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## *Factors that affect the behavior of the start in school sprinters category 12-15 years*

*Factores que afectan el comportamiento de la arrancada en los velocistas escolares categoría  
12-15 años*

*Fatores que afetam o comportamento da largada em velocistas escolares da categoria 12 a 15  
anos*

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### **SUMMARY**

In the Pinar del Río province, in the last five years a certain decrease in the performance of short distance runners has been noted. One of the aspects that affects this is the poor use of the start. This research was carried out with the objective of analyzing the behavior at the



start of the 100-meter dash race of school sprinters in the 12-15-year category of the Pinar del Río Sports Initiation School. Currently, efforts are made to personalize the type of start to the specific characteristics of each local athlete to guarantee optimal use of their anthropometric characteristics, muscular power, race distance and location on the track. The study was carried out with eight athletes in the 12-15-year-old category, male, enrolled in the speed area at the Pinar del Río Sports Initiation School. A documentary review of the low start training process carried out in school sprinters was carried out, in addition to applying other empirical methods such as: observation to training, measurement and survey technique. The results show that there are factors in the training process that threaten the competitive success of these athletes; this generates the need to organize actions in a sequential, logical order that allows their improvement based on adjustment to changes in the condition of these subjects.

**Keywords:** start, athletics, speed.

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## RESUMEN

En la provincia Pinar del Río, en los últimos cinco años se ha notado cierto descenso de los rendimientos de los corredores de distancias cortas. Entre uno de los aspectos que incide en ello figura el pobre aprovechamiento de la arrancada. Esta investigación se realizó con el objetivo de analizar del comportamiento, en la arrancada de la carrera de 100 metros planos de los velocistas escolares categoría 12-15 años de la Escuela de Iniciación Deportiva de Pinar del Río. En la actualidad, se procura personalizar el tipo de arrancada a las características específicas de cada atleta, local para garantizar un aprovechamiento óptimo de sus características antropométricas, potencia muscular, distancia de carrera y ubicación en la pista. El estudio se llevó a cabo con los ocho atletas de la categoría 12-15 años, sexo masculino, matriculados en el área de velocidad en la Escuela de Iniciación Deportiva de Pinar del Río. Se realizó una revisión documental del proceso de entrenamiento de la arrancada baja que se lleva a cabo en los velocistas escolares, además de aplicar otros métodos empíricos como: la observación a los entrenamientos, la medición y la técnica de encuesta. Los resultados arrojados muestran que existen factores en el proceso de



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entrenamiento que atentan contra el éxito competitivo de estos atletas; esto genera necesidad de organizar acciones en un orden secuencial, lógica que permitan su perfeccionamiento en base al ajuste a los cambios de la condición de estos sujetos.

**Palabras clave:** arrancada, atletismo, velocidad.

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### **RESUMO**

Na província de Pinar del Río, nos últimos cinco anos, notou-se uma certa diminuição no desempenho dos corredores de curta distância. Um dos aspectos que afeta isso é o mau aproveitamento da largada. Esta pesquisa foi realizada com o objetivo de analisar o comportamento na largada da corrida de 100 metros rasos de velocistas escolares da categoria 12-15 anos da Escola de Iniciação Esportiva Pinar del Río. Atualmente, são feitos esforços para personalizar o tipo de largada às características específicas de cada atleta local para garantir o aproveitamento ideal de suas características antropométricas, potência muscular, distância de corrida e localização na pista. O estudo foi realizado com oito atletas da categoria 12 a 15 anos, do sexo masculino, matriculados na área de velocidade da Escola de Iniciação Esportiva Pinar del Río. Foi realizada uma revisão documental do processo de treinamento low start realizado em velocistas escolares, além de aplicar outros métodos empíricos como: observação ao treinamento, medição e técnica de levantamento. Os resultados mostram que existem fatores no processo de treinamento que ameaçam o sucesso competitivo desses atletas; Isso gera a necessidade de organizar as ações em uma ordem sequencial e lógica que permita seu aprimoramento a partir do ajuste às mudanças na condição desses sujeitos.

**Palavras-chave:** arranco, atletismo, velocidade.

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## INTRODUCTION

Athletics brings together several sports disciplines that derive from the natural activities of human beings: walking, running, jumping and throwing. The short or speed races capture the attention of a large number of spectators, to the point of becoming the main attraction.

Para Fis *et al.* (2021) in this sport, as in others, basic motor skills do not have to go alone in their development. Basically, in 100-meter dash races there is a predominance of the indissoluble relationship between strength and speed, rapid strength that defines the body's ability to oppose and overcome resistance from an external point of view, sports performance is the result of the athlete's ability to obtain a place in the competition that is qualitatively evaluated according to the training plan carried out.

The races are made up of four fundamental phases: 1) start, 2) transitory or acceleration steps, 3) normal steps and 4) final or close. The start has only a 1.1% influence on the competitive result of the sprinters, but this small percentage is sometimes enough to define a competitive result, hence the interest that has been given to it in scientific research.

According to Ruíz (2005), currently efforts are being made to personalize the type of start, with optimal use of anthropometric characteristics, muscle power, race distance and location on the track (straight or curved).

Athletic speed tests are complex disciplines that depend on multiple factors of a conditional nature, decision making and movement control, the importance of which will vary depending on its duration. (Sánchez and Suárez, 2023)

Morales *et al.* (2021-a) considers that running is a particular type of locomotion that man performs to move quickly, but in speed running it is not just about moving quickly, but rather about coordinating all aspects of said locomotion in such a way that a distance can be covered as quickly as possible.

In total agreement with Fis and Serantes (2019), when reasoning how important it is to lay the foundations for those aspects that, in the sense of the formation of basic motor habits,



should be considered by specialists, not as something finished, but as a procedure to achieve technical improvement.

One of the great challenges of Cuban athletics, in its struggle to optimize sports performance, is the improvement of the national and international results of its athletes; within its specialties, speed requires the efficient transformation of the push and initial step of the rear leg of the low start, which allows increasing the technical reaction for takeoff from the starting block (Carpio and Trujillo 2017).

The low start, with its variants associated with individualities, for better use of the motor potential and the anthropometric particularities of the runners, makes the difference in the evolutionary process of short smooth races.

Although the start influences only 1% in the competitive result of the competitors of short smooth races, called sprinters, but this small percentage is sometimes enough to define a competitive result, hence the interest that has been given to it in the present scientific investigation.

In studies carried out by Sánchez and Suárez (2023), they report having confirmed in practice that in training and competition situations there may be difficulties in breaking the inertia for the execution of the start; they appear impatient and anxious to get out of the starting block, leading to false starts.

According to Ruiz (2005), currently efforts are made to personalize the type of start to the specific characteristics of each athlete, seeking optimal use of their anthropometric characteristics, muscular power, race distance and location on the track (straight or curves).

The 100 m start requires the athlete to be dynamic, active both in training and in competitions; the start requires agility and strong movements of the legs and arms, as well as reaction speed (Beltrán and Milan 2020).



In Pinar del Río, Cuba, in the last five years, a certain decrease in the performance of short distance runners has been noted, one of the aspects that affects this being the poor use of the start.

Some of the variables that are taken into account for the selection of the type of start and the preparation of the runner to guarantee its optimal use, are modifiable under the effect of the training, however, observations of the training and competitions show that the treatment of the start in short distance runners at school ages lacks personalization and constant readjustment of it taking into account the changes that the athlete undergoes in the training process, as well as his growth and psychomotor and functional maturation. As it should be considered according to (Ruiz, 2005).

In this same order, there is a need to obtain information about the characteristics of the competitive activity of the 100 m flat race, since their determination allows to detect performance indicators, guide the athlete's preparation process towards present achievements and future, as well as its control (Morales, *et al.*, 2021-a)

Other studies related to the topic discussed that have served as references in this work were also evaluated, such as those published by Carpio and Trujillo (2017), Agüero and Trujillo (2019), Morales *et al.* (2021-b) and Morales *et al.* (2022), which propose different exercises and methodologies in the training of sprinters, which particularize the start.

Therefore, the need to improve the treatment of the start in school sprinters (12-15 years) in athletics that contributes to the success of the race becomes evident. Therefore, the objective of this research focuses on analyzing the behavior of school sprinters in the 12-15-year category in the start during the 100-meter dash race



## MATERIALS AND METHODS

### *Context and participants*

The study was carried out with the EIDE "Ormani Arenado Llonch" sprinters aged between 12-15 years. Of a total of 8 athletes, all of them are male, three have two years of experience, four have one year of experience and one is new.

It was important to characterize the population studied (Table 1).

*Table 1. - Characterization of sprinters athletes*

athletes	Size	Mass	I.C.	Length Legs
1	150	50	23	85
2	155	48	24	80
3	162	57	24	92
4	161	56	22	90
5	157	48	17	87
6	160	54	16	89
7	155	52	19	80
8	163	60	18	92

In addition, three Eide coaches with more than ten years of experience were used as a source of information, one presents the category of postgraduate specialist in athletics and all three present the second level category of the International Association of Athletics Federations (IAAF). The documentary review of the Physical Education curriculum, as well as the degree program and class system, provided important information for the result of this study.

The documentary review was carried out on the training plans of the last five years and their evaluations, the *Comprehensive Athlete Preparation Program*.

In this same order, observation of six training sessions in the competitive modeling stage and during the national school competition, a measurement to examine the theoretical criteria on the progression of speed within a short race and a survey of coaches were carried





out, what showed that there are divergences in the correct exercise of the low start in sprinters.

## RESULTS AND DISCUSSION

The documentary review showed that in the province of Pinar del Río, in the last five years, a certain decrease in the performance of short distance runners has been noted. Among the aspects of greatest incidence, the poor use of the start stands out; some of the variables that are taken into account for the selection of the type of start and the preparation of the runner to guarantee its optimal use, are modifiable under the effect of training.

In the data referring to the speeds achieved in each section of the race, measured with a specialized semi-electronic chronometer (brand) with one hundred memories, it is evident that the highest values of starting speed correspond to the athletes who ultimately obtained the best speed at the end of the test, like athlete eight (Table 2)

Table 2. - Reference records of the speeds achieved in each section of the race

athletes	10 meters	20 meters	30 meters	40mts	50 meters	60mts
1	5.59	6.35	6.71	7.14	7.25	7.42
2	6.02	6.85	7.85	8.33	8.62	8.75
3	5.88	6.41	7.61	7.94	8.16	8.24
4	5,85	6,76	7,26	7,59	7,74	7,99
5	6,17	6,99	7,39	7,68	7,81	7,92
6	5,59	6,45	7,09	7,27	7,47	7,75
7	5,38	6,01	6,96	7,17	7,42	7,52
8	5,32	6,33	7,04	7,30	7,40	7,49
Arithmetic average	5.71	6.50	7.22	7.53	7.71	7.86
Maximum	6.17	6.99	7.85	8.33	8.62	8.75
Minimum	5.32	6.01	6.71	7.14	7.25	7.42

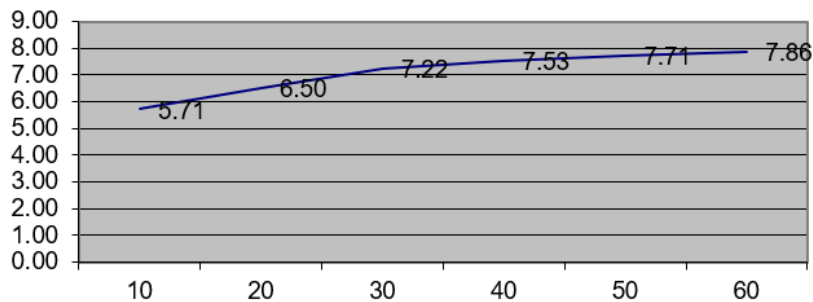
The analysis of the *Comprehensive Athlete Preparation Program* for the area of speed and hurdles confirms the importance given to the treatment of the start from the initial specialization stage of the speed runner, but there are no declared actions corresponding to its personalization and adjustment according to the aspects that can be modified by training.



It lacks an organization of the elements of the teaching-learning process such as tasks, methods, means, organizational procedures and methodological observations.

Consequently, and considering that actions appear in the literature that could contribute to improving the sprinter's start in athletics, it is necessary to group them according to the recurring criteria discussed in the first section of this article and order them in a logical sequence, corresponding to the theoretical precepts of the current training methodology.

In the controls applied, the theoretical criteria on the progression of speed within a short race could be verified, highlighting a greater inclination of the line between sections 1 and 3, which is inseparably related to the modification of the initial speed state until reaching the maximum or close to it after thirty meters, by determining the arithmetic mean of the speed in each section of the race from 10 to 60 m. (Figure 1).



*Fig.1. - Speed variability in each race section from 10 to 60 m*

It is also corroborated that the best result in short-duration flat speed races is related to the ability to vary the translational speed upwards, highlighting the fact that the athlete two who was previously indicated as the second with the best exit speed, was the one with the best overall performance, thanks to his acceleration possibilities after the fourth and fifth stages of the race in the 60 m. (Figure 2).



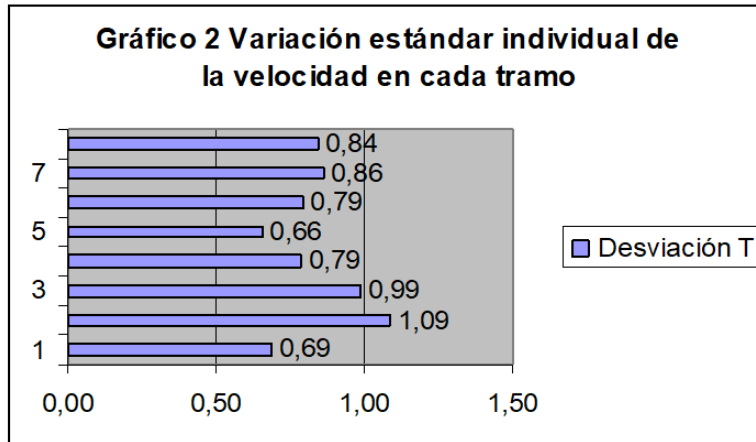


Fig. 2.- Variation in each speed section

Already in Figure 3, a better relationship can be inferred between the final result of the flat race and the starting speed, represented by section 1 (first in the 10 metros race) with respect to the transitory steps that characterize the speed in section 2 (20 metros), hence, training aimed at improving the start and exit speed is considered of great importance, even when this is not the main factor that ensures performance and competitive results (Figure 3).

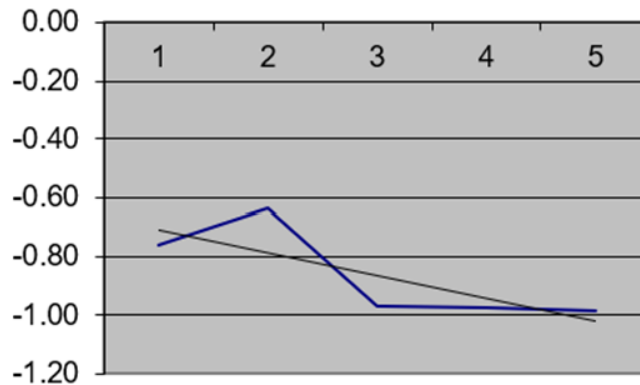


Fig. 3. - Relationship between the speeds recorded in each section with respect to the final result

Six training sessions were observed in the competitive modeling stage and during the national school competition and the main difficulties are that the start is optional for the athletes, the leg with the greatest strength is not used at the time of the start. All this infers an optimal reaction at the moment of departure.



To guarantee an optimal start, a personalized placement is needed and as Morales (2021-a) specifies, the reaction speed is determined by the shortest time that elapses between the application of a stimulus and obtaining a motor response. Taking into account these factors, it is necessary to define the requirements that speed, as a sporting modality, demands of an athlete, and then compare the correspondence of the individual particularities with said requirements.

Theoretically, the sprint training process for sprinters involves adjusting the position to the individual conditions of the athlete, treating the leading abilities and guaranteeing general technical mastery.

In a survey of coaches, it was known that there are divergences in the correct exercise of the low start in sprinters, which shows the concern that these coaches have to solve this problem. Everyone agrees that this element had a negative impact on the results compared to the previous year.

The coaches agree on the existence of an incorrect methodological treatment, a neglect of certain precisions in the preparation and also that the sudden changes that occur at these ages that can affect the final performance in the competition since the athlete can grow, achieve changes in the way you start in the starting blocks.

In the treatment of the low start, it is essential to personally attend to the potential of the runner, as mentioned by Zorrila (2018), as well as the use of alternative technical exercises for its dynamics, as proposed by Palacios and Villalobos (2017). The teacher cannot use rigid schemes to achieve such a transformation, nor should he apply artificial procedures that distance the child's natural abilities from their biological roots.

Another important element to address is focused on the need for anthropometric, physical and morpho-functional indicators, which contribute to the improvement of this low start training process, as Palacios (2019) points out, at the current time they are susceptible to changes accordingly to the current demands of the sport and the particularities of each territory or municipality, to achieve this improvement, the use of current indicators is reflected on.



Constant updating according to the demands of modern sport is essential because, as expressed by Quintana *et al.* (2021), the changes in the current competitive system of athletics with a tendency to increase competitive demands worldwide at younger ages, have caused the most accepted theories on the conception of the long-term sports preparation system to become outdated.

How far could it was possible go with the bibliographic search:

Cueto *et al.* (2020) makes it clear that in each new cycle of planning and development of sports training in groups of high-performance athletes, new tasks and means are introduced that, when properly adapted and individualized, will have a morpho-functional adaptive effect. Which must be measured and interpreted, and thus make corrections to the tasks within the development of sports training, to then optimize athletic knowledge and performance.

There are several studies analyzed for this work, they fundamentally look for biomechanical analysis of the race, factors that affect the section to reach maximum speed after the start, but there are few that make a deep assessment of the low start as a cardinal element for the expected result, as Morales (2022) states, in speed athletics, specifically in the 100-meter dash race, the speed start or the stud start is the first phase that takes place within a race. of speed from 1928 -1929. On the other hand, Bezodis (2009) mentions that the start of blocks, being part of the first phase of the race, is even more decisive despite its brevity, since a bad start conditions the resulting acceleration of the athlete. and therefore, a later acquisition of maximum speed.

It is a reality that the changes in the current competitive system of athletics, with a tendency to increase competitive demands at a global level at younger ages, have caused the most accepted theories on the conception of the long-term sports preparation system to become outdated.

The changes in the current competitive system of athletics, with a tendency to increase competitive demands worldwide at younger ages, have caused the most accepted theories on the conception of the long-term sports preparation system to become outdated. This



constitutes a limitation for the implementation of new methodological concepts in this process, with its implications in the decrease in the effectiveness of the sporting life of our athletes and the selection of the sporting reserve to join the elite. Quintana *et al.* (2021)

## CONCLUSIONS

By way of conclusion, it is proposed that the start in the school sprinters (12-15 years) of the Sports Initiation School "Ormani Arenado Llonch" of Pinar del Río shows insufficiencies that imply the need to organize actions in a sequential order logical. These factors that lead to this irregularity must be treated in advance to contribute to the improvement of the sport based on the adjustment to the changes in the athlete's condition within the annual macro structure to the analysis of theoretical budgets. Likewise, they must take advantage of the opportunities offered by the current scientific and technological level and in accordance with the available material resources.

## REFERENCES

- Pérez Agüero, H., & Villalobos Trujillo, J. R. (2019). Sistema de ejercicios para los pasos transitorios en velocistas de 11 -12 años / Exercise system for transitional steps in 11 -12 year. *Universidad & ciencia*, 8, pp. 986-1000.  
<https://dialnet.unirioja.es/servlet/articulo?codigo=8315485>
- Beltrán, M. y Milán E. (2020). Modelo temperamental para corredoras de 100 y 200 metros planos. *Revista Cultura Física y Deportes de Guantánamo*. 10, Número Especial.
- Carpio, M. P., & Trujillo, J. R. V. (2017). Alternativas de ejercicios técnicos para la dinámica de la arrancada baja, en velocistas de la categoría escolar, del área Ricardo Pérez Alemán de Ciego De Ávila. *Universidad & Ciencia*, 6(3), pp. 91-104.  
<https://revistas.unica.cu/index.php/uciencia/article/view/456>



- Sanz, A. C., Ramírez, O., Díaz, P. C., & Benítez, J. L. (2020). Caracterización morfofuncional de los corredores de 400 metros cubanos con vista a la olimpiada de Atenas 2004. *Revista Cubana de Medicina del Deporte y la Cultura Física*, 5(1), Article 1. <https://revmedep.sld.cu/index.php/medep/article/view/297>
- Fis Abreu, O., & Serantes Pardo, A. (2019). SISTEMA DE EJERCICIOS BÁSICOS PARA VELOCISTAS DE 400 METROS PLANOS CATEGORÍA 15-16 AÑOS MASCULINOS EIDE PROVINCIAL CIEGO DE ÁVILA / SYSTEM OF BASIC EXERCISES FOR VELOCISTAS OF 400 METERS FLAT CATEGORY 15-16 MASCULINE YEARS EIDE PROVINCIAL BLIND MAN DE ÁVILA. *Universidad & Ciencia*, 8, pp. 617-627. <https://revistas.unica.cu/index.php/uciencia/article/view/1473>
- López Fis, S., Castillo Fuentes, D., & Hernández Macías, R. (2021). Sistema de ejercicios para mantener la velocidad máxima en los corredores de 100 m/p. *Athlos: Revista internacional de ciencias sociales de la actividad física, el juego y el deporte*, 23, pp. 63-77. <https://dialnet.unirioja.es/servlet/articulo?codigo=7840754>
- Morales Fabregas, A.M, Sanchez Oms,A.B, Perdomo Ogando,J.M. (2021-a). Características de la actividad competitiva de la carrera de 100 metros planos. *Ciencia y Actividad Física*, 8(1), pp. 105-120, <https://revistacaf.uclv.edu.cu/index.php/revista/article/download/120/476>
- Morales Fábrega, A., Sánchez Oms, A., Perdomo Ogando, J., & Pérez Sierra, A. (2021-b). Patrón biomecánico de la primera fase de la carrera de 100 metros para velocistas juveniles/Biomechanical pattern of the first phase of the 100 m race for junior sprinters. *PODIUM -Revista de Ciencia y Tecnología en la Cultura Física*, 16(3), pp. 809-827. <https://podium.upr.edu.cu/index.php/podium/article/view/10>
- Morales Fábrega, Alberto Miguel, Sánchez Oms, Alberto Bautista, & Perdomo Ogando, Juan Manuel. (2022). Metodología para el perfeccionamiento de la técnica de la primera fase de los de 100 metros planos. *Revista Cubana de Educación Superior*, 41(1), 12. Epub



01 de marzo de 2022. [http://scielo.sld.cu/scielo.php?script=sci\\_arttext&pid=S0257-43142022000100012&lng=es&tlng=es](http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0257-43142022000100012&lng=es&tlng=es).

Carpio, M. P., & Trujillo, J. R. V. (2017). ALTERNATIVAS DE EJERCICIOS TÉCNICOS PARA LA DINÁMICA DE LA ARRANCADA BAJA, EN VELOCISTAS DE LA CATEGORÍA ESCOLAR, DEL ÁREA RICARDO PÉREZ ALEMÁN DE CIEGO DE ÁVILA. *Universidad & Ciencia*, 6(3), pp. 91-104. <https://revistas.unica.cu/index.php/uciencia/article/view/456>

Quintana Díaz, A., Sterling Canto, D., Mendoza de Lara, O., Hechavarría Gil, A., & Gómez Cuevas, R. (2021). Procedimiento metodológico para la determinación de la reserva deportiva cubana en el Atletismo. *Acción*, 17 (Especial). <https://accion.uccfd.cu/index.php/accion/article/view/196>

Ruiz, J. (2005). Metodología y técnica del Atletismo. Barcelona. Editorial Paidotribo. [https://books.google.com.cu/books?id=4qxLd2bV-a8C&printsec=copyright&hl=es&redir\\_esc=y#v=onepage&q&f=false](https://books.google.com.cu/books?id=4qxLd2bV-a8C&printsec=copyright&hl=es&redir_esc=y#v=onepage&q&f=false)

Sánchez Matos, Y., & Suárez Rodríguez, M. de la C. (2023). Diagnóstico de la concentración de la atención en velocistas de la Selección Nacional de Ciclismo. *Ciencia Y Actividad Física*, 10, pp. pp. 43-57. <https://doi.org/10.5281/zenodo.8212861>

Zorrilla Nardo, Y. y Arguelles Frómeta, N. (2018): "Ejercicios para mejorar los pasos transitorios en los atletas de categoría 10 -11años de atletismo del área especial Pablo de la Torriente Brau". *Revista Caribeña de Ciencias Sociales* (mayo 2018). <https://www.eumed.net/rev/caribe/2018/05/ejercicios-atletismo.html>

***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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