

Improving motor skills in children with autistic spectrum disorder through futsal

Mejora de las habilidades motrices en niños con trastorno del espectro autista a través del fútbol sala

José María López Díaz^{1*}, Carlos-María Alcover², Ricardo Moreno Rodríguez¹

¹ Facultad de Ciencias Jurídicas y Sociales. Universidad Rey Juan Carlos, España

² Facultad de Ciencias de la Salud. Universidad Rey Juan Carlos, España

* **Correspondence:** José María López Díaz, josemaria.lopez@urjc.es

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Abstract

Currently, it is evident that the participation in physical and sporting activities of people with Autism Spectrum Disorder (ASD) is very limited due to the characteristics of the diagnosis itself. This research work arose from the need to analyse the effect that sport practice has on the development of motor skills in children between six and 12 years of age with an ASD diagnosis, with a severity level of one. A total of 13 children with ASD aged six to 10 years (M = 7.23 years; SD = 1.42) participated in the physical-sports training programme. A pre-experimental, pretest-posttest design was adopted. Statistical analysis was performed with non-parametric tests using the Wilcoxon test in order to compare the results of the group of participants at two time points. The results of the study showed an improvement in the performance of the motor skills assessed. These data can help to consider sport as a real alternative to work with this group. Likewise, this type of programme can help to promote healthy lifestyles and improve the quality of life of the participants.

Keywords: special educational needs, ASD, sport, sports skills, sport training.

Resumen

Actualmente, es evidente que la participación en actividades físicas y deportivas de las personas que presentan un Trastorno del Espectro Autista (TEA) es muy limitada debido a las características propias del diagnóstico. Este trabajo de investigación surgió por la necesidad de analizar el efecto que tiene la práctica deportiva en niños y niñas de entre seis y 12 años con un diagnóstico TEA, con un nivel de gravedad uno, en cuanto al desarrollo de las habilidades motrices. Un total de 13 niños con TEA de entre seis y 10 años (M = 7.23 años; DT = 1.42) participaron en el programa de los entrenamientos físico-deportivos. Se adoptó un diseño preexperimental, pretest- posttest. Se realizó un análisis estadístico con pruebas no paramétricas aplicando la prueba de Wilcoxon con el objetivo de comparar los resultados del grupo de participantes en dos momentos temporales. Los resultados del estudio mostraron una mejora en la ejecución de las habilidades motrices evaluadas. Estos datos pueden ayudar a considerar el deporte como una alternativa real para trabajar con este colectivo. Igualmente, este tipo de programas pueden ayudar a promover hábitos de vida saludables mejorando la calidad de vida de los participantes.

Palabras clave: necesidades educativas especiales, TEA, deporte, habilidades deportivas, entrenamiento deportivo.

Introduction

Currently, disability cannot be seen as a barrier that limits or prevents participation in any kind of regular activity, be it social, work, leisure, or any other type of activity. In this case, it is important to focus on the capabilities and not on the limitations of the person with a disability (Gómez et al., 2018). To this end, it is necessary to work on a process of regulation at both the individual and collective level, with the aim of changing the social thinking that is held about disability, as this should be seen as a characteristic of the person and not as the defining characteristic (López-Díaz, 2019).

In this sense, sport is one of the disciplines that can most affect this group. However, throughout history, until practically the present day, people with disabilities have not had equal opportunities to carry out any type of physical activity (García-Obrero & González-García, 2021; Robles-Rodríguez et al., 2017). This has also been the case for people with Autism Spectrum Disorder (ASD), as sport has not been seen as a beneficial component (Villalba, 2015).

The people with ASD are characterised by severe permanent impairments in the main areas of development (Rivière, 1998), persistent deficits in communication and social interaction, restricted interests and stereotyped behaviours (APA, 2013). In the latest DSM-5 classification, ASD groups together social and communicative impairments, while retaining the criteria referring to mental and behavioural rigidity. As a result, ASD begins to be assessed in terms of the person's 'social communication' and 'restricted and repetitive behaviour' (APA, 2013). Given this situation, ASD is classified into three levels of severity, with grade 1 being the mildest and grade 3 the most severe. This is determined by the supports required for management in the areas of 'social communication' and 'restricted and repetitive behaviour' (APA, 2013). Furthermore, although motor skill deficits are not listed as a diagnostic criterion in the latest edition of the Diagnostic and Statistical Manual of Mental Disorders, there is evidence that this is particularly true for ASD (Ohara et al., 2020). Studies such as those by Harris (2017) and Kruger et al. (2019) confirm the presence of alterations in coordination, deficits in fine and gross motor skills or difficulties in maintaining body posture. These difficulties may limit certain body movements, influencing participation in activities with a social character. This situation results in limited participation in group physical activities, which generates a loss of opportunities for socialising in the context of the activity and an increased predisposition to inactivity (Kruger et al., 2019; Ruiz, et al., 2015). On the contrary, there are studies that recognise that working on motor skills through physical activity is beneficial, as this intervention leads to an improvement in both motor and social skills (Healy et al., 2018; Kruger et al., 2019; Ohara, et al., 2020). Therefore, it is necessary to link the practice of physical exercise to the daily life of people with ASD (Villalba, 2015).

The authors Julián et al. (2015, p. 66) point out that including physical activity in the daily life of people with ASD represents a "positive impact on mental and physical health, reduces environmental and behavioural disorders, promotes the development of socialisation, is within the focus of interest of children and adolescents, and increases satisfaction in family life". This statement becomes even more important if we take into account the latest research on the epidemiology of ASD, which shows a significant increase in the prevalence of ASD in the last 30 years (1/160 cases) (Luarte et al., 2021), reaching 1% and 2% of the incidence in children (André et al., 2020).

Taking advantage of this situation, it is important to promote continuous, regular and progressive sport practice (López-Díaz et al., 2021) that helps to achieve a correct personal and social development, and that serves as a source of health (Cuesta et al., 2016). Furthermore, if we take into consideration that sport can be included as a leisure activity, the impact it can have on the person who does it can be beneficial (Villalba, 2015).

Currently, there are programmes that are used as treatment or therapy to improve the lives of people with ASD. When intervening with this group, it is important to know and analyse the different needs in different contexts. This will facilitate the promotion of personal and social development and, consequently, the improvement of quality of life. According to Verdugo (2006), if the context is favourable and presents the necessary support, the person will have more chances of success in his/her development.

Several research studies have recognised that physical exercise can be beneficial at the cognitive, executive, motor coordination, social and academic performance levels (Cano et al., 2014; Gámez-Calvo et al., 2022; González-Gross & Meléndez, 2013). This recognition favours the opinion that sport has begun to be used as a therapeutic alternative to be applied to people with ASD. It should also be taken into account that the participation of children with ASD in regular schools is beneficial on a social level (Lindsay, 2007) because the contact with others helps to improve their social skills.

The aim of this study was to analyse the effect of playing sport on the development of motor skills in children with ASD through an indoor football training programme. This programme provided those interested in playing indoor football with the opportunity to do so from a playful point of view. It should be noted that play is a necessary element in the developmental process of children, regardless of whether or not they have ASD. For children, play is the working alternative in their leisure time. In this sense, games and activities should be adapted to the particular needs of each of the participants, thus acquiring a flexible and individualised character (Cuesta et al., 2016), with the intention of working on and enhancing different motor skills.

On the other hand, it should not be forgotten that, in order to play futsal, it is necessary to know a series of concepts and skills which are learned thanks to sports training. These sports spaces help to develop and enhance sporting elements such as physical preparation, technique and tactics of the sport (Gómez et al., 2008), others oriented to the social sphere such as companionship, respect, solidarity, equality and tolerance, among others (García, 2005), as well as to become familiar with the rules and regulations of the game. Cruz (2015) considers that children with ASD need programmes of these characteristics that help them to enhance their abilities, with the aim of improving their quality of life and that of the environment around them.

Method

Participants

The children who participated in the sports programme were from various municipalities in the south of the Community of Madrid. The type of sampling used was casual and intentional. Given the particularity of the population we were going to work with in the project, it was necessary to select this type of sampling due to the voluntary nature of the participants (Hernández & Carpio, 2019; Pimienta, 2000). Individual interviews were

conducted with the families of the children interested in participating. These meetings were conducted by a multidisciplinary team composed of two psychologists and a physical education teacher and senior football sports technician. The interviews were used to find out whether those interested met the selection profile:

- Ages six to 12 years.
- Have a diagnosis of ASD with a severity level of one.

The study sample consisted of a total of 13 children aged between six and 10 years ($M = 7.23$ years; $SD = 1.42$). Because the project was aimed at minors, it was necessary to have the supervision and approval of the Ethics Committee of the King Juan Carlos University, registration number 1511201714117. This Committee was responsible for ensuring compliance with current legislation to protect the rights of the participants in the sports programme. In addition, the families of the participants signed an informed consent regarding the operation and purpose of the sports programme.

Instrument

Due to the fact that there was no tool available that would fit the sport dimensions to be measured, it was necessary to use an "ad hoc" tool in order to evaluate the impact of sport practice with respect to the development of motor skills. Taking into account that the sports training was aimed at children between six and twelve years of age, it was necessary to know the stage of development of the child in their physical and sporting dimensions. Consequently, the objectives worked on in the subject of Physical Education in the Primary Education stage were reviewed. In addition to making use of the educational law itself, a review of the scientific literature on motor development and different tools measuring psychomotor skills was carried out. However, each of these questionnaires contained very specific items which could not be literally included within futsal, but served to contrast and adapt the new items to the sporting parameters of futsal. By selecting those items that were most suited to this sport and adapting them to the sporting context of the programme, a first draft of an "ad hoc" questionnaire was designed. This questionnaire was subjected to a Delphi process to confirm the content validity of the selected motor skills. The profiles that collaborated in this process were related to the type of research programme. The panel of experts was composed of two occupational therapists, two physical education teachers, one special education teacher and one psychologist. All of them had at least four years of professional experience in the field of disability and attention to diversity, working in services for people with disabilities and doing research in this field.

To complete the process, three rounds of anonymous consultation were carried out. The first consisted of providing a description of the sport programme and all the elements that were intended to be measured with each of the proposed items. The experts received the questionnaire design to be used with all the proposed items. In the second round, each expert was sent the opinions of the other participants with the intention of generating a debate and obtaining a consensus on the results. In this round, the experts provided new answers justifying those cases where there was no convergence with respect to the opinions of the group. The last round served to bring the experts' consensus closer together to form a common evaluation tool.

The final result was a questionnaire made up of 67 items grouped into seven dimensions. These dimensions included elements related to sporting technique such

as throwing the ball, control, driving and dribbling. On the other hand, we worked on actions linked to tactical elements of the game such as attack and progression in the game, support, unmarking, ball conservation and the ability to position oneself on the field of play in a coherent manner. They also worked on the dimensions of movement and jumping. The items collected items such as whether the action: was executed in a static position, walking or running; frontally, laterally or backwards. When the action involved the ball, it was executed: with the ball in motion or stationary, with the head or with the feet; with the dominant or non-dominant leg; in static position, walking or running; and following the coach's instructions or performing them autonomously.

The evaluation method of the questionnaire was following a Likert-type scale with five response options: 1. "Does not do it or ignores the order"; 2. "He does it wrong or he tries, but he doesn't succeed"; 3. "He does it with help"; 4. "He does it on his own, but has difficulties"; and 5. "It does well".

Procedure

In order to work on the different motor skills of the participants, the coach designed an indoor football training programme consisting of 34 one-hour sessions. To measure the results, the evaluation tool was administered at two points in time: a diagnostic evaluation was carried out at the beginning of the sports programme to find out the initial level that the participants had with respect to the motor skills, and another evaluation was carried out at the end of the sports training sessions to find out the results achieved in the motor skills evaluated. In this way, it was possible to compare the results obtained. Each session was structured in three main blocks: warm-up, main part and cool-down. The warm-up included all the tasks aimed at increasing body temperature and heart rate in order to prepare the body for more intense physical activity. The main part is the block that carries all the specific workload of the session, i.e. it includes all the tasks that are of a more intense nature. The return to calm brought together tasks that helped the body to enter a state of relaxation (Martínez et al., 2009).

All sports activities were adjusted to the basic levels of the sport. In addition, they were all flexible in order to be individually adapted so that each child could participate according to his or her individual characteristics. The sports games were characterised by being simple and dynamic tasks with and without the ball, physical, technical and tactical elements were collected in order to learn to play indoor football and develop sporting skills with the intention of modelling new skills and enhancing others already acquired.

Data analysis

The statistical package SPSS for Windows was used for the analysis of the results. To carry out the research, a statistical analysis was carried out with non-parametric tests using the Wilcoxon test with the aim of comparing the results of the group of participants at two points in time, applying a pre-experimental, pretest-posttest design. On the other hand, to determine the practical differences in each variable, the effect size (ES) was calculated using Hedges' g , which reduces bias due to the low number of participants. In this case, effect sizes below 0.2 are considered low, between 0.2 and 0.8 are moderate and above 0.8 are high.

In addition, it should be noted that the field study required the participation of three independent external judges. These judges received prior training in order to understand the dynamics of the training sessions. This methodology was used to check whether the opinions and results of the three judges coincided or were close in terms

of the evaluation of results (inter-judge consistency). To measure inter-rater consistency, Krippendorff's alpha was calculated with a result of .8095.

Results

Next, the results obtained in the sports programme are developed. The movement dimension was the most

basic skill assessed (table 1). The results obtained at the beginning of the programme for the walking skill showed above average scores, which was not the case for the running skill. However, the trend of results in all cases was very positive as the mean scores improved with respect to the initial level, with significant improvements in frontal and lateral movements ($p \leq .005$).

Table 1. Movement around the playing space

Action	PRE		POS		Z	Sig.*	TE
	M	DT	M	DT			
Walking (Fr)	4.08	0.57	5.00	0	-3.05	.002*	0.588
Walking (La)	2.46	0.80	3.67	0.68	-2.84	.004*	1.002
Walking (HA)	2.67	0.69	3.67	0.75	-2.53	.017	1.024
Running (Fr)	3.85	0.91	4.92	0.28	-3.02	.003*	0.902
Running (La)	2.26	0.68	3.44	0.57	-3.03	.003*	0.710
Running (HA)	2.31	0.90	3.36	0.67	-2.65	.009	0.980

Legend: Maximum score = 5; minimum score = 1; Fr = Front; La = Lateral; HA = Towards * significant values $p \leq .005$; TE = effect size

The jumping dimension was divided into two blocks (table 2) because the performance of the two options was different. The data relating to the dimension of jumping with feet together showed an improvement in the scores with respect to the initial level, although in neither case were these improvements significant. Something similar

happened with the jumping with feet apart modality. The results obtained at the beginning of the programme improved at the end of the programme. In addition, this improvement was significant in jumping backwards with feet apart ($p \leq .005$).

Table 2. Jumping

Action	Feet together							Feet apart						
	PRE		POS		Z	Sig.*	TE	PRE		POS		Z	Sig.*	TE
	M	DT	M	DT				M	DT	M	DT			
From static position (Fr)	3.64	0.89	4.41	0.61	-2.24	.076	0.998	3.26	1.12	4.41	0.59	-2.62	.009	1.228
From static position (La)	2.56	0.94	3.51	0.81	-2.35	.02	1.185	2.44	0.95	3.41	0.63	-2.42	.021	1.060
From static position (HA)	2.64	0.92	3.69	0.90	-2.69	.01	1.037	2.51	1.02	3.36	0.62	-2.19	.033	1.195
Slowly (Fr)	3.33	1.00	4.31	0.77	-2.19	.037	1.320	3.33	0.89	4.23	0.79	-2.37	.02	1.119
Slowly (La)	2.18	0.90	3.38	0.88	-2.5	.018	1.264	2.23	0.87	3.23	0.66	-2.65	.009	0.986
Slowly (HA)	2.33	0.98	3.26	0.80	-2.17	.033	1.376	2.10	0.71	3.23	0.75	-2.71	.009	0.956
Fast (Fr)	2.97	1.16	4.28	0.74	-2.39	.03	1.444	2.90	0.99	3.97	0.90	-2.26	.036	1.392
Fast (La)	2.00	0.77	3.03	0.70	-2.39	.026	1.083	1.97	0.71	3.03	0.73	-2.51	.037	0.982
Fast (HA)	1.77	0.85	3.03	0.65	-2.81	.006	1.033	1.77	0.72	2.97	0.66	-3.03	.003*	0.767

Legend: Maximum score = 5; minimum score = 1; Fr = Front; La = Lateral; HA = Towards * significant values $p \leq .005$; TE = effect size

The throwing dimension was divided into two modalities (table 3) because the execution of both options was different. In this case, the object of the ball was taken as a reference: hitting the ball while in motion or throwing the ball while stationary. Taking into account ball striking while the ball was in motion, it can be observed that all scores improved with respect to the initial level. Moreover,

this improvement was significant when the player ran and threw the ball with the dominant leg ($p \leq .005$). Regarding the mode of throwing with the ball stationary, all the scores also improved with respect to the initial level. However, in this case the improvement was significant when the player ran and threw the ball with the non-dominant leg ($p \leq .005$).

Table 3. Ball throwing: the player is able to hit the ball in different positions

Action	Ball in motion							Stopped ball						
	PRE		POS		Z	Sig.*	TE	PRE		POS		Z	Sig.*	TE
	M	DT	M	DT				M	DT	M	DT			
From static position (CC)	2.97	1.32	3.64	1.06	-1.7	.093	1.335	-	-	-	-	-	-	-
Walking (CC)	2.44	1.30	3.56	0.99	-2.51	.014	1.251	-	-	-	-	-	-	-
Running (CC)	2.33	1.28	3.31	1.11	-2.4	.018	1.193	-	-	-	-	-	-	-
From static position (PD)	3.18	1.00	4.13	0.63	-2.62	.014	1.063	3.72	0.93	4.38	0.62	-1.94	.095	1.212
From static position (PND)	2.13	1.00	3.64	0.72	-2.88	.008	1.136	2.38	1.07	3.62	0.68	-2.85	.007	0.997
Walking (PD)	3.13	0.99	4.10	0.63	-2.55	.012	1.150	3.54	1.07	4.26	0.57	-1.85	.165	1.236
Walking (PND)	2.21	1.01	3.36	0.67	-2.66	.013	1.005	2.15	1.01	3.56	0.81	-2.83	.007	1.056
Running (PD)	2.64	0.94	3.87	0.76	-2.81	.005*	1.042	3.13	1.14	4.18	0.71	-2.37	.036	1.326
Running (PND)	1.90	0.89	3.10	0.61	-2.73	.011	0.961	1.74	0.98	3.38	0.69	-3.09	.002*	0.882

Legend: Maximum score = 5; minimum score = 1; CC = With the Head; PD = Leg Dominant; PND = Leg Non-Dominant; * significant values $p \leq .005$; TE = effect size

Regarding the ball control dimension (table 4), all results improved with respect to the initial level. In this case, the results showed significant improvements when players

wanted to control the ball with the non-dominant leg while walking ($p \leq .005$) or when they controlled the ball with the non-dominant leg while running ($p \leq .005$) on the field.

Table 4. Ball control: the player is able to hit the ball in different positions

Action	PRE		POS		Z	Sig.*	TE
	M	DT	M	DT			
From static position (PD)	3.31	1.00	4.36	0.62	-2.5	.018	1.168
From static position (PND)	2.31	1.28	3.62	0.78	-2.55	.026	1.202
Walking (PD)	2.97	1.15	4.28	0.60	-2.67	.011	1.221
Walking (PND)	1.87	1.17	3.51	0.73	-2.87	.004*	1.307
Running (PD)	2.41	1.08	3.51	0.86	-2.4	.029	1.253
Running (PND)	1.46	0.90	3.10	0.78	-3.09	.002*	1.029

Legend: Maximum score = 5; minimum score = 1; PD = Leg Dominant; PND = Leg Non-Dominant; * significant values $p \leq .005$; TE = effect size

Regarding the ability to drive the ball around the pitch (table 5), all the results improved with respect to the

initial level. However, despite this, in no case was the improvement significant.

Table 5. Ball handling: the player is able to carry the controlled ball on the field of play

Action	PRE		POS		Z	Sig.*	TE
	M	DT	M	DT			
Walking (PD)	3.49	0.69	4.31	0.66	-2.61	.016	0.794
Walking (PND)	2.62	1.04	3.67	0.76	-2.44	.016	1.251
Running (PD)	2.79	0.88	3.77	0.74	-2.39	.024	1.117
Running (PND)	2.03	1.08	3.10	0.82	-2.48	.020	1.272

Legend: Maximum score = 5; minimum score = 1; PD = Leg Dominant; PND = Leg Non-Dominant; * significant values $p \leq .005$; TE = effect size

The dribbling dimension was divided into two blocks (table 6) because the execution of the skill was performed in two different ways. On the one hand, the option of dribbling an opponent was assessed. In this case, all scores improved with respect to the initial level. Moreover, when dribbling was done walking and with both legs ($p \leq .005$), or running with the dominant leg ($p \leq .005$), or running with the non-dominant leg ($p \leq .005$), the improvement in

skill was significant. On the other hand, the child's ability to dribble immobile objects such as a row of cones was measured. As before, all scores improved from baseline. When dribbling was done walking and with both legs ($p \leq .005$), or running with the dominant leg ($p \leq .005$), the improvement in skill was significant.

Table 6. Dribbling: the player is able to overcome an opposition while maintaining possession of the ball

Action	To an adversary						To a stationary object							
	PRE		POS		Z	Sig.*	TE	PRE		POS		Z	Sig.*	TE
	M	DT	M	DT				M	DT	M	DT			
Walking (PD)	2.49	0.92	3.82	0.82	-3.22	.002	0.740	2.95	1.02	4.21	0.69	-2.94	.003*	1.087
Walking (PND)	1.56	0.84	3.05	0.79	-2.97	.003	1.095	2.05	0.87	3.56	0.57	-3.03	.002*	1.050
Running (PD)	2.31	0.89	3.41	0.91	-2.8	.007	0.876	2.36	0.95	3.77	0.89	-2.89	.004*	1.104
Running (PND)	1.49	0.82	2.97	0.84	-3.05	.003	0.944	1.74	0.90	3.03	0.83	-2.72	.008	1.184

Legend: Maximum score = 5; minimum score = 1; PD = Leg Dominant; PND = Leg Non-Dominant; * significant values $p \leq .005$; TE = effect size

Regarding the tactical component (table 7), different elements were taken into account since the sporting aspects worked on were very basic actions provided by the game itself. In this case, a distinction was made between executing the action following the coach's guidelines or

performing the action autonomously showing knowledge of the game. Once again, all the results improved with respect to the initial level. Furthermore, improvements were significant in the cases of unmarking ($p \leq .005$) and positioning oneself rationally on the pitch ($p \leq .005$).

Table 7. Aspects related to tactical elements of the game

Action	PRE		POS		Z	Sig.*	TE
	M	DT	M	DT			
Attack/progress (DE)	2.51	0.99	3.74	0.87	-2.76	.006	1.134
Attack/progress (MA)	1.56	1.07	3.18	1.09	-2.84	.007	1.243
Support (DE)	2.49	1.19	3.41	0.95	-2.01	.063	1.440
Support (MA)	1.74	1.04	2.79	0.89	-2.31	.034	1.196
Disengage from the opponent (DE)	1.97	1.00	3.49	0.96	-2.86	.004*	1.209
Disengage from the opponent (MA)	1.23	0.83	2.82	0.83	-3.08	.002*	0.919
Keeping the ball (DE)	2.23	1.03	3.49	0.95	-2.48	.014	1.383
Keeping the ball (MA)	1.54	0.95	2.82	0.87	-2.48	.025	1.258
Positioning on the field of play (DE)	2.00	0.76	3.56	0.92	-2.91	.004*	1.156
Positioning on the field of play (MA)	1.31	0.51	2.87	0.83	-3.19	.002*	0.741

Legend: Maximum score = 5; minimum score = 1; DE = Trainer's Guidelines; MA = Autonomous Manner; * significant values $p \leq .005$; TE = effect size

Discussion

At the end of the sports programme, an improvement in the performance of motor skills was observed. However, this improvement was not reflected consistently in each of the skills evaluated, nor in the individual performance of the players. It should be noted that the training design was the same for all because the children were at an introductory stage in futsal. The first dimension measured was movement, taking into account that this skill serves as the basis for the correct development of the rest of the motor skills. As recognised by Rosa et al. (2018), at around six and eight years of age, children begin to be able to coordinate somewhat complex motor movements. In this sense, Prieto (2010) considers that movement serves as a communication tool to become aware of the environment and to develop perceptual-motor skills. On the other hand, at the beginning of the programme, there were children who presented difficulties due to their motor clumsiness motivated by the characteristics of their ASD diagnosis (Harris, 2017; Kruger et al., 2019).

Although there were no problems moving frontally, there were problems moving laterally or backwards. Regarding the first modality, it is considered a basic and repetitive type of movement, used constantly from the early stages of development. However, the other two require a more complex execution such as movement in the footwork and the sense of spatial orientation. For Domínguez (2010), performing good footwork will be fundamental to achieve success, and this will depend on the number of times the action is executed and the quality of how it is performed (López-Ros, 2013).

The range of results in terms of jump size was wider due to the different modalities. The training sessions helped to produce improvements, although in some cases not with the expected result. Strength, coordination and balance are elements that will intervene in the execution of the jump (García & García, 2018). Jumping with one foot first and then with the other foot while maintaining balance increased the difficulty compared to jumping with feet together. However, the level of experimentation and repetitive use from different situations and forms of execution will allow learning about body control (Castejón, 2000). The possible difficulties shown could be derived from the age and

maturational process of the participants (García & García, 2018) and the possible delay in the development of motor skills of children with ASD, alterations in motor patterns such as balance, coordination and the development of the body schema (Vega, 2005).

The four individual technical actions that were evaluated (shooting, control, driving and dribbling) showed favourable results with respect to the initial level. Despite this, there were cases where the improvement was diminished by the player's ability to respond or by the difficulty of executing the skill itself.

It should be borne in mind that technique cannot be disarticulated from the rest of the elements that influence execution (Sánchez et al., 2012). All these actions had as an element to work on laterality, that is, to execute each of the actions with both legs or with both sides of the body (Staples, & Reid, 2010), with the aim of enhancing motor skills, achieving a more complete physical development and increasing the athlete's performance. However, the motor difficulties of children with ASD must be taken into account. It is important to remember that, in order to learn to play futsal, it is necessary to go through different phases in which a series of sporting skills are acquired. Depending on the age or level of experience of the athlete, there will be certain skills that cannot be assessed in the same way, either because of their complexity or because they require a combination of several motor skills (Figueredo et al., 2019). As expected, the children performed worse when they executed the actions with the non-dominant leg. Furthermore, if they had to run, the difficulty increased due to the level of coordination required (Prieto, 2010). It is also important to take into account the external stimulus of the ball, as well as the level of attention and concentration required to execute the action well (Rojas et al., 2014). This effort to which the athlete is subjected can cause the onset of fatigue and negatively influence performance (Camacho et al., 2019). However, the constant repetition of the actions with both legs led to a reduction in the number of errors and an improvement in skills. The fact that the instructions for performing the tasks were simple facilitated learning and retention for the execution of sport skills (Camacho, 2019). For his part, López-Ros (2013) considers that both quantity and quality are fundamental for learning.

The skill of dribbling presented the particularity of direct confrontation between players. For the execution of this skill to be effective, the player must be able to make decisions instantly, since uncontrollable external elements dependent on the opponent intervene in this action, in many cases awakening the player's capacity for improvisation and imagination. However, people with ASD also present difficulties when participating in games with an imaginative or symbolic component (López-Díaz et al., 2021). Hence, children executed the action more slowly, as they required more time to plan and execute the movements, to sequence them and to foresee the consequences (Crissien-Quiroz et al., 2017).

On the other hand, it should be noted that some basic tactical actions were selected because the tactical elements help the formation of reflective athletes and evaluators of their own sporting practice (Ortín et al., 2016). To execute the tactical element well in a sport, it is necessary to know the game where the action takes place (Corcho et al., 2017). In the case of football or futsal, tactical actions require tactical thinking which will allow making the right decisions depending on the context of the game (Corcho et al., 2017). This situation is aggravated when the environments where children with ASD move do not have a concrete structure (Urrutxi & Velásquez, 2011). It was observed that, when the coach provided instructions, the players were able to play according to the rules (Ortín et al., 2016). This helped the children to gain self-confidence and improve. However, when they had to play autonomously, none of them were able to perform the action on their own due to the difficulty in understanding and interpreting the actions of the game, as well as in making the right decisions as in football (Corcho et al., 2017).

In the case of the ball keeping action, limited technical skills and poor interpretation of collective play meant that there were problems for teams to maintain possession of the ball. When it was achieved, it was because the coach intervened to generate favourable situations for the development of this skill. In this case, it is important for the coach to establish rules in order to improve collective play (Corcho et al., 2017). In addition, the level of knowledge shown by the trainer about ASD helped to produce a closer encounter between the group, contributing to improve social interaction and promoting greater confidence to carry out the action effectively. In this sense, Campos-Campos (2021) considers the reference figure that the group of people with ASD may have to be very important for the development of their activities.

The composition of the teams was an element to take into account when analysing the performance of the players. There were children who had a faster learning curve due to the ease with which they were able to execute certain skills. This was reflected in the superiority of some of them in performing certain tasks. In the training matches, the coach rotated the players in the teams in order to reinforce other elements such as motivation, sportsmanship, solidarity and effort, among others.

According to the results collected, it can be pointed out that the children went from having a rather limited sporting level, as the actions were mostly poorly executed or the coach's help was needed, to finishing the programme with a higher sporting performance in each of the actions executed.

Finally, despite achieving an improvement in the development of motor skills, it is important that children do not drop out of sport. In fact, as pointed out by Fransen et al. (2012), it is advisable not to play only one sport; participation in a variety of sports has a positive influence on the development of motor coordination,

strength, endurance and speed. Abernethy et al. (2005) continued along the same lines, stating that the practice of multiple sports contributes to participating in a variety of sporting experiences, which helps children's decision-making. Furthermore, it should not be forgotten that practice should be carried out from a playful perspective, thus ensuring adherence to group sport practice (May et al., 2018). Furthermore, it is important to be patient during the process of teaching and learning, as the results are often not immediate.

Conclusions

The aim of this research project was to analyse the effect of playing sport on the development of motor skills in children with ASD. The results obtained in the study confirm that the indoor football sports programme has proved to be positive for children with ASD, as there have been improvements in the motor skills assessed with respect to the initial level.

On the other hand, the fact that there is no specific tool that measures motor skills in children with ASD makes it difficult to measure and evaluate in order to obtain more accurate data. Therefore, it is important to be cautious with the results obtained. The inter-judge observation method has a subjective component that can limit or deviate the result of the action. With regard to the duration of the programme, it is difficult to determine the effect of the impact. The trend shows that it has been positive, however, it would be advisable to carry out periodic follow-ups to check whether the improvements obtained have been maintained over time and which skills have been consolidated or weakened.

Being aware of this situation, it would be interesting to develop in the future specific instruments to help measure motor and/or sport skills in children with and without ASD. In view of the positive trend of the programme, it would be interesting to continue proposing sports facilities for children with ASD, at any level of severity. In the case of ASD level 1, to verify that the results continue to be positive, while in the cases of ASD level 2 and 3, to find out and investigate the impact that this type of programme can have on these profiles.

Finally, it should not be forgotten that such programmes can help to promote healthy lifestyles and thus improve the quality of life of their participants.

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