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ABSTRACT

Extracurricular sport can promote the development of physical literacy of young people with autism provided they are given adequate opportunities to participate. In an attempt to test whether children and teen with autism have equal opportunities to participate, this study analysed parental perceptions of environmental barriers to participation in motor-sports activities in a sample of 48 parents of children with and without autism.

Lo sport extrascolastico può promuovere lo sviluppo della physical literacy dei giovani con autismo a patto che siano offerte loro opportunità adeguate per partecipare. Nel tentativo di verificare se i giovani con autismo abbiano pari opportunità di partecipazione, in questo studio è stata analizzata la percezione genitoriale delle barriere ambientali che ostacolano la partecipazione alle attività motorie-sportive in un campione di 48 genitori di ragazzi con e senza autismo.

KEYWORDS

Sport, autism, developmental age, environmental barrier, equal opportunity

Sport, autismo, età evolutiva, barriere ambientali, pari opportunità

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1. Introduction

Extracurricular sports activities can play a significant role in the development of physical literacy, a multidimensional concept that encompasses the skills, motivation, confidence, and knowledge needed to engage in various physical activities throughout life (Whitehead, 2013). At the core of physical literacy is the acquisition of motor skills, which serve as the foundation for an individual's subsequent learning (Monacis & Colella, 2022). In systematic review studies, Lubans et al. highlight that numerous studies have shown positive relationships between basic motor skills (such as locomotor and object control skills) and physical activity participation, concluding that mastery of these skills is essential for an active lifestyle, supporting motor, cognitive, and social development (2016; 2010). In relation to autism spectrum disorder, studies show that extracurricular sports activities not only positively impact the reduction of symptoms related to stereotyped behavior, communication, and relational difficulties, as well as sensory hypersensitivity (Bremer et al., 2006; Levante et al., 2023), but also promote motor skill development (Bandini et al., 2013; Bo et al., 2016; Todd & Reid, 2006).

For motor-sports activities to successfully promote physical literacy for individuals with autism, it is essential to ensure they have adequate and accessible opportunities for participation. In this context, Article 30 of the United Nations Convention on the Rights of Persons with Disabilities (2006) explicitly states that people with disabilities must be guaranteed the right to participate on an equal basis with others. The same principle is reiterated in the Solfagnano Charter, which declares that "Persons with disabilities have the right to follow their preferences, to pursue their hobbies, and to choose the sport, cultural and creative as well as other leisure activities to which they devote themselves, also by using accessible solutions in sports and arts disciplines and cultural and creative professions on an equal basis with others" (G7, 2024, p. 15). However, as Bickenback points out, institutional documents lack useful indicators to empirically assess whether and to what extent the principle of equal opportunities is being applied in practice (2009). In agreement with Cioni (2023), the concept of equal opportunities in motor-sport activities can be operationalized as the condition in which individuals with disabilities encounter no more environmental barriers to participation than their peers without disabilities.

Scientific literature suggests that children and teens with autism participate in motor-sport activities less frequently than their peers (Solish et al., 2010; MacDonald, Esposito, & Ulrich, 2011; Obrusnikova & Cavalier, 2011) and face numerous environmental barriers (Taliaferro & Hammond, 2016; Obrusnikova & Miccinello, 2012; Scharoun et al., 2016; Reinders et al., 2019; Hickingbotham et al.,

2021; Boucher et al., 2022; Nicholson et al., 2019; Duquette et al., 2016). According to the WHO, environmental factors significantly influence participation and functioning, particularly during childhood, due to children's dependency during development (2007). For this reason, the ICF emphasizes assessing environmental factors by categorizing them into five domains: products and technology; natural and human-made environments; relationships and social support; attitudes; and services, systems, and policies. Using the ICF as a framework, Table 1 summarizes the primary barriers discussed in the literature alongside the ICF codes that describe these factors.

Although the scientific literature highlights significant environmental barriers for young people with autism, other research suggests that some of these factors may also apply to children and adolescents without disabilities. For example, in a systematic review, Biddle et al. (2010) show that local program availability, attitudes, and parental support are important factors in sports participation for children without disabilities. Similarly, Somerset et al. (2018) highlight that for this group, limited parental time, availability of transport, costs, and local program availability, as well as peer attitudes, can all act as barriers to participation in sports activities. These factors are similar to those identified for children with autism. Shields and colleagues (2012) argue that there is no reason to assume that factors affecting children without disabilities are irrelevant to those with disabilities.

If this hypothesis holds, it raises the question of whether specific barriers apply only to children and teens with disabilities. The available data suggest that the difference between young people with and without disabilities may lie in both the type and intensity of environmental factors. While some factors may affect both groups to varying degrees, it is challenging to determine this due to a lack of comparative studies. Consequently, comparative studies between these groups are essential for empirically testing whether children with autism face more environmental barriers than their peers without disabilities.

ICF Environment Domains	Environmental Barriers	ICF Codes
Products and Technology	Lack of equipment	e140
Natural Environment and Human-made Changes to Environment	Unfavourable climatic conditions	e225
	Overcrowded or noisy environments	e250
Support and Relationships	Lack of support from family members	e310
	Lack of support from peers	e325
	Lack of support from sports educator	e330
Attitudes	Negative attitudes of family members	e410
	Negative attitudes of peers	e425
	Negative attitudes of the sports educator	e430
Services, Systems and Policies	Lack of suitable sports offers	e555
	Excessive costs	e565
	Lack of information on available activities	e535
	Lack of specific training of sport educators	e585
	Lack of public transport services	e540
	Lack of safety	e545

Table 1 - Environmental barriers to participation in sport for young people with autism

2. Objectives

Based on the considerations above, the present study aims to compare children and adolescents with and without autism regarding the environmental factors that hinder participation in motor-sports activities. More specifically, the study intends to:

1. Determine whether children and adolescents with autism encounter more environmental barriers than their peers without autism.
2. Identify the environmental barriers that show the greatest differences between the groups.

3. Methods

By definition, environmental factors are external to individuals but cannot be assessed independently of the individuals themselves. What can be assessed is the valence—positive or negative—that any environmental factor assumes for a given person, acknowledging that the same factor may have different valences for different people. The influence of environmental factors on a person's life can therefore be varied and complex (WHO, 2007). The ICF specifies that environmental factors should be coded from the perspective of the person whose situation is being described, suggesting that the person directly affected should be involved as far as

possible, or that those who know the person and their environment well should be consulted. Bearing these recommendations in mind and considering the methodological challenges of directly involving children and adolescents with autism, this study involved their parents. Parents are responsible for mediating daily between their child and their environment, making them uniquely positioned to provide the information necessary for this study.

Data were collected between April and May 2024 using the online version of the Sport Participation and Environment Measure (SPEM) (Cioni & Magnanini, 2024), a self-report questionnaire for parents of children and adolescents, with or without a diagnosis. The environmental factors scale has good psychometric properties and consists of 16 distinct factors identified as relevant to participation in motor-sports activities among young people with and without disabilities (Biddle et al., 2010; Bloemen et al., 2014; Ginis et al., 2016; Jaarsma et al., 2014; McGarty & Melville, 2018; Saebu et al., 2010; Sallis et al., 2000; Shields, 2012; Somerset & Derek, 2018; Xu et al., 2020). Parents are asked to indicate whether each of the 16 environmental factors is sometimes a barrier or facilitator to their child's participation. The questionnaire used in this study also includes an introductory section on sociodemographic information about the child and the parent.

The questionnaire was administered to a sample of parents purposefully selected (Cicchitelli, 1997) from the network of Project Filippide associations that promote sports for individuals with autism (<https://progettofilippide.com/>). Additionally, through a snowball sampling approach, the initial participants were asked if they knew other parents of young people with and without autism who might be interested in participating. A total of 48 parents participated in the study, including 28 parents of young people with autism and 20 of young people without autism.

Data collected from the questionnaire were subjected to quantitative descriptive analysis (frequencies, percentages, means, and standard deviation) and inferential analysis using SPSS-22 software. Specifically, Chi-square tests for categorical variables and Student's t-tests (for independent samples) for quantitative variables were conducted to test for statistically significant differences between the groups. A p-value of <0.05 was considered significant. In addition, Cramer's V-index was used to check the effect size. Following Cohen (1988), effect sizes were interpreted as negligible for values below 0.10, small for values between 0.10 and 0.30, medium for values between 0.30 and 0.50, and large for values above 0.50.

4. Analysis

The children and teens in the study range in age from 6 to 18 years ($M=12.6$; $SD=3.09$), with 54.2% male ($N=26$) and 45.8% female ($N=22$). The parents range in

age from 34 to 61 years ($M=47.7$; $SD=5.99$), with mothers representing 62.5% ($N=30$) of respondents and fathers 37.5% ($N=18$). Consistent with data from other disability studies (ISTAT, 2019), parents of young people with autism report a monthly household income of €2,781, which is slightly lower than the €3,300 reported by parents of young people without autism. Statistical analyses indicate no significant difference in income between the groups ($t=1.577$; $p>0.05$).

As shown in Table 2, parents of young people with autism perceive nearly all environmental factors more frequently as barriers (B) or sometimes barriers (BF), whereas parents of young people without disabilities tend to view each environmental factor more often as a facilitator (F). However, inferential statistical analyses indicate that the differences are not significant for 10 of the 16 factors considered. Specifically, no statistically significant differences were found for factors such as 1 “weather conditions”; 2 “physical accessibility”; 4 “safety”; 6 “attitudes of the sports educator”; 7 “physical demands”; 12 “public transport”; 13 “private transport”; 14 “time”; 15 “financial resources”; and 16 “equipment.” For some of these factors, the percentage of parents of children with autism who perceive them as barriers or sometimes barriers is noteworthy. For instance, factors such as 6 “attitudes of the sports educator,” 15 “financial resources,” and 14 “time” are perceived as barriers or sometimes barriers by 39.3%, 53.5%, and 60.7% of parents of children with autism, respectively. This indicates that these and other factors, according to parents' perceptions, may act as potential barriers to participation in motor-sports activities for children and teens with autism. Nevertheless, these factors are also perceived as possible barriers by a substantial portion of parents of children and teens without autism—20%, 20%, and 50%, respectively. Thus, while differences exist between the groups, they do not reach statistical significance ($p>0.05$). In other words, although parents of young people with autism perceive these factors more frequently as barriers or sometimes barriers, these factors appear relevant for all children, regardless of diagnostic condition.

The factors for which significant differences emerged between the groups ($p<0.05$) were factor 3 “sensory quality,” factor 5 “peer attitudes,” factor 8 “cognitive demands of the activity,” factor 9 “social demands of the activity,” factor 10 “information,” and factor 11 “suitable activities.” Specifically, factor 3, “sensory quality,” is perceived as a barrier or sometimes a barrier by 67.1% of parents of children and teens with autism, compared to 30% of parents of children and teens without autism. This suggests that young people with autism, to a significantly greater extent than their peers, may be affected by environmental features such as

excessive noise or crowding in sports venues, likely due to sensory hypersensitivity often associated with autism (Vio & Lo Presti, 2014).

Factor 5, "peer attitude," is perceived as a barrier or sometimes a barrier by 82.1% of parents of children and teens with autism, compared to 20% of parents of those without autism. Factor 8, "cognitive demands of the activity," is viewed similarly by 82.1% of parents of children and teens with autism, compared to 25% of parents of children and teens without autism. Factor 9, "social demands of the activity," is perceived as a barrier or sometimes a barrier by 60.7% of parents of children and teens with autism, compared to 15% of parents of those without autism. Together, factors 8 and 9 suggest that sports activities may still be too challenging for those with cognitive and social difficulties, such as young people with autism.

Environmental factor			B	BF	F	X ²	V
1	Weather conditions	A	10,7%	18,6%	70,7%	4,092	0,284
		N	10%	0%	90%		
2	Physical accessibility	A	3,5%	17,9%	78,6%	1,391	0,170
		N	0%	10%	90%		
3	Sensory quality	A	24,2%	42,9%	32,9%	4,587*	0,266
		N	10%	20%	70%		
4	Safety	A	8,6%	15%	76,4%	3,544	0,269
		N	0%	10%	90%		
5	Peer attitude	A	0	53,6%	46,4%	5,498*	0,338
		N	0	20%	80%		
6	Attitude of the sports educator	A	10,7%	28,6%	60,7%	3,117	0,255
		N	0	20%	80%		
7	Physical demands of activity	A	14,2%	42,9%	42,9%	3,603	0,274
		N	5%	25%	70%		
8	Cognitive demands of activity	A	35,7%	46,4%	17,9%	15,945**	0,576
		N	15%	10%	75%		
9	Social demands of activity	A	25%	35,7%	39,3%	10,382**	0,465
		N	10%	5%	85%		
10	Information	A	57,1%	17,9%	25%	7,502*	0,395
		N	20%	20%	60%		
11	Suitable activities	A	53,6%	28,6%	17,8%	19,493**	0,637
		N	5%	15%	80%		
12	Public transport	A	7,1%	25%	67,9%	2,596	2,389
		N	25%	20%	55%		
13	Private transport	A	7,1%	7,1%	85,8%	2,121	0,210
		N	0%	15%	85%		
14	Time	A	7,1%	53,6%	39,3%	0,563	0,108
		N	5%	45%	50%		
15	Financial resources	A	14,3%	39,3%	46,4%	5,501	0,339
		N	5%	15%	80%		
16	Equipments	A	25%	7,1%	67,9%	1,943	0,201
		N	10%	5%	85%		

N= 48; A=with autism (N=28); N=without autism (N=20). B= factor perceived as a barrier; BF= factor sometimes perceived as a barrier; F= factor perceived as a facilitator. *p<0,05; **p<0,01. df=2

Tabel 2 - Parental perceptions of environmental barriers to the sports participation

Factor 10, "information," is perceived as a barrier or sometimes a barrier by 75% of parents of children and teens with autism, compared to 40% of parents of those without autism. Finally, factor 11, "suitable activity," is perceived as a barrier or sometimes a barrier by 82.2% of parents of children and teens with autism, compared to 20% of parents of those without autism. The lack of activities suited for children with special needs has also been highlighted in other studies (Biddle et al., 2010; Bloemen et al., 2014; Ginis et al., 2016; Jaarsma et al., 2014; McGarty & Melville, 2018; Saebu et al., 2010; Sallis et al., 2000; Shields, 2012; Somerset & Derek, 2018; Xu et al., 2020) and is undoubtedly one of the most significant barriers for young people with autism. In fact, when analyzing effect sizes, this factor is among the most substantial in terms of group differences ($V=0.637$), along with factor 8, "cognitive demands of the activity" ($V=0.576$), and factor 9, "social demands of the activity" ($V=0.465$).

Conclusions

Extra-curricular sports can help promote physical literacy among all children and teen. Young people with autism have the right to participate in sports activities on an equal basis with others, but some studies suggest they participate significantly less than their peers (Solish et al., 2010; MacDonald, Esposito, & Ulrich, 2011; Obrusnikova & Cavalier, 2011). In an effort to address a gap in the scientific literature, this study explores equal opportunities for participation in motor-sports activities at later ages. We aim to combine a human rights-centered approach with the methodological rigor expected of scientific research, recognizing that without reliable and detailed data on disability, there cannot be policies grounded in respect for human rights (Griffo, 2009).

Focusing solely on parental perceptions of children and teens with autism, we observe that potential barriers to sports participation for this population are multiple and varied. This underscores the need for a holistic approach that brings together the various stakeholders involved in organizing and managing motor-sports activities, including sports educators, program managers, parents, policymakers, and even the children and young people themselves.

When comparing groups, we find that parents of children with autism more frequently perceive nearly all factors as barriers, confirming the hypothesis that even in motor-sports, children with autism do not have the same participation opportunities as their peers. However, the data also show that many factors relevant to children with autism are similarly relevant to their peers; statistically significant differences appear in only six of the sixteen environmental factors

considered. The most notable differences relate to the lack of suitable activities for the child and the cognitive and social demands of existing sports activities. These findings align with similar research (Cioni, 2023; Cioni & Magnanini, 2024; Cioni, Spavier Alves & Estrelado Sousa, 2022) and suggest that sports, historically shaped by ableism (Brittain et al., 2020; Haycock & Smith, 2011; Valet, 2016), have only partially adapted to accommodate those with special needs, calling on society to provide activities that are fully accessible in terms of required abilities.

As argued previously, for sports to embrace the challenge of participation for all, substantial investment in educator training is essential. Educators are on the front lines in environments that, much like schools, are rich in diversity and demand a broad set of skills. This makes it more crucial than ever to be able to plan in a personalized and integrated way, taking into account each individual's abilities, resources, and limitations (Cioni, 2023; Cioni & Magnanini, 2022; Magnanini, 2018).

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