ALPHA FITNESS COMPARATIVE STUDY

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ACTIVYOU

Co-funded by the Erasmus+ Programme of the European Union

INTRODUCTION

In the context of this report, a study of physical fitness in adolescents will be conducted, focusing on the assessment of values obtained through four fundamental tests. The primary objective of this research is to analyse and compare fitness levels between different demographic groups, specifically focusing on differences between genders (boys and girls) and between different sporting environments (clubs and schools).

Assessing physical fitness through such standardised tests will not only allow us to better understand the physical fitness of adolescents, but also to identify possible disparities between demographic groups and sporting environments.

These tests have been carried out in different contexts, three educational centres, Liceo la Paz in Coruña (Spain), Os Nikolak Velimirovic in Sabac (Serbia), a football sports club in Coruña (Spain) and a youth basketball association in Prerov (Czech Republic). In all of them, the participants who have taken the tests are teenagers between 13 and 16 years of age.

As for the participants who have passed the tests, they are: Innosport, through its football club 72 participants Czech Youth Association z.s, through its youth basketball association 29 participants and through its basic school group another 33.

Liceo La Paz (has carried out the tests to a higher number than agreed, in order to involve all the lines of the school) 126 participants.

Os Nikolak Velimirovic 78 students from his school.

The four tests that will form the core of our analysis are as follows:

• Aerobic Capacity: Assessed by the 20-metre out-and-back test, also known as the Coursse Navette. This test provides a measure of subjects' cardiovascular endurance and lung capacity.

• Maximum Upper Body Strength: To be assessed by manual grip strength, expressed in kilograms. This test is indicative of upper body muscular strength and endurance.

• Lower Body Explosive Strength: Measured by the long jump with feet together in centimetres. This test will give an idea of the power and explosiveness of the leg muscles.

• Speed/Agility: This will be assessed by the time in seconds required to complete a 4x10 metre run. This test will allow us to analyse the speed and the ability to change direction of the subjects.

During the analysis of the results of these tests, we will focus on categorising fitness levels based on predefined standards, establishing categories ranging from "Very Low" to "Very High".

These standards, which are enclosed, are taken from the standard measurements made by Europe through the AlphaFitness battery measurement.

Aerobic capacity: 20 meter shuttle test

Boys

	Very Low	Low	Medium	High	Very High
13	≤3,0	3,5 - 4,5	5,0 - 6,0	6,5 - 7,5	≥8,0
14	≤3,5	4,0 - 5,5	6,0 - 6,5	7,0 - 8,5	≥9,0
15	≤4,0	4,5 - 5,5	6,0 - 7,0	7,5 - 8,5	≥9,0
16	≤4,0	4,5, - 5,5	6,0 - 7,0	7,5 - 8,5	≥9,0

Girls

	Very Low	Low	Medium	High	Very High
13	≤2,0	2,5 - 2,5	3,0 - 3,5	4,0 - 4,5	≥5,0
14	≤2,0	2,5 - 3,0	3,5 - 4,0	4,5 - 5,0	≥5,5
15	≤2,0	2,5 - 3,0	3,5 - 4,0	4,5 - 5,0	≥5,5
16	≤2,0	2,5 - 3,0	3,5 – 4,0	4,5 - 5,0	≥5,5

Maximum upper body strength: hand grip strength (kg)

Boys

	Very Low	Low	Medium	High	Very High
13	≤21,4	21,5 - 24,7	24,8 - 27,8	27,9 - 31,8	≥31,9
14	≤26,3	26,4 - 30,4	30,5 - 34,0	34,1 - 38,5	≥38,6
15	≤31,3	31,4 - 35,7	35,8 - 39,7	39,8 - 44,3	≥44,4
16	≤35,9	36,0 - 40,0	40,1 - 43,7	43,8 - 48,1	≥48,2

Girls

	Very Low	Low	Medium	High	Very High
13	≤19,9	20,0- 22,5	22,6 - 24,8	24,9 - 27,6	≥27,7
14	≤21,5	21,6 - 24,1	24,2 - 26,4	26,5 - 29,2	≥29,3
15	≤22,5	22,6 - 25,1	25,2 - 27,4	27,5 - 30,3	≥30,4
16	≤22,9	23,0 - 25,4	25,5 - 27,8	27,9 - 30,8	≥30,9

Explosive strength of the lower body: long jump to feet together (cm)

Boys

	Very Low	Low	Medium	High	Very High
13	≤135	136 - 152	153 - 167	168 - 184	≥185
14	≤151	152 - 169	170 - 183	184 - 200	≥201
15	≤165	166 - 182	183 - 196	197 - 212	≥213
16	≤175	176 - 192	193 - 206	207 - 221	≥222

Girls

	Very Low	Low	Medium	High	Very High
13	≤118	119 - 133	134 - 147	148 - 163	≥164
14	≤121	122 - 137	138 - 151	152 - 167	≥168
15	≤123	124 - 138	139 - 151	152 - 167	≥168
16	≤126	127 - 141	142 - 154	155 - 169	≥170

Speed/agility: 4x10m (sec)

Boys

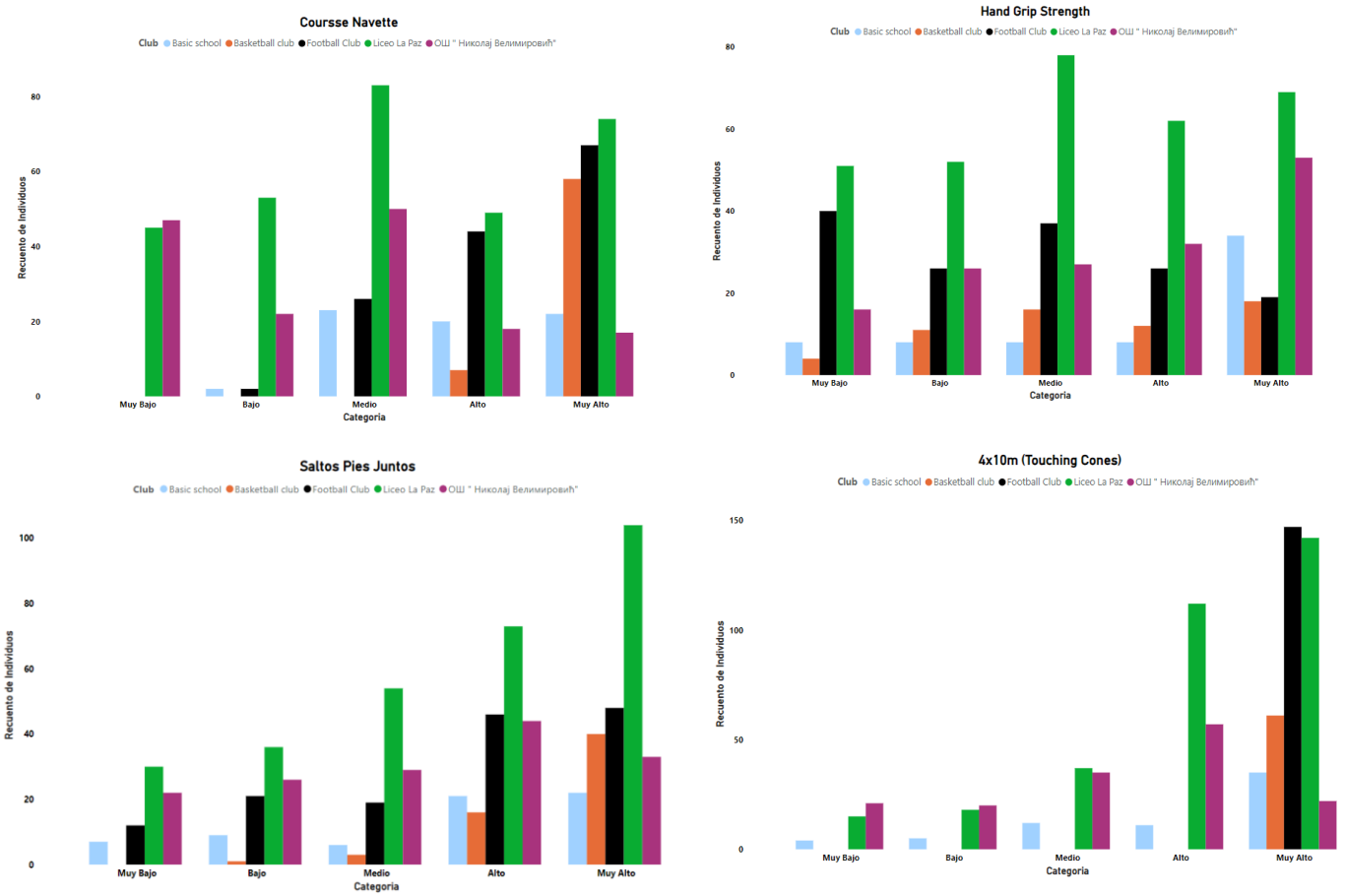
	Very Low	Low	Medium	High	Very High
13	≥13,0	12,3 -12,9	11,8 - 12,2	11,2 - 11,7	≤11,1
14	≥12,6	11,9 - 12,5	11,4 - 11,8	10,9 - 11,3	≤10,8
15	≥12,1	11,5 - 12,0	11,0 - 11,4	10,5 - 10,9	≤10,4
16	≥11,8	11,1 - 11,7	10,7 - 11,0	10,2 - 10,6	≤10,1

Girls

	Very Low	Low	Medium	High	Very High
13	≥13,9	13,1 - 13,8	12,5 - 13,0	11,9 - 12,4	≤11,8
14	≥13,8	13,0 - 13,7	12,4 - 12,9	11,8 - 12,3	≤11,7
15	≥13,7	13,0 - 13,6	12,4 - 12,9	11,8 - 12,3	≤11,7
16	≥13,6	12,9 - 13,5	12,3 - 12,8	11,7 - 12,2	≤11,6

SCHOOL COMPARISON

In this first section, we will make a comparative study of the different schools. The following image shows the distribution of each of the categories for each school with respect to each of the tests carried out:



Coursse Navette

- Football Club stands out as the institution with the highest records in the "Very High" category, demonstrating a consistent performance across the higher fitness levels.
- Liceo La Paz has the most prominent number of individuals in the "Medium" and "Very Low" categories, indicating a wide disparity in test scores, likely reflecting differences in training intensity or population diversity.
- In contrast, the Basketball Club shows a strong presence in the "High" and "Very High" categories, highlighting its emphasis on aerobic and physical fitness specific to the demands of the sport.
- The Serbian school ОШ "Николај Велимировић" has relatively low representation in the "High" and "Very High" categories, suggesting room for improvement in the physical fitness of its students.
- Finally, the Basic School shows a more balanced distribution across categories but lacks significant representation in the "Very High" category.

This analysis reveals that sports clubs generally outperform schools in aerobic capacity and fitness, as reflected by their higher scores in the "High" and "Very High" categories. This outcome aligns with the structured training and specificity of physical activities in sports environments. On the other hand, schools

like **Liceo La Paz** and **ОШ "Николај Велимировић"** demonstrate greater variability in performance, possibly due to less specialized training and a broader student base.

Hand Grip Strength

- Liceo La Paz stands out as the institution with the highest records across all categories, including the "Very High" and "High" levels, showcasing a strong overall performance in hand grip strength.
- ОШ "Николај Велимировић" follows closely in the "Very High" category, demonstrating good results, particularly at the upper levels of strength.
- The Football Club maintains a balanced distribution across the categories, but it does not dominate in the "Very High" category as much as the schools.
- The Basic School has a strong presence in the "High" category but lacks significant representation in the "Very High" range, indicating moderate strength levels among its individuals.
- Finally, the Basketball Club exhibits limited representation across all categories, suggesting that hand grip strength may not be a primary focus of its training regimen.

This analysis highlights a contrast in performance patterns between schools and clubs. **Liceo La Paz** and **ОШ "Николај Велимировић"** achieved remarkable results, likely due to broader participant bases and varied fitness levels. Sports clubs, such as the **Basketball Club**, show a more specialized focus, which may not emphasize hand grip strength as a key physical attribute.

Long Jump

- Liceo La Paz again dominates in the 'Very High' category, with a significant number of individuals reaching this level, reflecting an excellent capacity for power and explosiveness among its participants.
- ОШ 'Николај Велимировић' follows in second position in the 'Very High' category, also demonstrating good results in this test, but does not reach the levels of Liceo La Paz.
- The Football Club shows a balanced performance in the 'High' and 'Very High' categories, excelling in these areas. This could be related to the emphasis on physical skills in team sports such as football.
- The Basic School is represented in all categories, but less frequently at the 'High' and 'Very High' levels, indicating a more moderate performance overall.
- Basketball Club has a low representation in almost all categories, suggesting that its participants may not prioritise this specific skill in their training.

The results of this test show that **Liceo La Paz** and **ОШ 'Николај Велимировић'** have a clear focus on developing physical skills of jumping and power, with excellent performance of their students. On the other hand, institutions such as the **Basic School** and the **Basketball Club** could benefit from incorporating specific exercises to improve explosiveness and power in their training programmes.

Targeted jumping and strength training programmes for under-performing clubs and schools could close the gap in these skills. In addition, the Football Club maintains a solid performance, indicating that their training can include a good combination of strength and coordination.

4x10m (Touching Cones)

- Football Club and Basketball Club dominance: Sports clubs stand out widely in the best performing categories. The Football Club stands out as the institution with the highest number of records in the top category, closely followed by the Basketball Club. This pattern suggests that the regular and specific training to which their members are subjected generates consistent results in agility and speed tests.

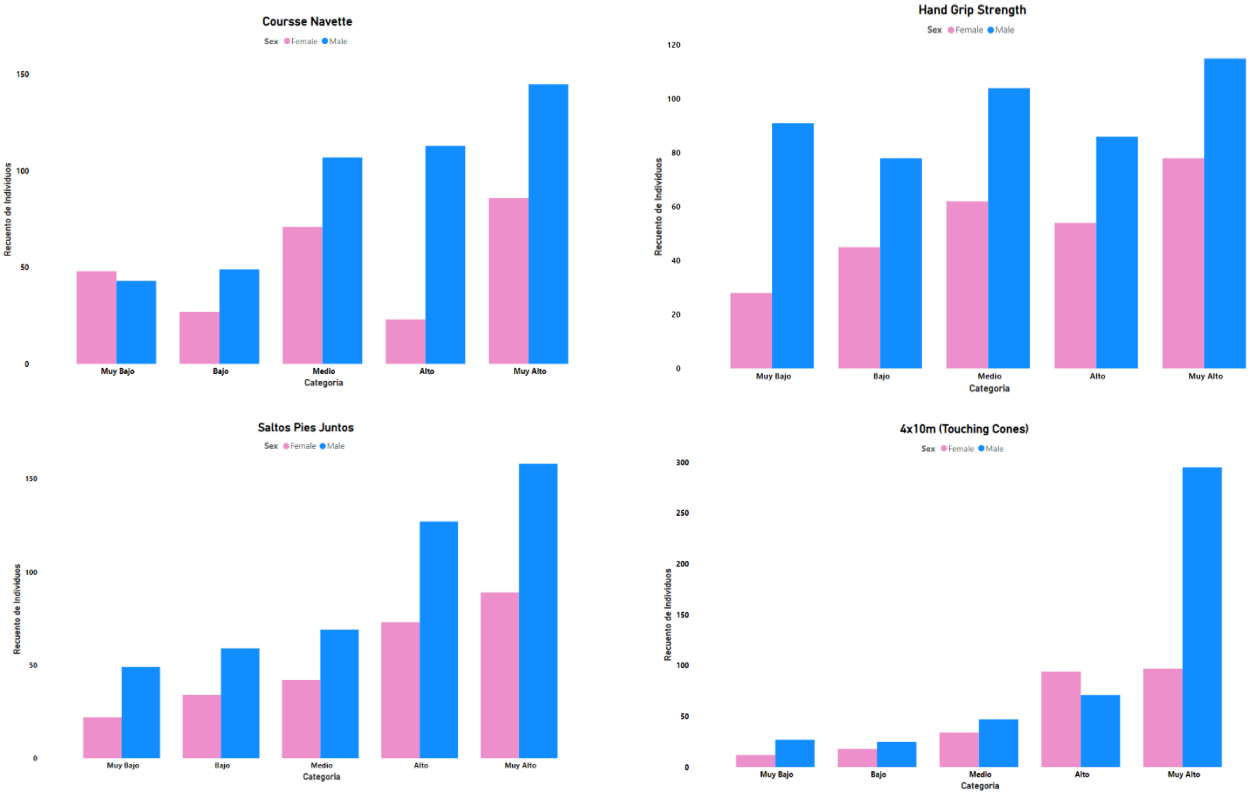
- Varied performance in schools: Educational institutions, such as Liceo La Paz and ОШ ‘Николај Велимировић’, show a wider distribution of results, from the highest to the lowest categories. This is evidence of a significant diversity in the physical level of the students, possibly influenced by the heterogeneity of their population and the lower intensity of the training programmes.

- Particularities of Liceo La Paz: Although it has a presence in the higher categories, Liceo La Paz also concentrates a large number of students in the lower categories, which could be related to the inclusion of varied class groups and the lack of specialisation in physical training.

- Consistent Basketball Club results: This club manages to maintain an outstanding performance in the higher categories without showing presence in the lower ones, which reflects a solid and homogeneous preparation among its members.

In this test, a clear advantage of sports clubs over educational institutions is evident. This can be attributed to their greater focus on regular and specific physical training, while schools show greater variability in their results. In order to improve overall physical performance, it would be necessary to implement more structured and frequent training programmes in schools, promoting a more balanced development of their students.

GENDER COMPARISON



Analysing these images, we can draw the following conclusions for each test:

Coursse Navette

- Male dominance in the higher categories: Men perform strongly in the ‘High’ and ‘Very High’ categories, significantly outperforming women in both categories. This suggests that, in this aerobic endurance test, men tend to perform better at the more demanding levels.
- Balanced female performance: Although females are under-represented in the higher categories, their distribution in the ‘Very Low’, ‘Low’ and ‘Medium’ categories is more even compared to males. This may reflect less variability in fitness levels within the female group.

- Higher male representation at the extremes: Men have a significantly higher presence in the lowest and highest categories, which could indicate a greater dispersion in their results. This contrasts with the more concentrated distribution observed for women.

In the Course Navette test, men tend to perform better in the higher categories, which could be attributed to physiological differences and/or training levels. However, they also show greater variability in their results. Women, on the other hand, show a more consistent performance, although with less representation at the higher levels.

Hand Grip Strength

- Male-dominant performance: Men outperform women in all the top categories, especially in 'Very High' and 'High', where the difference is most pronounced. This result could be related to higher average physical strength in men, associated with physiological differences.

- Balanced participation in the medium and low categories: In the 'Medium' and 'Low' categories, a more balanced distribution between men and women is observed, although men still have a higher representation. This could indicate that both genders have a significant participation at moderate performance levels.

- Female presence in the lowest categories: Females have a higher relative representation in the 'Very Low' and 'Low' categories, reflecting a lower capacity for strength in certain groups. This may be due to differences in muscle development or physical training approach.

In the Hand Grip Strength test, men significantly excel in the higher categories, consolidating their position as the group with the highest grip strength. Women, on the other hand, show a higher concentration in the lower and middle levels, but are also represented in the higher categories, although to a lesser extent.

Jumping Feet Together

- In this case, the male gender is higher in the 'High' and 'Very High' categories, showing a greater number of individuals in these areas, especially in the latter, where the difference with the female gender is more notable. On the other hand, females show a more uniform behaviour, with a more balanced distribution in all categories.

A greater regularity is observed for females in terms of proportion in the different categories. However, the best records continue to be obtained by men, who dominate the higher categories. In both cases, the initial situation reflects potential, and it is recommended to continue promoting physical activity improvement plans, seeking not only to increase the strength of the lower body, but also to encourage a comprehensive improvement in the coordination and harmony of physical development between the different segments of the body, thus promoting a balanced and healthy physical development in young people of this age group.

4x10m (Touching Cones)

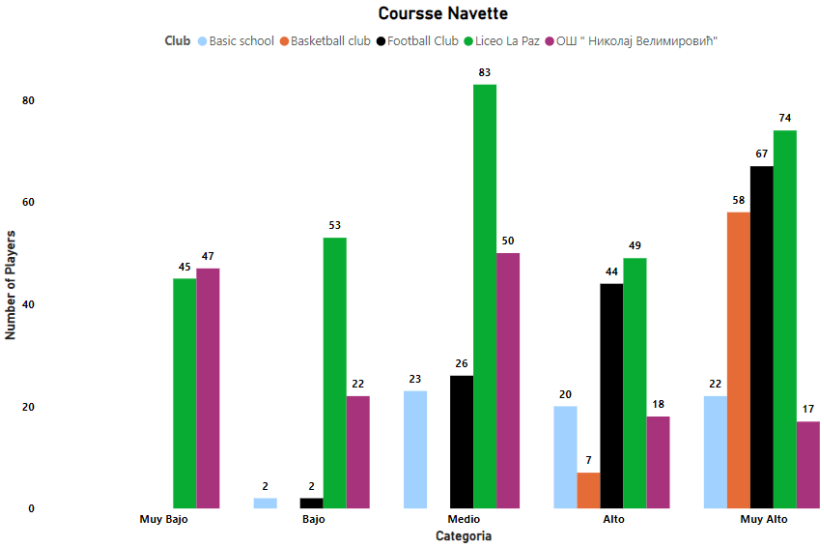
- In this case, the male gender stands out in the 'Very High' category, where it presents a great superiority in comparison with the female gender, significantly surpassing it in number of individuals. On the other hand, the female gender shows a better performance in the 'High' category, where there is a greater number of individuals compared to males.

Females show a more uniform trend, with a relatively consistent distribution between the medium and high categories. Males, on the other hand, stand out for their superiority in the highest category, reflecting exceptional performance in the best records. Both groups have a solid base, and it is recommended that further work be done on improvement programmes that promote agility and speed. This will not only enhance performance in this specific event, but will also contribute to the holistic and balanced physical development of young people at this stage of development.

FINAL RESULTS ON HEALTHY PHYSICAL CONDITION

The results of the AlphaFitness battery evaluation were very diverse among adolescents aged 12 to 15 years. Significant variations were observed in all tests, both within each age group and between different physical activity context groups.

Regarding cardiovascular resistance

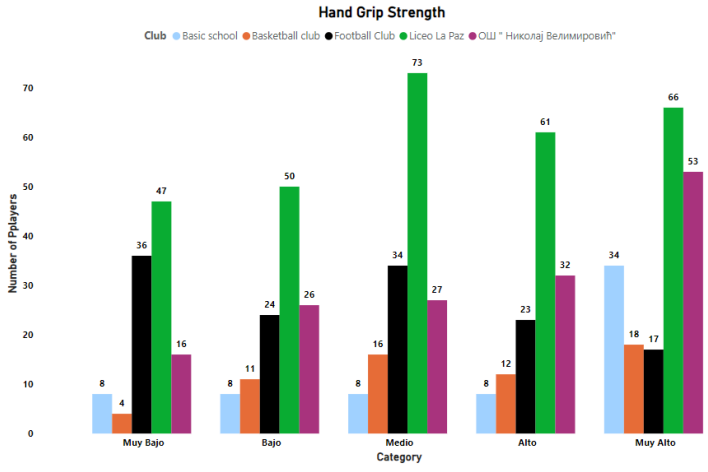


In this analysis, it stands out that the results in cardiovascular endurance vary widely among the different groups evaluated. The 'Liceo La Paz' stands out significantly, especially in the 'Medium' and 'Very High' categories, reflecting an outstanding cardiovascular endurance capacity in its participants. In contrast, the basketball club shows a good performance in the 'Very High' category, although its participation in the intermediate categories is limited, indicating a lower consistency in the general levels.

On the other hand, the basic schools have a higher proportion of participants in the lower categories, indicating the need to implement strategies to improve their cardiovascular endurance. Finally, the 'ОЛЛШ Николай Велимировић' group has the lowest levels overall, with a low representation in the higher categories.

These data emphasise the need for further work on programmes that promote cardiovascular endurance, particularly in the lower performing groups. Increasing physical activity will not only improve this fundamental capacity, but also establish healthy habits that will have a positive impact on the school, family and recreational environment of young people, promoting comprehensive and sustainable development.

In relation to muscle strength, marked differences were observed between genders



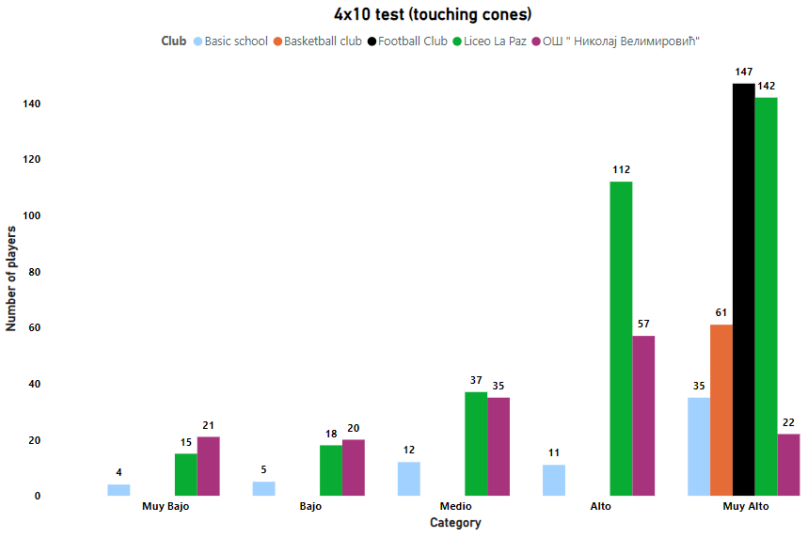
The graph illustrates the distribution of shuttle run test results across various clubs, grouped by performance categories. It can be observed that:

A significant variation in performance levels exists, with the "Medio" and "Muy Alto" categories showing the highest participation from the tested individuals, particularly in the Liceo La Paz and the ОШ "Николај Велимировић" groups. These clubs consistently demonstrate higher levels of muscle endurance and strength compared to others.

Marked differences were observed between genders within the data. Boys tend to dominate the higher performance categories (Alto and Muy Alto), suggesting greater muscle strength or endurance, while girls often fall within the lower performance groups (Muy Bajo and Bajo). This aligns with biological differences in muscle mass and development rates during adolescence, which contribute to variations in physical capabilities.

The distribution underscores the need to tailor physical education programs to bridge this gender gap in muscle strength. Introducing targeted exercises and inclusive strength-building initiatives may help ensure equitable development and foster improvements across all groups. Recognizing these gender-based differences is crucial to support holistic growth during a formative phase of physical development.

Regarding the measurement of Speed-Agility



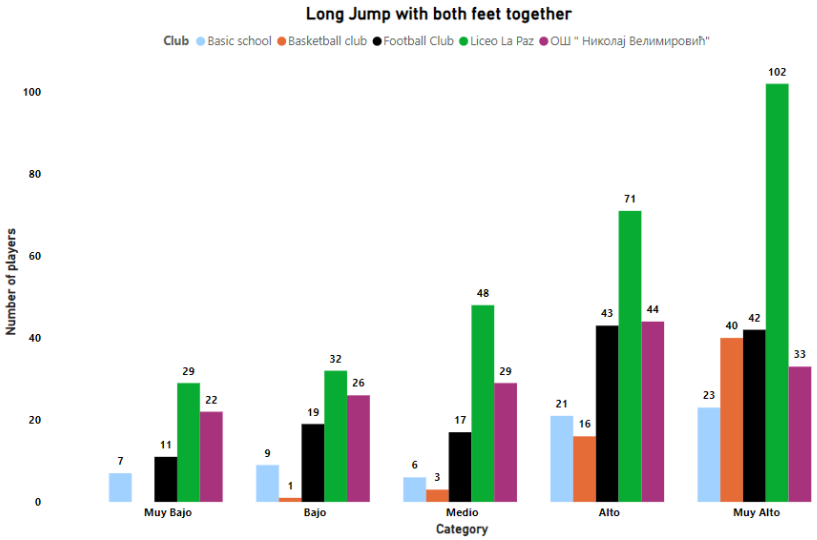
- Differences Between Sports and Schools: Significant differences were observed in performance on the 4x10 test across different clubs. Athletes from Football Club and Basketball Club excelled in the "Muy Alto" category, indicating superior speed and agility skills compared to those from Basic Schools. This emphasizes the specialized training these athletes receive, focused on quick directional changes. However, some clubs showed room for improvement, indicating the influence of both training quality and inherent genetic components.

- Relationship With Sports Experience: A positive correlation is evident between test performance and the level of sports experience. Participants from Liceo La Paz and ОШ "Николај Велимировић," who likely have a structured sports background, consistently performed in the "Alto" and "Muy Alto" categories. This highlights the impact of experience on refining speed-agility skills, essential for excelling in such tests.

- Impact of Running Technique: Athletes with superior running mechanics, characterized by efficient body positioning and smooth directional changes, achieved higher performance levels. Clubs with a focus on technique-driven training programs saw better results, validating the importance of biomechanics in agility-based activities.

The disparities observed between schools and sports clubs emphasize the importance of including targeted speed and agility exercises, along with running technique improvements, in training regimens. Such measures can bridge performance gaps and enhance the ability to accelerate and change direction effectively across diverse athletic disciplines.

Regarding the measurement of lower body strength through jumping



Significant performance variations were observed between genders. Males consistently recorded higher numbers in the "Alto" and "Muy Alto" categories compared to females, highlighting differences in lower body strength. Additionally, participants in younger age groups were predominantly clustered in the "Muy Bajo" and "Bajo" categories, emphasizing the developmental stage's impact on performance.

The results reaffirm the positive correlation between athletic performance and sports experience or physical attributes. Participants from sports-focused clubs, such as the Football Club and Basketball Club, achieved higher scores, particularly in the "Muy Alto" category. Similarly, participants associated with the Liceo La Paz club, known for its structured sports programs, stood out as top performers. These results suggest that height and regular physical training are pivotal in developing explosive lower body strength.

The ability to generate and sustain explosive force reflects the robustness of the leg and hip muscles. These findings further highlight the need to prioritize interventions for underperforming groups, notably within Basic Schools, where participants were overrepresented in the "Muy Bajo" and "Bajo" categories. Efforts must focus on structured training and strength development plans to address these deficiencies and promote balanced physical growth among all demographic groups.

Last conclusions:

The findings from this study highlight the significant variability in the physical fitness levels of the adolescents evaluated, influenced by factors such as gender, age, and the physical activity environment. These results emphasize the importance of considering these variables when designing fitness programs or interpreting performance metrics.

The need to implement comprehensive programs that promote physical activity and healthy lifestyles from an early age is evident. Initiatives such as our ACTIVYOU project, integrated into the ACTIVE LIFE HEALTHY framework, aim to address these disparities by encouraging physical development through diverse and inclusive activities. These efforts will play a crucial role in enhancing the outcomes of future AlphaFitness battery studies.

Moreover, the results underline the necessity for continued research to better understand the underlying determinants of physical fitness during adolescence. This knowledge will inform the development of more effective and targeted strategies to improve fitness levels. The next phases of our project, featuring two subsequent studies, will focus on consolidating these improvements and ensuring a lasting impact through the structured interventions outlined in our plan.

LICEO LA PAZ

CZECH YOUTH ASSOCIATION