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Original

CONDICIÓN FÍSICA RELACIONADA CON LA SALUD Y HÁBITOS DE EXPOSICIÓN SOLAR EN JÓVENES PRACTICANTES DE VELA LIGERA NO DE ÉLITE

HEALTH-RELATED FITNESS AND SUN EXPOSURE HABITS IN YOUTH PRACTICING NON-ELITE DINGHY SAILING

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RESUMEN

La disminución de la participación deportiva en jóvenes sugiere la necesidad de promover deportes alternativos como la vela. No obstante, la falta de estudios sobre la exposición solar en estos deportistas evidencia una importante área de investigación. El objetivo de este estudio es evaluar los niveles de forma física relacionados con la salud de los jóvenes que practican vela ligera y analizar sus hábitos de exposición al sol y las medidas de protección. Un estudio transversal de 48 regatistas optimistas no de élite (edad media: 12,0±1,8) evaluó su forma física mediante el IMC, la forma cardiorrespiratoria (6MWT), la fuerza muscular (dinamometría manual) y la flexibilidad (sentarse y alcanzar). Un cuestionario evaluó sus conocimientos, actitudes y preocupaciones sobre la exposición al sol, la protección y el riesgo de cáncer de piel. Los resultados no indicaron diferencias significativas en la aptitud cardiorrespiratoria entre sexos, mientras que la flexibilidad y la fuerza muscular sí difería significativamente. La fuerza muscular aumentaba con la edad. Aunque el 68,8% de los participantes utilizaba protección solar con SPF≥50, al 31,2% no le gustaba utilizarla. Las mujeres tenían mejores conocimientos sobre la exposición al sol y el riesgo de cáncer. Los marineros que no eran de élite mostraban perfiles antropométricos y fuerza muscular favorables, adoptaban medidas de fotoprotección y eran conscientes de los riesgos de la exposición solar.

Palabras clave: vela, jóvenes, condición física, exposición solar, cáncer de piel.

HEALTH-RELATED FITNESS AND SUN EXPOSURE HABITS IN YOUTH PRACTICING NON-ELITE DINGHY SAILING

ABSTRACT

The decline in youth sports participation suggests the need to promote alternative sports such as sailing. However, the lack of studies on sun exposure in these athletes highlights an important area for research. This study aims to assess the health-related fitness levels of non-elite youth engaged in dinghy sailing and analyze their sun exposure habits and protective measures. A cross-sectional study of 48 non-elite optimist sailors (average age: 12.0±1.8) evaluated their physical fitness through BMI, cardiorespiratory fitness (6MWT), muscle strength (hand dynamometry), and flexibility (sit-and-reach). A questionnaire assessed their knowledge, attitudes, and concerns about sun exposure, protection, and skin cancer risk. Results indicated no significant differences in cardiorespiratory fitness between sexes, while flexibility and muscle strength differed significantly. Muscle strength increased with age. Although 68.8% of the participants used sunscreen with SPF≥50, 31.2% did not like to use it. Females had better knowledge about sun exposure and cancer risk. Non-elite sailors demonstrated favourable anthropometric profiles and muscle strength, adopted sun protection measures, and were aware of sun exposure risks.

Keywords: sailors, youth, physical fitness, solar radiation, skin cancer.

Journal of Sport and Health Research 2025, 17(1):87-97

INTRODUCTION

Research shows that physical activity (PA) in childhood and youth is linked to both immediate and long-term metabolic, skeletal, psychological and fitness health outcomes (Trost & Loprinzi, 2008). In fact, regular PA participation leads to improved fitness levels, which are considered strong indicators of youth's health (Ortega et al., 2008). In spite of this, studies have detected a decline in PA practice among youth that appears to being before adolescence (Ramos-Munell et al., 2024). Given the significant benefits of PA, various initiatives have been launched to counteract declining participation rates among youth. For instance, governmental and non-governmental organisations have instituted programmes to increase PA prevalence among youth, and by extension to improve their level of fitness, mainly through sports practice (Micheli et al., 2011).

In Spain, the promotion of sports participation is primarily facilitated by municipal governments. They offer financial support to clubs in order to establish sports schools where youth can engage in their preferred sports modalities. It appears that soccer, dancing, and water sports are among the most favored modalities by youth (Peral et al., 2020). Among water sports, dinghy sailing stands out as an interesting practice, characterized by its unique blend of physical activity and cognitive challenges, The practice of this outdoor activity has been associated with improvements in both physical and psychological health, as well as enhanced academic learning among youth (Cotterill & Brown, 2018). Furthermore, dinghy sailing has also linked to wellness and health recovery (Lloret et al., 2021).

Despite these benefits, there is a notable gap in literature regarding the fitness levels of youth participating in dinghy sailing. This is especially noteworthy when compared to the data available for soccer (Nunes et al., 2021) or dancing (Burkhardt & Brennan, 2012). While there are some investigations available on the fitness levels of youth practicing dinghy sailing, they often involve small sample sizes (Santos et al., 2016) or focus on elite sailors (Callewaert et al., 2015). Consequently, further research is required to examine the fitness levels of youth sailors.

The practice of dinghy sailing exposes youth to the risk of excessive sun exposure, which is also an under-researched topic. While studies on sun-protection and sun-exposure habits among sailors have been previously conducted, they have primarily focused on adult populations and elite athletes (Gutiérrez-Manzanedo et al., 2021; Gutiérrez-Manzanedo et al., 2022; Zalaudek et al., 2020; de Castro et al., 2021). Therefore, there is a need for more research specifically examining sun-protection measures and sun-exposure habits among youth engaged in dinghy sailing.

Under these circumstances, this study aims to assess the health-related fitness levels of non-elite youth engaged in dinghy sailing and analyze their sun exposure habits and protective measures.

METHODS

Participants

This is an observational, cross-sectional, descriptive study. Youth were recruited for the study by sending invitation letters via email to various sailing clubs in the autonomous community of Galicia, located in the north of Spain. The inclusion criteria were as follows: a) being under 14 years old, b) engaging in sailing activities at least once per week, and c) not having any medical conditions that would advise against the performance of the proposed tests. Youth who had represented the national team or had taken part in national/international competitions were excluded from the study. Informed consent was obtained from all participants, and the study was approved by the Ethics Committee of the Faculty of Education and Sport Science at the University of Vigo.

Health-related physical fitness measurements

Body composition was assessed using body mass index (BMI), calculated with youth in light clothing and no shoes. Cardiorespiratory fitness was measured with the six-minute walking test (6MWT) according to the protocols outlined by Kasović et al. (2021). Muscular strength was measured using a hand-held dynamometer and flexibility with the sit and reach test; both tests were assessed following the standardized Eurofit protocols (Adam et al., 1987).

Sun-protection measures and habits

Journal of Sport and Health Research 2025, 17(1):87-97

A validated questionnaire assessed youth's attitudes and knowledge about sun exposure and protection (Gutiérrez-Manzanedo et al., 2021). The attitudes section includes questions that allowed to choose from options such as 'strongly agree', 'agree', 'neutral', 'disagree', and 'strongly disagree' as their responses. The knowledge section was made up of ten true/false questions.

Physical activity practice

An 'ad hoc' questionnaire was administered to the youth to gather data on sailing experience (years), sailing practice (hours per week on the water), as well as their involvement in other sports activities.

Procedures

Data collection occurred at the sailing club facilities over two days. The measurements were carried out by a physical education specialist. Day one involved administering the questionnaires and performing anthropometric, muscular strength and flexibility assessments. On day two, the 6MWT was conducted in the port esplanades

Statistical Analysis

Quantitative variables were expressed as means and standard deviations (SD) if normally distributed, assessed via the Kolmogorov-Smirnov test, and qualitative variables were expressed as number and percentage. For group comparisons, unpaired Student's t-test or ANOVA were employed for quantitative variables, while Chi-square or Fisher's exact tests were used for qualitative variables.

The statistical analyses were conducted using IBM SPSS version 25 (SPSS Inc., Chicago, IL, USA), with a significance level set at $p<0.05$.

RESULTS

A total of 48 youth (mean age: 12.0 ± 1.8 years; 52 % girls) who were optimist sailors completed the assessments. Thirty-two participants acknowledged practicing other sport modality. The participants' characteristics and the main health-related physical fitness scores obtained are shown in Table 1. The scores obtained in the cardiorespiratory fitness test (6MWT) were similar for both sexes. Female participants exhibited higher levels of flexibility (20.0 ± 6.4; p = 0.002) at the expense of their male counterparts, who achieved significantly better results in muscular strength (26.0 ± 9.8; p = 0.018).

Table 1. Health-related physical fitness results for whole sample, for boys and girls.

	TOTAL X±SD	GIRLS X±SD	BOYS X±SD	P
BMI	18,2±2,3	17,7±1,8	18,7±2,7	0,144
Muscular Strength	23,0±8,7	20,1±6,4	26,0±9,8	0,018*
Flexibility	16,8±7,6	20,0±6,4	13,3±7,4	0,002*
Cardiorespiraory Fitness	611,5±28,8	605,2±25,8	618,2±30,9	0,120

*p<0.05 (N_{total}=48 for BMI, flexibility, cardiorespiratory fitness; N_{total}=47 for muscular strength; N_{girls}=25 for BMI, flexibility, cardiorespiratory fitness; N_{girls}=24 for muscular strength; N_{boys}=23 for BMI, muscular strength, flexibility, cardiorespiratory fitness).

Health-related physical fitness scores, considering the age of the participants, are presented in Table 2. The analysis revealed a lower BMI and cardiorespiratory fitness in the < 12 group. Furthermore, there was a statistically significant increase in dynamometry values with increasing age in the groups ($p < 0.001$) (Table 2).

Table 2. Health-related physical fitness scores in age groups.

	<12 years X±SD	12 years X±SD	13 years X±SD	> 13 years X±SD	P
BMI	16.8±1.7	19.1±2.5	17.9±2.4	19.3±1.6	**0.001***
Muscular Strength	13,8±4,1	25.3±5.2	25.7±7.9	30.3±7.4	**<0.001***
Flexibility	20.2±6.3	16.2±8.1	14.0±6.8	15.1±8.8	0.178
Cardiorespiratory Fitness	595.6±29.7	623.5±25.5	609.6±21.9	621.5±29.7	**0.039***

*p<0.05 (N<12years=15 for BMI, flexibility, cardiorespiratory fitness; N<12years=14 for muscular strength; N12years=13 for BMI, muscular strength, flexibility, cardiorespiratory fitness; N13years=10 for BMI, muscular strength, flexibility, cardiorespiratory fitness; N>13years=10 for BMI, muscular strength, flexibility, cardiorespiratory fitness).

Twenty-seven participants (56.3 %) had skin phototype III, seventeen (35.4 %) had skin type IV, while 2 (4.2 %) had skin type II, and 2 (4.2 %) had skin type V.

Journal of Sport and Health Research 2025, 17(1):87-97

Table 3 illustrates that 85.4% of participants used leggings or long-sleeve lycra, indicating a strong adherence to protective measures. Also, 68.8 % of youth used SPF ≥ 50, while 91.7 % reported not using SPF < 50, reflecting awareness of the risk of unprotected sun exposure. No differences were found in the frequency and use of sun protection factors between the sexes.

Table 3. Frequency of use of sun protection factors.

	Never [N(%)]	Hardly [N(%)]	Sometimes [N(%)]	Usually [N(%)]	Always [N(%)]
Sunglasses	8 (16,7)	9 (16,7)	11 (22,9)	9 (18,8)	11 (22,9)
Cap or visor	2 (4,2)	7 (14,6)	12 (25,0)	12 (25,0)	15 (31,3)
Leggins or long sleeve lycra	0 (0,0)	1 (2,1)	6 (12,5)	26 (54,2)	15 (31,3)
Sun-protection with SPF<50	21 (43,8)	15 (31,3)	8 (16,7)	2 (4,2)	2 (4,2)
Sun-protection with SPF≥50	0 (0,0)	4 (8,3)	11 (22,9)	19 (39,6)	14 (29,2)

Figures 1 and 2 show attitudes and concerns about sun exposure. Around 31.2 % of the youth stated that they did not like using sun protection, and 23.3 % said they didn't worry about applying sun protection every training day. However, 81.2 % were concerned about getting sunburned with sun exposure or developing spots or wrinkles (83.4 %). In addition, thirty-nine (81.2 %) participants indicated that their parents were more concerned about sun protection use than they were, which may help to increase awareness and reinforce sun protection measures.

Figure 1. Attitudes about sun exposure.

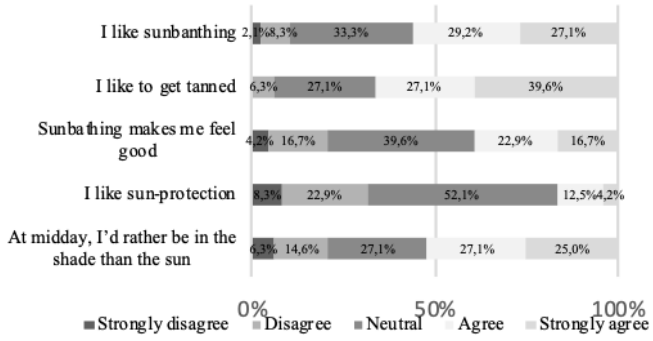
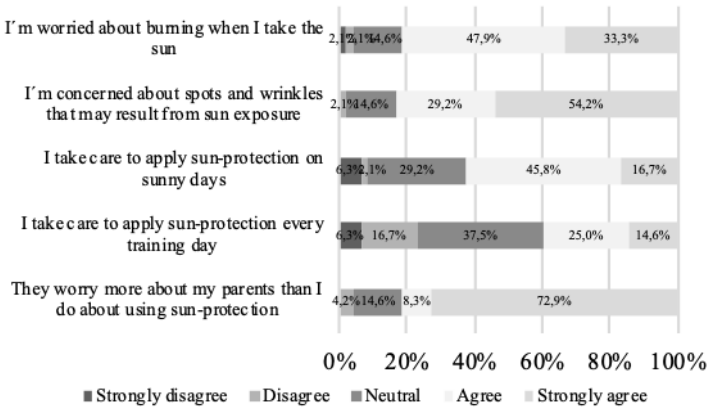


Figure 2. Concerns about sun exposure.



Regarding knowledge about sun exposure, sun protection, and the risk of cancer, 78.0 % of the participants answered correctly. In addition, the female sex showed significantly more knowledge than their male colleagues (p = 0.015).

DISCUSSION

The aim of this study was to provide information on health-related fitness levels in youth who practice non-elite dinghy sailing. The results obtained show that the practice of sailing at an early age is a beneficial stimulus for the health-related physical fitness of the participants. However, photoprotection measures should be adopted due to the risk associated with sun exposure during the practice of this sport.

Among the few studies that have evaluated anthropometric characteristics and performance indicators in young optimist sailors (Caraballo et al., 2021; Santos et al., 2016; López et al., 2016; Polato et al., 2007; Tejada-Medina & Ventaja-Cruz, 2018), only Callewaert et al. (2015), included in their sample non-elite sailors (n: 8). Thus, the findings showed here add valuable information to the existing body of knowledge in this topic, providing scientific evidence on amateur optimists who do not compete at international or national level.

The practice of physical activity offers multiple benefits for the physical and social health of youth, as well as being an effective tool for the prevention of obesity (Micheli et al., 2011). In Spain, childhood obesity and overweight figures are alarming, with the second highest prevalence in Europe (de Bont et al.,

Journal of Sport and Health Research 2025, 17(1):87-97

2022). In comparison with the general Spanish population, non-elite optimist sailors showed a low prevalence of overweight or obesity (Laja-García et al., 2019; Manzano-Carrasco et al., 2023). The obtained mean BMI values are consistent with previous studies on competitive optimist sailors (Caraballo et al., 2021; Polato et al., 2007), suggesting a low prevalence of obesity among these athletes. Furthermore, the BMI values were comparable to those of high-level athletes aged 12 - 13 years who participated in other sports disciplines (athletics: 17.75 ± 3.81; swimming: 18.83 ± 5.28; triathlon: 19.04 ± 6.91; taekwondo: 19.02 ± 2.09) (Navarro, 2020; Nikolaidis et al., 2016;).

Physical activity and muscular strength have been associated with improved metabolic and cardiovascular health risk profiles in youth (Ramírez-Vélez et al., 2016; Gomes et al., 2017). The muscle strength test values obtained were similar than those typically observed in the general population of the same age range (Chillón et al., 2011; Nuñez et al., 2019). Likewise, these results coincide with those found in other studies conducted in optimist sailors by Callewaert et al. (2015) (n: 16; mean age: 11.7 ± 1 years; handgrip score: 25.5 ± 8.1 kg), Tejada-Medina & Ventaja-Cruz (2018) (n: 3; mean age: 12.8 ± 1.1; handgrip score: 23.8 ± 2.0 kg) or by Polato et al. (2007) (handgrip score in 17 infantile and 33 juvenile: 22.5 ± 2.9 kg and 29.6 ± 5.5 kg respectively). Participants under the age of 12 exhibited lower handgrip strength scores in comparison to their peers in the same age range participating in sports like basketball (Gerodimos, 2012) or wrestling (Gerdominos et al., 2013). However, these differences tend to diminish as the participants age, with mean values becoming similar to those observed in other sports such as swimming (Gomez-Bruton et al., 2019), combat sports (Longo et al., 2021), or climbing (Watts et al., 2003). In addition, this study found statistically significant differences in the strength levels of boys and girls, as is the case in sports such as taekwondo, judo and wrestling (Longo et al., 2021). These results highlight the existing differences in strength levels according to sex and age.

In sailing, the demands of the activity overload the back muscles and cause pain in more than 43 % of optimist sailors (Kostanski et al., 2019). Therefore, optimal levels of flexibility are essential to prevent the development of low back pain (Feldman et al., 2001). The results obtained in the sit-and-reach test reflect significantly higher levels of flexibility in the female participants, which as an expected finding. In comparison with the general Spanish population, girls showed similar flexibility levels, while boys obtained lower values (Chillón et al., 2011). Callewaert et al., (2015) found higher sit and reach values (19.9 - 28.1 cm) among non-elite and elite optimist sailors. Nevertheless, their findings might be limited by the small sample size (n: 14). In comparison with other sports disciplines such as long-distance runners (Eisenmann & Malina, 2003), handball (Zapartidis et al., 2011) or taekwondo (Nikolaidis et al., 2016), our data indicate lower values of flexibility. Although there was no statistical association, a decrease in flexibility values was observed as the age group advanced, which highlights the need to work on this ability for the prevention of injuries and postural health of athletes.

A good cardiorespiratory fitness has been postulated as a protective factor against the development of cardiovascular diseases in youth (Isasi et al., 2018). In our sample, cardiorespiratory fitness was similar in both sexes. In comparison with the general population, optimist sailors showed a lower cardiorespiratory capacity as measured by the 6MWT (Geiger et al., 2007; Kahraman et al., 2019; Raistenskis et al., 2016). The lack of studies that analyzed cardiorespiratory fitness by means of the 6MWT in young athletes prevents further discussion in this regard. However, a study of elite optimist sailors that evaluated physiological responses during sailing in different external conditions showed that the exercise intensity is not particularly high (López et al., 2016), unless sailing was practiced in high wind conditions (Santos et al., 2016), which is not the case in our sample. These findings suggest that non-elite optimist sailing does not place a significant demand on the cardiovascular system.

To the best of the authors' knowledge, this is the first study that has evaluated sun protection habits and practices in youth who practice sailing, as well as sun-related knowledge and attitudes. Thus, both good knowledge and high concern about the negative consequences of sun exposure have been observed.

Journal of Sport and Health Research 2025, 17(1):87-97

The incidence of skin cancer in Spain has significantly risen in the general population (de Castro-Maqueda et al., 2021). Among sailors, exposure to sunlight is exceptionally high, with this excessive exposure being the primary factor contributing to the development of skin cancer (Gutiérrez-Manzanedo et al., 2022). Therefore, despite the existing recommendations and guidelines for the general population regarding prevention, these measures are either Inadequate or not effectively implemented, underscoring the need to intensify precautions (Aceituno-Madera et al., 2010). In nautical disciplines, this is especially relevant, as more than 84.0 % of practitioners report sunburn and are at higher risk of developing skin cancer compared to the general population (de Castro-Maqueda et al., 2021; Gutiérrez-Manzanedo et al., 2022; Zalaudek et al., 2020), even during childhood (Mahé et al., 2011).

Regarding the use of photoprotection measures, it's noteworthy that 33.4 % of the participants never or hardly ever used sunglasses and 18.8 % never or hardly ever used a cap or visor, in contrast to elite sailors (sunglasses: 85.7 %; cap or visor: 75.0 %) (Gutiérrez-Manzanedo et al., 2022; Zalaudek et al., 2020). In contrast, the majority of youth used leggings or long-sleeve lycra, while only half of elite sailors acknowledged its use (Gutiérrez-Manzanedo et al., 2022; Zalaudek et al., 2020).

In relation to the use of sun-protection, Zalaudek et al. (2020), found that only 32.2 % of the sailors used SPF > 50. In the present study there was a higher proportion of participants using SPF ≥ 50 usually or always (69.0 %). The fact that not all participants used SPF ≥ 50 may be because they already employ other measures, such as leggings or long sleeve lycra, sunglasses, or a cap, which provide comprehensive photoprotection for the body. They might prefer not to use additional sun protection to avoid potential eye irritation, as observed in other sports like surfing (de Castro-Maqueda et al., 2021).

In this study, the participants expressed their attitudes and concerns about sun exposure. The most commonly indicated attitudes were a dislike of using sunscreen and concerns about getting sunburned, or developing spots or wrinkles due to sun exposure. These findings align with those observed in Paralympic sailors, although these displayed a greater preference for shaded areas during the critical hours of sunshine as a preventive measure (Gutiérrez-Manzanedo et al., 2022). In contrast to previous studies (Gutiérrez-Manzanedo et al., 2022; de Castro-Maqueda et al., 2021), the youthsin this investigation displayed a high level of knowledge regarding sun exposure and skin cancer. This difference could potentially be attributed to the educational efforts made by parents, who exhibited greater concern about the use of photoprotection measures compared to their youth.

One of the primary strengths of this study is its original approach, as it is the first investigation to explore health-related physical fitness and sun protection practices in a representative sample of youth engaged in non-elite dinghy sailing. However, this study has several limitations. Firstly, like any voluntary study, it may suffer from selection bias. Secondly, laboratory tests have not been used to assess cardiorespiratory capacity. Lastly, the data obtained from the sun exposure and skin cancer questionnaire have been self-reported, potentially introducing bias through overestimation.

CONCLUSIONS

This study aimed to evaluate health-related fitness levels and sun protection practices among youth engaged in non-elite sailing. The results indicate that these population exhibit a favorable anthropometric profile and adequate muscular strength, emphasizing the benefits of physical activity in this population. Furthermore, most young sailors adopted sun protection measures and demonstrated a good understanding of the risks associated with sun exposure, likely due to educational efforts by their parents. These findings suggest the need to continue promoting sailing as a healthy activity and to enhance education on sun protection measures

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Journal of Sport and Health Research 2025, 17(1):87-97

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