

The role of Football in Enhancing psychosocial skills in Youth with Autism spectrum disorder

ALBERTO CEI^{1,3}, BRUNO RUSCELLO², and DANIELA SEPIO^{2,3}

^{1,3} *Department of Human Sciences and Promotion of the Quality of Life, San Raffaele Roma Open University, Rome, Italy*

² *School of Sport and exercise Sciences, Faculty of Medicine and Surgery, "Tor Vergata University" Rome, Italy*

³ *ASD Calcio Integrato, Rome, Italy*

The study investigates the impact of football program, including a summer camp, on children with Autism Spectrum Disorder (ASD). Motor skill assessments showed significant improvements in ball handling abilities. Parent evaluations revealed strong correlations between factors such as verbal communication, social interaction, transitions, and task attention, indicating overall psychosocial skill enhancement. The intensive training, both in terms of hours and quality of activities, played a crucial role in these improvements. This research highlights the potential benefits of structured team sports programs for youth with ASD, emphasizing the importance of physical activity in their development and well-being.

KEY WORDS: Children with ASD, summer camp, training, parents, football.

Children with Autism Spectrum Disorder (ASD) exhibit deficits in social interaction, understanding of tasks, and verbal and nonverbal communication (APA, 2013). Several studies have examined the role of physical activity and sports in promoting skill acquisition in these areas and also in improving psychological and social abilities (e.g., Cei et al., 2017; Cei and Luiselli, 2017; Bremer et al., 2016; Luiselli, 2014). The main reason for increasing these activities in children with ASD is to counter their predominantly sedentary condition (Lalonde, 2017), enhancing their body functioning, cognitive and emotional processes, as well as enriching and improving interactions with peers and adults. These are certainly ambitious goals but are the same ones developed and valued by typically developing peers in sports clubs.

The few studies conducted with youth with ASD show that they are less physically active compared to their typically developing peers, and the percentage of sedentary individuals increases with age (Pan, 2011). In particular, a review conducted by Kapsal et al. (2019) highlighted that physical activity has positive effects on the physical condition and psychosocial health of youth with intellectual disabilities. It emerged that resistance training has the best impact on physical fitness, while the development of sports skills and basic movements instructions contribute to increased physical and psychosocial health. The positive impact of these instructions on physical well-being is more evident in children compared to adolescents and in those with severe intellectual disabilities compared to those with moderate-level disabilities. Professionals working with these youth are suggested to focus interventions on sports and movement training. The greatest benefits of this type of training might be due to the social nature of many of these activities compared to the solitary nature of resistance exercise or running. This is also consistent with previous research (Johnson, 2009) showing that youth with intellectual disabilities gain greater benefits from physical activity when performed in a group setting. However, what is meant by group activity should be better clarified in the future, as investigations in Johnson's review (2009) concern group fitness activities rather than team sports. Westendorp, Houwen, Hartman, and Visscher (2011) highlighted that youth with borderline or mild levels of intellectual disabilities who engage in team sports exhibit better ball control compared to their peers of similar intellectual levels who do not participate in these sports.

Up to now, the dissemination of physical activity programs in youth with ASD has been neglected, even though research data show motor, psychological, and social benefits from continued practice over time. Additionally, sports can serve as effective support for therapies involving these youth. Despite these positive findings, it remains more likely for a young person with intellectual disabilities to lead a sedentary lifestyle, which in turn contributes to problems like obesity, cardiovascular diseases, and respiratory issues (De, Small, and Baur, 2008; Kahathuduwa et al., 2019). In contrast, engagement in physical activity programs, even at moderate levels of intensity, can improve flexibility, increase muscle strength, reduce weight and body mass index. It also impacts psychological issues by reducing behavioral difficulties (reduction of stereotyped movements and self-stimulating behaviors), improving self-concept, and developing cognitive functions (Luiselli 2014; Sowa and Meulenbroek, 2012). Major literature reviews have highlighted that the activities mostly involve individual sports such as running, cycling, weight training, roller skating, horseback riding, walking, and water activities

and treadmill use (Bremer et al., 2016; Lang et al., 2010; Sowa and Meulenbroek, 2012; Lancioni et al., 2009). These studies have shown that short and intense exercises can facilitate learning and reduce behavioral problems during and immediately after training sessions. The reason why individual sports have been used more frequently compared to other sports lies in the apparent ease of teaching strategies and the reduction of practical cooperative activities and development of social skills compared to team sports. However, team sports and group activities might facilitate those prosocial behaviors and interpersonal communication that play a more marginal role in individual activities. To address this need, Cei et al. (2017) developed a naturalistic intervention to study the effects of a football-based training program on children with ASD. In the initial phase, “Calcio Insieme” (Football Together) project recruited 30 children (6-13 years old) with ASD from the public schools. To assess the impact of the training program on psychosocial skills (collaboration, communication, socialization, problematic behaviors, self-support), interviews were conducted with parents and school teachers before and after the training period. The results showed that after 8 months of activity, parents and school teachers perceived that participants had improved their psychosocial and motor skills, with differences based on the severity of their condition. Regarding quantitatively assessed motor skills, the children significantly improved on 6 out of 10 tests. Concerning football skills, running with the ball, 39.3% of the children showed no improvement, 28.6% reached an intermediate level, and 10.7% reached a medium-high level of skill. The only other research in team sports conducted previously involved three adults with severe intellectual disabilities, teaching them how to pass the ball with their feet (Luyben et al., 1986; Luiselli, 2014). These positive results regarding the involvement of youth with intellectual disabilities in individual and team sports emphasize the importance of their dissemination (Sowa and Meulenbroek, 2012). Furthermore, it emerges that these activities should take place in natural environments, and football, so deeply rooted in our society, could constitute one of these contexts where these youth can engage in activities like their typically developing peers.

While reduced sports participation and the strong prevalence of a sedentary lifestyle among youth with ASD pose limitations to their development and well-being, even for those who are already engaged in sports programs during the school year, the summer period can be overwhelming and not relaxing for these families. Summer can thus become a time of overload in the absence of organizational options similar to those available during the school year. In this regard, participating in summer camps provides a specific structure for a certain period of time suitable for youth with ASD. Data show that

parents perceive a positive impact on the development of self-esteem and social skills in their typically developing children with summer camp participation (Bialeschki and Browne, 2018). Therefore, it is plausible that positive outcomes can also be achieved with youth with intellectual disabilities if the program is designed to meet their improvement needs.

Few studies have been conducted to investigate the role of summer camps for children with intellectual disabilities, primarily because until a few years ago, opportunities to attend such programs were limited. In the 1970s, it was estimated that only about 10% of children with genetic, motor, or intellectual disabilities had participated in camping experiences (Hillman and Appel, 1978). It was only starting in the 1990s that a larger number of summer camps began catering to the needs of youth with disabilities (Sessoms and Henderson, 1994). Meanwhile, therapy programs and camps have had a long history and have represented an opportunity for vulnerable youth with learning and psychosocial problems to improve their emotional and social functioning while having fun with their peers (Mishna, Michalski, and Cummings, 2001).

One of the first studies with youth with intellectual disabilities was conducted in 1978 by Hung and Thelander over a period of 3 weeks and involving 18 children with ASD. Four areas have been evaluated: self-help skills, language training, and reduction of undesirable behaviors. The results showed that all children improved by at least 15% in one of these areas. The findings from other investigations (see Nimer, 2011 for a more detailed description and critical commentary) generally demonstrated positive effects, even though summer camp programs, the number of hours per day, and the activities practiced were not always well specified. Moreover, these studies mostly focused on emotional, cognitive, and social issues, with very few conducted with youth with intellectual disabilities. Overall, the data showed that summer camp programs increased the quantity of interpersonal relationships and social skills (Blachman and Hinshaw, 2002; Boyd et al., 2008; Bodzioch et al., 1986; Lopata et al., 2006; Michalski et al., 2003; Mishna et al., 2001; O'Halloran, 1996; Rynders et al., 1990; Walker et al., 2010), improved physical self-control (Casali, 1983; Nimer, 2011), increased self-help skills and positive behaviors (Dreikurs, 1987; Freeman et al., 1982; O'Halloran, 1996; Hung and Thelander, 1978; Oakley, 1980; Pohl, 1981), enhanced language skills (Hung and Thelander, 1978), problem-solving abilities (Rickard et al., 1975), and self-esteem (Michalski et al., 2003; Mishna et al., 2001; Zemke et al., 1984). Among these studies, eight investigated the outcomes of summer camps for children with intellectual disabilities (Boyd et al., 2008 - 6 youth with mental disabilities; Gruber, 1992 - 21 children with various physical,

learning, and autism-related disabilities; Hung and Thelander, 1978 - 18 youth with ASD; Lopata et al., 2006 - 30 with Asperger’s; Nimer, 2011 - 109 with multiple disabilities; Oakley, 1980 - 30 with mental disabilities; Pohl, 1981 - 3 with intellectual disabilities; Rynders et al., 1990 - 3 with ASD; Walker et al., 2010 - 12 with ASD). Among these inquiries, Walker, Barry, and Bader (2010) conducted an original study organizing a summer camp for 12 children aged 3 to 12 over a four-week period, bi-weekly for a total of 8 hours per week and 32 hours overall. The main interest of this study lies in the proposal of a new measurement system to assess specific psychosocial dimensions; it is a short questionnaire that parents and assistants easily completed in a few minutes before and after the camp. The limitation of this research is that this measurement was only used on a small group of children and was not used in other studies. Overall, none of the mentioned studies have investigated the effects that sports camps can have on youth with intellectual disabilities, particularly those with ASD. Additionally, program specifics and direct involvement hours were often not described. Furthermore, sports games were not identified as relevant activities to promote social interactions with peers. From 2016 onward, four studies have been conducted with football in youth with intellectual disabilities (Table I).

TABLE 1.

Football programs for youth with autism spectrum disorder by Vetri and Roccella, 2020, modified.

Study	Group Dimension	Gender F/M	Age	Weeks	Program	Results	Measurements
Hayward et al. 2016	18	5/13	9,7	6	Adapted Football	Shooting Accuracy and 15-Yard Agility Test	US Youth Football Training Activities
Cei et al. 2017	30	3/27	6-13	20	Football training program	Motor and Psychosocial Skills	Qualitative and Quantitative Measures
Chambers e Radley, 2019	3	0/3	12	36	Peer-mediated intervention	Football skills Accuracy	Quantitative Measures
Barak et al. 2019	19	3/16	19-55	24	Multi-phase sessions	Mobility skills	Football skills assessment

Hayward et al. (2016) conducted a study to verify the effectiveness of a 6-week community-based adaptive football program for a small group of 18 children with ASD. They evaluated the outcomes of physical activity, such as pre- and post-football skills, participation frequency, and parental satisfaction. The aim of their football program was to teach basic football skills to children with ASD, providing them an opportunity to have fun and interact with peers. The results supported the feasibility and effectiveness of the football program, as they found improvements in ball-kicking accuracy and agility time over 15 yards. Parental satisfaction was high, with 100% of parents recommending the program to others, and they reported that their children were more active and enjoyed playing football.

Cei et al. (2017) developed a 20-week training program that showed improvement in various psychosocial dimensions at the end of the training period. Children were evaluated through interviews conducted by sports psychologists at parents and support teachers from their schools, both at the beginning and the end of the training period. The assessment focused on their interactions with children in the areas of collaboration, communication, socialization, behavioral issues, and ball-related skills.

Chambers and Radley (2019) used a different approach, employing peer-mediated intervention to promote skill acquisition in children with ASD. They selected three boys with autism (aged 12, 12, and 11) and trained a 14-year-old to teach the three participants football skills, including throwing, kicking, and defense. By the end of the study, the three participants had rapidly acquired the desired football skills.

A similar project named "Game of Life" (GOL, Barak et al., 2019) focused on improving the quality of life for children and adults with social difficulties or disabilities, through a football program. Nineteen adults with ASD (average age 32, ranging from 19 to 55 years) were recruited from residential care centers. This study is unique in that it included a comparison group of 50 adults with intellectual disabilities. The GOL program involved six months of weekly sessions and a final friendly tournament. Interestingly, individuals with ASD did not show significant improvements in overall football skills, but they did demonstrate significant improvements in physical fitness (Sit and Reach Test) and mobility skills (reduction in the Timed Up and Go test). However, the intellectual disability group showed better improvements compared to the ASD group, which the authors attributed to the need for further refinement of the GOL program to better suit individuals with ASD.

Method

STUDY DESIGN

The study aimed to examine the effects on psychosocial interactions of children with ASD through a relatively extended training period that encompassed year-long activity from the first week of October to the first week of June (twice a week for two hours) and a summer camp the last three weeks of June (3 weeks, 5 hours per day, 5 days a week). The psychological evaluation of the outcomes achieved at the end of the summer camp focused on four psychosocial factors: verbal communication, social interaction, task attention, and activity transition, utilizing a modified version of the measure proposed by Walker et al. (2010). The psychological assessment was conducted by the parents at the beginning of year work (October) and after the summer camp (June), a method that has demonstrated validity in previous research. The study acknowledged the constructive role of parental concerns in guiding pediatric practice standards in identifying developmental issues. In the same periods have been conducted the motor skills tests.

The summer camp took place in Rome, for 5 days from Monday to Friday, from 8am to 1pm, for a duration of 3 weeks. The camp encompassed cognitive, emotional, linguistic, and motor/sport-related activities, with the participants rotating between football and expressive activities each day. They alternated these activities for 75-minute periods: football and expressive activities. They were divided into groups of 10, transitioning from one activity to another. In the early morning, there was a welcome time (30 minutes), mid-morning allowed for rest and light snacks and drinks (30 minutes), and before going home, there was a farewell time (15 minutes).

PARTICIPANTS

Involving 90 young individuals with ASD aged 7 to 18. The participants had varying degrees of ASD severity certified by the Health Departments of the city of Rome, Italy. Parents have signed an informed consent form to allow their children to participate in the program, join the research project, and disseminate scientific results. Participants were affiliated with the Italian Federation of Sports for Intellectual and Relational Disabilities (FISDIR) of the Italian Paralympic Committee to cover any insurance costs related to sports activities. A medical professional was consistently available during the camp to address any injuries or medical issues.

MOTOR SKILLS

The multidisciplinary team of instructors and professionals involved in the program included physical education graduates, sports psychologists, a speech therapist, a doctor, and a coordinator for family and school relationships. This diverse team aimed to meet the specific needs of children with ASD.

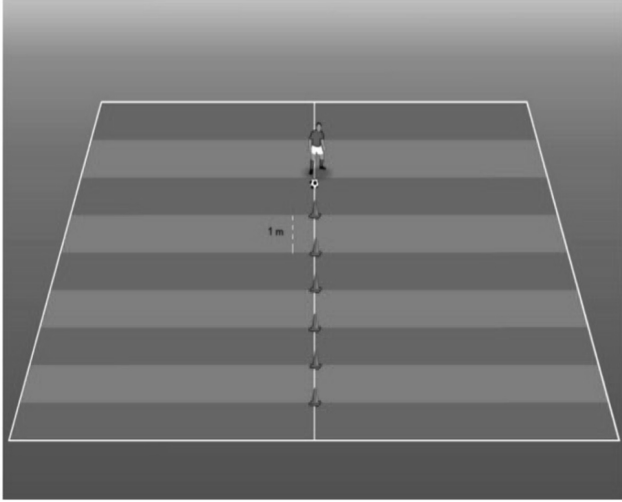
Motor skills assessment utilized three football-specific tests, which were repeated at the beginning of the program and during the summer camp. These tests were designed for individuals with moderate levels of intellectual disability who could comprehend and execute the instructions provided by coaches. The assessment occurred over a 9-month interval, and the tests were focused on:

1. Slalom dribbling with the ball. (*Attachment 1*)
2. Differentiation test. (*Attachment 2*)
3. Precision shooting test. (*Attachment 3*)

PSYCHOLOGICAL ASSESSMENT

The psychological assessment was conducted using an adaptation of the Adaptive Social Skills Measure (ASSM; Walker et al., 2010), designed to represent children's psychosocial abilities in four areas: verbal communication (items 1-6; example: responding to direct questions), social interaction (items 7-12; example: playing with others), transitions (items 13-16; example: smoothly transitioning to different activities), and task attention (items 17-

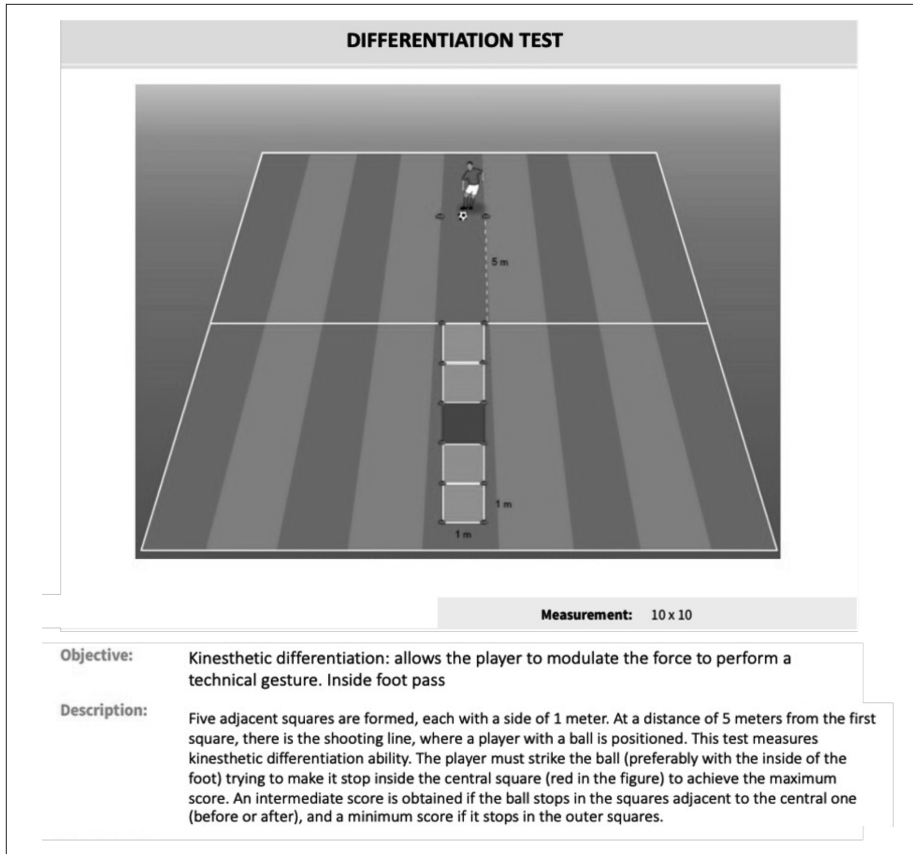
SLALOM TEST



Measurement: 10 x 10

Objective:	Dribbling the ball at high speed with changes of direction/sense, balance,
Description:	6 cones placed one meter apart from each other. This test measures the player's dribbling ability in relation to the time taken and execution speed. At the "ready/go" signal, the player starts with the ball and performs a slalom dribble between the cones in both directions (out and back). The test concludes once the player returns to the starting point. The examiner records the time taken from the "go" signal to when the player stops the ball at the starting point and assigns a score from 1 to 5 based on technical execution.

Attachment. 1



Attachment. 2

20; example: maintaining eye contact). The questionnaire was translated into Italian using the back-translation technique. The scale was independently translated from English to Italian by two Italian researchers fluent in English. The two researchers discussed their translations until reaching agreement on all items. This Italian version was then retranslated into English by a professional native English translator and compared to the original English version. Finally, the two Italian researchers re-evaluated the two translated texts to reach a final consensus on the Italian version of the scale. The extent to which each item corresponded to the specific child's behavior was rated on a 5-point Likert scale, ranging from 1 = never to 5 = frequently.



Attachment. 3

Results

MOTOR SKILLS ANALYSIS

The data are presented as mean \pm standard deviation, coefficient of variation percentage, and 95% confidence interval for the mean. The distribution of the sample was assessed using the Shapiro-Wilk test to check for normality. Non-parametric statistics were applied to examine any statistically significant differences within the treatment group (within-subject), both pre and post-intervention. The non-parametric Wilcoxon test was used to assess these differences. The effect size was measured using the r value, where $r=0.1$, $r=0.3$, and $r=0.5$ represent small, moderate, and large effect sizes, respectively. A statistical significance level of $p<0.05$ was considered.

TABLE I
Processing of motor behavior data: Descriptive statistics and non-parametric inferential analysis.

Test	Mean± Dev. St. [Coeff. Var.%]	C.I. average (95%)	Wilcoxon Signed Rank Test for the pre-post treatment difference
Test 1 pre (coach’s technical evaluation)	1.66±0.84 [50.6%]	1.35 – 1.98	W+=51.50; W-=578.50 z-score= - 4.344
Test 1 post (coach’s technical evaluation)	2.88±0.77 [26.7%]	2.58 – 3.16	P<0.001; ES: r = -0.35
Test 1 pre (assessment in seconds)	25.70±12.00 [46.7%]	21.22 – 30.18	W+=76.50; W-=484.50 z-score= -3.654
Test 1 post (assessment in seconds)	21.37±7.30 [34.2%]	18.64 - 24.09	P<0.001; ES: r = 0.45
Test 2 pre (score evaluation)	4.20±2.30 [54.7%]	3.34 – 5.05	W+=28.50; W-=566.50 z-score= -4.621
Test 2 post (score evaluation)	6.90±2.75 [39.8%]	5.86 – 7.93	P<0.001; ES: r = -0.39
Test 3 pre (score evaluation)	4.53±1.75 [38.6%]	3.87 – 5.18	W+=32.00; W-=496.00 z-score= -4.375
Test 3 post (score evaluation)	7.50±2.56 [34.1%]	6.54 – 8.46	P<0.001; ES: r = -0.39

Dev. St. = Standard Deviation
Coeff. Var.% = Coefficient of Variation
ES = Effect Size

From the data, it emerges that in the three motor tests, this group of young individuals with moderate-level autism showed significant improvement in each of them. In the slalom test, they significantly reduced the duration time of the slalom and improved the technical quality of ball control. In the differentiation test, they enhanced their ability to modulate shot strength to place the ball within scoring squares. In the third exercise, they exhibited improved accuracy in executing shots on goal in spaces of varying widths, narrower on the two lateral sides of the goal and wider in the central part.

Psychological Dimensions Analysis

The sub-scales and the total scale of the ASSM questionnaire, completed by parents before and after the intervention, reliability indicators (reflecting the reproducibility over time under consistent conditions of the provided results) are provided in the form of Cronbach’s Alpha values (Table II).

TABLE II
Cronbach's Alpha Coefficients For ASSM Sub-Scales And Total Scale.

	Parents pre	Parents post
Verbal Communication	0.68	0.71
Social Interaction	0.82	0.85
Transitions	0.85	0.88
Task Attention	0.76	0.81
Total	0.90	0.92

Pre = Pre-treatment; Post = Post-treatment

Values ranging between 0.7 and 1.0 are considered good indicators of the reliability of the obtained results. To assess the existing correlations between the sub-scales and total scales derived from the ASSM questionnaire, a general pre-post correlation matrix was generated (Table III). The p-values were calculated and indicated with corresponding symbols [*= Correlation is significant at the 0.05 level (two-tailed). **=Correlation is significant at the 0.01 level (two-tailed)]. The threshold for statistical significance was accepted as $p < 0.05$.

To determine significant differences in the pre and post-treatment group for the sub-scales and total scale of the ASSM questionnaire, a paired samples t-test was employed (Table IV). Effect Size values, represented as Cohen's d,

TABLE III
Correlations between the sub-scales and the total ASSM scale in the pre and post-treatment.

	Pre-C	Pre-I	Pre-T	Pre-A	Pre-To	Post-C	Post-I	Post-T	Post-A	Post-To
Pre-C	1	0.577**	0.265	0.336*	0.724**	0.913**	0.696**	0.335*	0.358*	0.727**
Pre-I		1	0.668**	0.546**	0.901**	0.522**	0.897**	0.644**	0.503**	0.815**
Pre-T			1	0.784**	0.796**	0.202	0.509**	0.853**	0.543**	0.622**
Pre-A				1	0.774**	0.230	0.405*	0.666**	0.740**	0.591**
Pre-To					1	0.631**	0.834**	0.753**	0.663**	0.887**
Post-C						1	0.706**	0.376*	0.361*	0.771**
Post-I							1	0.622**	0.542**	0.909**
Post-T								1	0.695**	0.798**
Post-A									1	0.764**
Post-To										1

C=Verbal Communication, I=Social Interaction, T=Transitions, A=Task Attention, To= Total.

**The correlation is significant at the 0.01 level (two-tailed)

*The correlation is significant at the 0.05 level (two-tailed)

TABLE IV
Paired-samples *t*-Test (pre-post) for ASSM sub-scales and total scale

	Pre-treatment Mean±DS) [Coeff Var%]	Post-treatment Mean±DS) [Coeff Var%]	Confidence Interval for the average Pre/Post	Paired- samples t-Test	Cohen d
Verbal Communication	5.24±0.92 [17.5%]	5.70±0.83 [14.5%]	4.94 – 5.54 5.43 – 5.97	-7.43*	-0.71; -0.34
Social Interaction	4.51±1.08 [23.8%]	5.14±1.08 [20.9%]	4.16 – 4.87 4.79 – 5.49	-7.68*	-0.78; -0.38
Transitions	4.65±1.13 [24.4%]	5.14±1.07 [20.8%]	4.28 – 5.02 4.79 – 5.49	-4.94*	-0.65; -0.24
Task Attention	4.60±1.06 [23.0%]	5.39±0.91 [16.9%]	4.25 – 4.94 5.09 – 5.69	-6.57*	-1.10; -0.50
Total	4.80±0.82 [17.2%]	5.34±0.79 [14.8%]	4.53 – 5.06 5.08 – 5.60	-8.53*	-0.89; -0.45

DS = Standard Deviation, Coeff. Var.% = Coefficient of Variation, * $p < 0.001$

are provided along with a 95% Confidence Interval. These values, adhere to the following reference thresholds in absolute value: very small: less than or equal to 0.20; small: from 0.20 to 0.50; medium: from 0.50 to 0.80; large: greater than 0.80. The software IBM-SPSS 25 for Windows (SPSS Inc., Chicago, IL) was utilized for data analysis and processing.

Discussion

Team sports for young with ASD have not been identified as significant activities for promoting social interactions with peers and adults. Few studies have investigated the role of football training programs with children with ASD, and improvement in interpersonal relationships has been highlighted as assessed by parents and school teachers (Cei et al., 2017). The present study involved children with ASD for a period of 9 months, including the annual activity from October to June and three consecutive weeks of summer camp. These were two different periods of engagement. During the academic year, the participants engaged in training twice a week for a total of 8 hours per month, while during the summer camp, they were involved for 25 hours a week for three weeks. The results of the motor tests conducted at the beginning of the year and at the end of the summer camp highlighted significant improvements in exercises involving ball handling.

The parent evaluations pre- and post-program showed a significant correlation between parent ratings related to the four factors. In a previous study (Walker et al., 2010), similar results were obtained from therapist evaluations of children with the same very high level of significance. It was hypothesized that a summer camp program specifically aimed at improving the psychosocial skills of children with ASD would stimulate improvements in these skills in both the home setting and child/parent interactions. To achieve this goal, this research examined the effects on psychosocial interactions of children with ASD over a training period that included regular season training typical of football, supplemented by a concentrated period characterized in terms of both quantitative and qualitative intensity (5 consecutive hours per day, 5 days a week for 3 weeks). Although the participants had breaks, they were required to remain physically active for a significantly greater number of hours than they were accustomed to. Our study suggests that the intensity of training, in terms of both quantity (hours per week) and quality (multidisciplinary activities), might be relevant in determining significant increases in psychosocial skills.

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