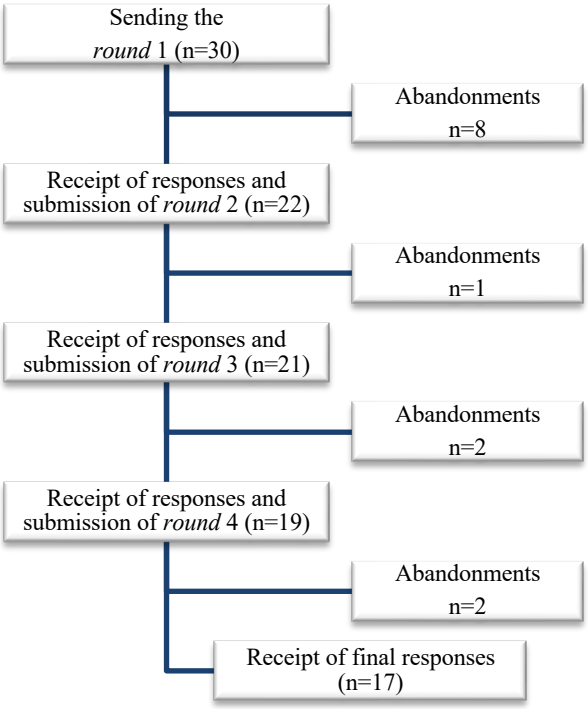
1	2	3	4	5
Strongly disagree	Disagree	Neither disagree nor agree	Agreed	Very much in agreement

Procedure

The 4 rounds that made up the technique (Figure 1) were arranged as follows: round 1) first, a questionnaire made up of 12 quali-quantitative questions with "multiple choice" and "to develop" format was sent through a Google form, to a total of 30 coaches from Argentina, Mexico, Chile and Ecuador, who were previously consulted if they met the inclusion criteria and presented interest in participating in the research; round 2) a total of 22 responses were received and, after their analysis, a new questionnaire was sent with the objective of reaching the initial consensus, this time totally under the "multiple choice" modality and presenting the percentages of the first round in each of the questions; round 3) a total of 21 responses were received and, after processing the data, new questionnaires were sent out, this time including the Likert scale parameters (Table 1) in order to begin to seek the agreement of the specialists; round 4) a total of 19 responses were obtained from the previous round and, once again, group opinions were presented, this time using the mean of the results as a reference, and then the questionnaires were resent in order to seek final agreement. Seventeen responses were received from the round 4 questionnaire, with which the results of the research were formed.

Figure 1

Progression of the Rounds of the Delphi technique used



Questionnaire

The first questionnaire sent out in round 1 was divided into two parts or sections. The first (Table 2), consisting of 3 questions, was aimed at obtaining demographic data from the coaches, while the second (Table 3), consisting of 9 questions, was oriented to information on sparring programming for amateur and professional boxers. In agreement with some of the variables described in the literature (Jordan et al., 1996; Sethi et al., 2021) (Jordan et al., 1996; Sethi et al., 2021) the questionnaire took into account the following topics: protections used, characteristics of sparring partners, weekly frequency, number of rounds and intensity developed.

Although the surveys were anonymous, the following legend was added at the end of each questionnaire: "By submitting the data in this form, you agree that the data will be used for research: Expert agreement on boxing sparring programming using a Delphi technique".

Table 2

Initial questionnaire - Demographic data

1	How many years have you been a boxing trainer?	1	2	3	4	5	6	7	8	9	>10
2	How many boxers have you trained?	<5			5-10			10-15			>15
3	How many of these boxers have you prepared to challenge for a title?	0			<3			3-6			>6

Table 3

Initial questionnaire - Sparring scheduling

4	Why do you think it is important to perform sparring sessions in boxing? Mention 3 or more reasons						
5	What are the protections you require your athletes to wear during sparring? Select for amateur boxing and then for professional boxing	Head	Gloves <14Oz	Gloves >14Oz	Bandaging of the hands	Groin protector (male)	Breastplate (women)
6	Which sparring partner would you select taking into account the level of experience of your athlete? Select for amateur boxing and then for professional boxing	< Experience level		= Experience level		> Level of experience	
7	Which sparring partner would you select taking into account the weight/category of your athlete? Select for amateur boxing and then for professional boxing	2 or more categories below	Up to 1 category below	Same category		Up to 1 category above	Up to 2 categories above
8	How many times a week do you think a boxer should spar? Select a minimum and a maximum for amateur and professional boxing	1	2	3	4	5	6	7
9	How many rounds of sparring do you think a boxer should do in one session? Select a minimum and a maximum for amateur and professional boxing	1 a 2	3 a 4	5 a 6	7 a 8	9 a 10	11 a 12	≥13
10	What is the intensity at which you consider sparring should be carried out? Select a minimum and a maximum for amateur and professional boxing	Low or no contact		Moderate		High, but not as high as the competition	High, equal to the competition
11	What are the criteria on which you base the dosage of the number of sparring rounds of an amateur boxer? Mention 3 or more criteria						
12	What are the criteria on which you base the dosage of the number of sparring rounds of a professional boxer? Mention 3 or more criteria						

For round 2, the "demographic data" section (Table 2) was eliminated and questions 4, 11 and 12 (Table 3) were modified and adopted a "multiple choice" format (Table 4) according to the answers obtained in the previous round.

Table 4

Modifications to the initial questionnaire

4	Why do you think it is important to perform sparring sessions in boxing? Select one or more criteria.	Technical-tactical preparation	Improved physical performance	Preparation of the combat strategy	Athlete evaluation	Mental preparation of the athlete
5	What are the criteria on which you base the dosage of the number of sparring rounds of an amateur boxer? Select one or more criteria.	Individual requirements of the athlete (physical condition, technical/tactical level, experience)	Timing of the competitive calendar/ Periodization	Characteristics of opponents (weight/category, height, styles, experience)	Competition characteristics (number of rounds, opponent's characteristics, level of competition)	Fixed programming with own criteria (same work scheme that is repeated and previously standardized by self-determination)
6	What are the criteria on which you base the dosage of the number of sparring rounds of a professional boxer? Select one or more criteria.	Characteristics of the competition (number of rounds, characteristics of the opponents, weight category, combat strategy)	Timing of the competitive calendar/ Periodization	Athlete characteristics (physical condition, technical/tactical level, experience, weight/category)	Fixed programming with own criteria (same work scheme that is repeated and previously standardized by self-determination)	Characteristics/level of sparring to be worked with

In *rounds* 3 and 4, only those options in which ≥50% agreement was obtained in the answers of the previous *round* were included, and a "multiple choice" format was used, presenting the Likert scale of Table 1.

Results

Rounds 1 and 2

After sending *round* 1 to a total of 30 coaches, who had been previously consulted about the possibility of being included in the research, a total of 22 responses were received (8 dropouts), and after sending *round* 2, 21 responses (1 dropout) (Figure 1).

Regarding demographic data (n=22), 90.9% of the coaches reported having >10 years of experience in the field of boxer preparation, while 9.1% selected 8 years. In addition, all the group of experts confirmed having experience in *amateur* and professional boxing (Table 5), as well as having prepared some of them for a title fight (Table 6).

Table 5

Number of boxers trained

N° of boxers	Amateur	%	Professional	%
>15	18	81.8	5	22.7
10 a 15	3	13.6	5	22.7
5 a 10	1	4.6	8	36.4
<5	0	0.0	4	18.2

Table 6

Number of boxers with whom a title has been contested

N° of boxers	Amateur	%	Professional	%
>6	17	77.3	4	18.2
3 a 6	3	13.6	9	40.9
<3	2	9.1	7	31.8
0	0	0.0	2	9.1

Questions 4, 11 and 12 in Table 3, in which coaches were required to complete by developing in round 1, were analyzed to extract key points from each response. In this way, the items that were then sent in the questionnaire for round 2 were assembled, this being entirely made up of "multiple choice" type questions.

Table 7 shows the results of round 2, which is representative of the initial consensus with which the expert agreement was later sought. Some of the items do not appear among the responses because they were eliminated after the return of round 1, as they were not selected by any of the coaches.

Table 7

Round 2 results

Ask	Item	%	
		Amateur	Professional
Why do you think it is important to perform sparring sessions in boxing?	Technical-tactical preparation	90.5	
	Preparation of the combat strategy	71.4	
	Athlete evaluation	57.1	
	Mental preparation of the athlete	23.8	
	Improved physical performance	14.3	
What are the protections you require your athletes to wear during sparring?	Head	95.2	95.2
	Gloves <14oz	23.8	4.8
	Gloves ≥14oz	76.2	90.5
	Hand bandage	71.4	71.4
	Groin protector	38.1	52.4
	Breastplate (women)	47.6	52.4
Which sparring partner would you select taking into account the level of experience of your athlete?	= experience	100	85.7
	> experience	76.2	81
	< experience	14.3	19.1
Which sparring partner would you select taking into account the weight/category of your athlete?	Same category	95.2	90.5
	Up to 1 category above	61.9	76.2
	Up to 1 category below	57.1	61.9
How many times a week do you think a boxer should spar?	Minimum 1	52.4	61.9
	Minimum 2	47.6	33.3
	Minimum 3	0	4.8

	Maximum 1	61.9	71.4
	Maximum 2	33.3	23.8
	Maximum 3	4.8	4.8
How many rounds of sparring do you think a boxer should do in one session?	Minimum 1 to 2	23.8	0
	Minimum 3 to 4	66.7	23.8
	Minimum 5 to 6	9.5	33.3
	Minimum 7 to 8	0	14.3
	Minimum 10 to 11	0	14.3
	Minimum >13	0	4.8
	Maximum 3 to 4	52.4	0
	Maximum 5 to 6	42.9	0
	Maximum 7 to 8	4.8	23.8
	Maximum 9 to 10	0	33.3
	Maximum 10 to 11	0	14.3
	Maximum 11 to 12	0	14.3
	Maximum >13	0	4.8
What is the intensity at which you consider sparring should be carried out?	Minimal Low or no contact	4.8	0
	Minimal Moderate	38.1	19.1
	Minimal High, but not as high as competition	33.3	61.9
	Minimal High, equal to the competition	23.8	19.1
	Maximum Moderate	9.5	0
	Maximum Alta, but not like the competition	33.3	28.6
	Maximum High, equal to the competition	57.1	71.4
What are the criteria on which you base the dosage of the number of sparring rounds of an amateur boxer?	Individual athlete requirements	76.2	
	Characteristics of the competition	71.4	
	Timing of the competitive calendar	61.9	
	Characteristics of the rivals	42.7	
	Fixed programming with own criteria	14.3	
What are the criteria on which you base the dosage of the number of sparring rounds of a professional boxer?	Characteristics of the competition	90.5	
	Timing of the competitive calendar	66.7	
	Athlete characteristics	61.9	
	Characteristics/level of *sparring*	52.4	
	Fixed programming with own criteria	19.1	

For all questions, agreement was obtained in both amateur and professional boxing, except for: minimum and maximum number of rounds that a professional boxer should perform in a session and minimum intensity at which sparring should be carried out in amateur boxing.

Rounds 3 and 4

For the preparation of the round 3 questionnaire, all those options in which a percentage ≥50% was reached in the round 2 responses were used. This third questionnaire was sent to a total of 21 coaches and responses were received from 19 of them (2 dropped out). Finally, round 4 was sent to 19 experts who had confirmed the submission of the 3 previous forms, concluding with a total of 17 final responses (2 dropouts).

Table 8 shows the results of round 4, which is representative of the final agreement of 17 of the 30 experts with whom the research began. Some of the items are not included among the responses because they did not reach the necessary consensus in round 2.

Table 8

Results of round 4

Ask	Item	Media	
		Amateur	Professional
Why do you think it is important to perform sparring sessions in boxing?	Technical-tactical preparation	4.8	
	Preparation of the combat strategy	4.7	
	Athlete evaluation	4.5	
What are the protections you require your athletes to wear during sparring?	Head	4.8	4.9
	Gloves ≥14oz	4.6	4.7
	Hand bandage	4.9	4.8
	Groin protector		4.7
	Breastplate (women)		4.4
Which sparring partner would you select taking into account the level of experience of your athlete?	= experience	4.7	4.7
	> experience	4.4	4.6
Which sparring partner would you select taking into account the weight/category of your athlete?	Same category	4.8	4.7
	Up to 1 category above	4.3	4.3
	Up to 1 category below	3.9	4
How many times a week do you think a boxer should spar?	Minimum 1	4.3	
	Minimum 2		4.3
	Maximum 2	4.2	
	Maximum 3		4.2
How many rounds of sparring do you think a boxer should do in one session?	Minimum 3 to 4	4.4	
	Maximum 3 to 4	4.2	
What is the intensity at which you consider sparring should be carried out?	Minimal High, but not as high as competition		3.8
	Maximum High, equal to the competition	4.4	4.8
What are the criteria on which you base the dosage of the number of sparring rounds of an amateur boxer?	Individual athlete requirements	4.4	
	Characteristics of the competition	4.6	
	Timing of the competitive calendar	4.3	

What are the criteria on which you base the dosage of the number of sparring rounds of a professional boxer?	Characteristics of the competition	4.7
	Timing of the competitive calendar	4.4
	Athlete characteristics	4.7
	Characteristics/level of sparring	4.5

For all the questions on which consensus was reached in round 2, there was also a high rate of agreement among the experts consulted. The only values below a mean of 4, a value representing complete agreement, were found for the selection of sparring weight/category in amateur boxing (down to 1 below) and for the minimum intensity at which sparring should be carried out in professional boxing (high, but not like competition).

Discussion

In the present study, we inquired about the programming of sparring in amateur and professional boxing: importance of its practice, necessary protections, experience and weight/category of partners, minimum/maximum weekly frequency, minimum/maximum number of rounds per session, recommended minimum/maximum intensity and criteria for the dosage of the number of rounds.

In the first instance and after the analysis of the results of round 1, the following criteria were distinguished as important for the practice of sparring in amateur and professional boxing: technical-tactical preparation, preparation of the combat strategy, evaluation of the athlete, mental preparation of the athlete and improvement of physical performance. Although some authors have mentioned the importance of sparring in order to develop the physical capabilities of athletes (Baum, 2022; Finlay et al., 2020; Follmer et al., 2020) and although this concept appeared among the responses of the coaches, a sufficient percentage of consensus was not reached in the first rounds for it to be considered in the final agreement. Similar findings are presented with regard to the criterion of mental preparation of the athlete.

Regarding protections, the highest percentages of consensus were obtained in both amateur and professional boxing for: 1) head, 2) gloves ≥14oz and 3) hand bandage. However, for professional boxing a consensus percentage was also reached for: 4) groin protector and 5) breastplate (women). At the end of round 4, agreement was reached for all 5 items. Some of these protections have also been mentioned as important in the literature (Förstl et al., 2010; Sethi et al., 2021; Tjønndal et al., 2021) in order to reduce the risk caused by exposure to impacts. According to the results on the use of headgear during sparring, where a consensus percentage of 95.2% was reached for both amateur and professional boxing and an agreement of 4.8 for amateur boxing and 4.9 in the case of professionals, we could infer that boxers should not carry out this practice without such protection.

Although it has been postulated about limiting sparring to medium and high intensity (Stiller et al., 2014), it is noteworthy that coaches agreed on a minimum for professional boxers "high, but not like competition" and maximum "high, same as competition". For amateur boxing there was no initial consensus on the minimum intensity, but there was consensus on the maximum intensity, which should be "high, equal to competition". This could indicate the possibility that coaches may agree to vary the minimum intensity of sparring in amateur boxing according to various criteria.

Because experts would select sparring partners of greater experience and up to 1 weight category higher, it should be noted that this could generate an increase in the forces produced in the strikes (Förstl et al., 2010; Lenetsky et al., 2013; Lopez-Laval et al.) with a subsequent higher sparring intensity.

The high intensities proposed by boxing coaches seem to be in agreement with some works carried out in other sports, where mention is made of their importance in the preparation of athletes in order to tolerate the demands of competition and thus achieve success in them (Gabbett, 2022; Gabbett & Gahan, 2016).

The volume or number of sparring rounds is an important issue to address when seeking to reduce the danger of blows received to the head (Stiller et al., 2014), a context in which the weekly frequency and number of rounds per session appear. The experts consulted in this work agreed on a weekly minimum and maximum for amateur and professional boxing, but regarding the amount per session, an agreement was only reached for amateur boxing. Thus, a concrete programming proposal was obtained for amateur boxers and, on the other hand, there does not seem to be a fixed number of sparring rounds per session for professionals, but it will depend on the characteristics of the competition, the athlete, his partner and the time of the competitive calendar.

The analysis of the results allowed us to distinguish the following criteria for the dosage of the number of sparring rounds in amateur and professional boxing: individual requirements or characteristics of the athlete, characteristics of the competition and time of the competitive calendar. Accordingly, the volume of sparring would be given by an interaction between the needs of the athlete and the demands of the competition.

Considering that prolonged exposure to impacts, shaped by the volume of training and number of years within the sport, can affect different cognitive functions and increase the risk of chronic traumatic brain injury (Bailey et al., 2013; Cunningham et al., 2020; Di Virgilio et al., 2019; Jordan et al., 1996; Stiller et al., 2014), sparring programming should be done with caution and always coordinated in an interdisciplinary manner by the coach, physical trainer and health care team.

During the data collection process of this research, one limitation was the difficulty in maintaining the adherence of the experts consulted, losing contact with 13 of the 30 with whom the work began, who abandoned the return of the results in different instances or rounds.

Conclusions

Through the implementation of a 4-round Delphi technique, an agreement was reached among 17 expert trainers from Argentina, Mexico, Chile and Ecuador, on some of the characteristics of sparring programming in amateur and professional boxing.

Firstly, it was determined that the importance of sparring sessions in boxing lies in the technical-tactical preparation and combat strategy, as well as in the possibility of evaluating the athletes.

As far as amateur boxing is concerned, the experts agreed that the necessary protections for sparring are headgear, ≥14oz gloves and hand bandage. Sparring partners must be of equal or greater experience, as well as of equal weight category, and up to 1 more above or below. The practice of this activity should be carried out a minimum of once a week and a maximum of 2 times a week, ranging from 3 to 4 rounds in each one, and with a maximum intensity "high, equal to competition". Finally, the criteria on which the dosage of the number of rounds in these athletes is based are individual requirements of the athlete, characteristics of the competition and time of the competitive calendar.

In professional boxing work, it is emphasized that the necessary protections for sparring are headgear, ≥14oz gloves, hand bandage, groin protector and, in the case of female boxers, breastplate. Sparring partners must be of equal or greater experience, equal weight category and up to 1 more above or below. The practice of this activity should be carried out a minimum of 2 times a week and a maximum of 3 times a week, with a minimum intensity "high, but not like competition" and a maximum "high, equal to competition". Finally, the criteria on which the

dosage of the number of rounds in these boxers is based are characteristics of the competition, moment of the competitive calendar, characteristics of the athlete, and characteristics or level of the sparring partner.

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