Move4Future: implementation and effects of a pilot physical exercise programme for children and youth at risk from multi-problem families

Move4Future: aplicación y efectos de un programa piloto de ejercicio físico para niños y jóvenes en situación de riesgo procedentes de familias multiproblemáticas

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Abstract

Introduction and Objective: Multi-problem families include several risk factors (e.g., mental health and weight issues). Physical exercise could be a strategy to prevent, treat and overcome numerous disorders. Thus, this study aimed to analyze the effects of implementing the Move4Future pilot program, in children and adolescents, on the following variables: i) anxiety levels, ii) body composition, iii) physical fitness, and iv) physical activity levels. Methodology: Ten participants (10.61±2.40 years) completed a 12-week physical exercise program with a weekly frequency of one session and were assessed at baseline and post-intervention. The Revised Manifest Anxiety Scale for Children, body mass, height, triceps skinfold, calf skinfold, relaxed arm circumference, waist circumference, calf circumference, and the FITescola® battery tests (push-ups, horizontal jump, agility, shoulder flexibility and lower limb flexibility) were applied.
Results and Conclusions: The main results showed a lower anxiety trait, although this change was not statistically significant (z=-1.832, p=0.067), a significant increase in stature (z=-2.197, p=0.028), a significant decrease in body mass index (z=-2.366, p=0.018), and in waist circumference (z=-2.201, p=0.028). The Move4Future pilot program shows improvement in average values of anxiety levels, body composition and upper strength in physical fitness. However, a multi-component intervention, including families and more sessions per week, may be important for better results.

Keywords

Children; development; health; fitness; physical activity; anxiety.

Resumen

Introducción y Objetivo: Las familias multiproblemáticas incluyen varios factores de riesgo (por ejemplo, problemas de salud mental y de peso). El ejercicio físico podría ser una estrategia para prevenir, tratar y superar innumerables trastornos. Así, este estudio tuvo como objetivo analizar los efectos de la implementación del programa piloto Move4Future, en niños y adolescentes, sobre las siguientes variables: i) niveles de ansiedad, ii) composición corporal, iii) aptitud física, y iv) niveles de actividad física.
Metodología: Diez participantes (10,61±2,40 años) completaron un programa de ejercicio físico de 12 semanas con una frecuencia semanal de una sesión y fueron evaluados al inicio y después de la intervención. Se aplicaron la Escala de Ansiedad Manifiesta Revisada para Niños, la masa corporal, la altura, el pliegue cutáneo del tríceps, el pliegue cutáneo de la pantorrilla, el perímetro relajado del brazo, el perímetro de la cintura, el perímetro de la pantorrilla y las pruebas de la batería FITescola® (flexiones de brazos, salto horizontal, agilidad, flexibilidad de hombros y flexibilidad de miembros inferiores).
Resultados y Conclusiones: Los principales resultados mostraron un menor rasgo de ansiedad, aunque este cambio no fue estadísticamente significativo (z=-1,832, p=0,067), un aumento significativo de la estatura (z=-2,197, p=0,028), una disminución significativa del índice de masa corporal (z=-2,366, p=0,018) y del perímetro de la cintura (z=-2,201, p=0,028). El programa piloto Move4Future muestra una mejora en los valores medios de los niveles de ansiedad, la composición corporal y la fuerza superior en la condición física. Sin embargo, una intervención multicomponente, que incluya a las familias y más sesiones por semana, puede ser importante para obtener mejores resultados.

Palabras clave

Niños; desarrollo; salud; forma física; actividad física; ansiedad.

Introduction

During the family life cycle, families often face various adverse situations. Sometimes, families accumulate multiple risk factors and are referred to as "multi-problem families" (Sousa, 2005). These families are characterized by a plurality of particularly complex problems in various areas of life, which can, in turn, affect several family members (Sousa, 2005; Tausendfreund et al., 2016). As a result, these families cope with multiple problems simultaneously in various/diverse areas of life. Some examples of these problems can be financial struggles, parenting issues, troubled relationships, psychiatric issues, health problems, and sometimes conflicts with social authorities or the justice system (Evenboer et al., 2018; Tausendfreund et al., 2016). In addition, the problems interact with each other, for example, if a family is struggling with financial issues, this stress can exacerbate more pressure on the other health or relation issues already present, and vice-versa. Thus, the problems are also complex due to the nature of the interaction between all the situations in which children/adolescents find themselves.

A multi-problem family is not defined solely by the number and complexity of its problems. The intensity of these issues and the family's inability to effectively manage them are also crucial traits. All these characteristics cause this multi-problematic situation to be tendentially persistent over time (Spratt, 2011).

Children and young people from multi-problematic families are at risk. They often exhibit behavioral problems in the present and throughout their lives (Spratt, 2011), and tend to face more limited opportunities in the future (Evenboer et al., 2018). In this sense, the issue of children at risk has gained more prominence since the 20th century. There are many children and young people who find themselves in maladjusted or dangerous situations and may be at family and/or environmental risk because the conditions necessary for their healthy development are not guaranteed (Nozes, 2018).

These problems affect mental health, and according to the World Health Organization (WHO, 2013), it is essential to prevent, treat and overcome any disorder. Nonetheless, mental health problems are the leading cause of disability and a major public health problem worldwide due to the progression of the disease, difficulties in prevention, treatment and its increasing prevalence (GDB, 2018; Wainberg et al., 2017). And yet, worldwide, about one in every six individuals suffers from some type of mental disorder during his/her lifetime (Kessler, 2012). For instance, depression, anxiety and stress are considered important indicators for mental health that, if left untreated, can negatively affect individuals (Al-Naggar & Al-Naggar, 2012; Teh et al., 2015). Specifically, anxiety is an emotional response that leads to a set of symptoms, including difficulty sleeping, fatigue, muscle tension and irritability (American Psychological Association, 2020), and other physiological changes such as restlessness, dry mouth, tachycardia, cold and clammy hands, chest tightness and muscle tension (Craske et al., 2009; Szuhany & Simon, 2022).

Young people who grow up in multi-problematic families are more likely to show symptoms of anxiety (Eisenberg et al., 2007). People with anxiety disorders also report a poorer quality of life compared to those without high levels of anxiety (Barrera & Norton, 2009). As mentioned before, a multi-problematic family is not simply the sum of the problems, but also if they are intense and complex. A child within this context more easily will reveal anxiety and mental issues, which in turn, will intensify all the other issues that this child is dealing with.

Family context and structure also emerge as an important social predictor of childhood obesity and overweight (Hortigüela Alcalá et al., 2016; Moore et al., 2016; Wang et al., 2022). Families with lower incomes, lower levels of education and greater exposure to stress tend to the worsening body composition of their children and young people (Augustine & Kimbro, 2013; Chávez Erives et al., 2023; Jebeile et al., 2022). In fact, a recent study identified poverty, a common trait of multi-problematic families, as the strongest predictor of obesity in offspring over time (Wang et al., 2022). These could be related to bad dietary habits such as the excessive consumption of energy-dense, micronutrient-poor foods; a high intake of sugar-sweetened beverages; and the ubiquitous marketing of these and fast foods (Liu et al., 2018; Mahumud et al., 2021) According to the WHO (WHO, 2024), childhood obesity is a serious public health problem worldwide, with more than 390 million children and young people (aged 5-19) being overweight or obese in 2022. In its turn, childhood obesity is a major risk factor for cardiovascular, musculoskeletal and metabolic diseases, as well as some types of cancer (ACSM, 2021; Pandita et al., 2016). Therefore, it is necessary and indispensable to promote policies and measures that reduce the prevalence of childhood obesity and overweight, especially among children and young people who are most at risk of developing these conditions (Wang et al., 2022).

Obesity and excess weight promote a negative cascade effect that impacts the daily lives of children and young people. This effect has been explored and discussed by Stodden's model (2008), in which researchers argue a bidirectional relationship between obesity with motor competence and physical fitness in young people. A young person lacking motor proficiency, compared to their peers, leads to avoiding physical and sporting activities. This avoidance leads to greater social isolation, reduced motor practice, and slower progress in motor competence. As a result, their physical fitness worsens, which further deteriorates their body composition (Hulteen et al., 2018; Stodden et al., 2008). Motor experience is essential for developing motor competence, which, in turn, is crucial for achieving good physical fitness. These variables are interconnected, and for optimal motor development, children should have opportunities to explore a variety of motor tasks, including several sports activities (Bompa & Buzzichelli, 2018; Mercê et al., 2021).

Physical activity, defined as motor activity that significantly increases the metabolic rate, enhances motor competence by increasing motor experience and motor skills (Rodrigues et al., 2021), improving physical fitness (Lee, 2021), fostering relational skills, reducing stress levels, enhancing feelings of well-being (Biddle & Asare, 2011), and contributing to better body composition (Jerónimo et al., 2024). These metabolic benefits are greater if physical activity is practised with moderate to high intensity. Moderate-intensity activities, such as brisk walking or leisurely cycling, elevate the heart rate to about 40-59% of the maximum heart rate, whereas vigorous-intensity activities, like fast running or swimming, significantly increase the heart rate to about 60-89% of the maximum (ACSM, 2021). Given these benefits, physical activity is especially important for at-risk children, who experience higher levels of stress (Wang et al., 2022) and a greater risk of developing overweight and obesity (Augustine & Kimbro, 2013). It should also be noted that engaging in physical activity at a young age contributes to adherence and maintenance of this practice in adulthood (Hulteen et al., 2018). This fact can contribute to reducing the risk of developing metabolic and cardiovascular diseases not only in the short term but also in the long term.

The Move4Future programme consists of a pilot physical exercise program for children and young people at risk, from multi-problematic families, with the purpose of increasing their physical activity and promoting all the associated benefits. This study aimed to analyse the effects of implementing the Move4Future pilot program on the following variables: i) anxiety levels, ii) body composition, iii) physical fitness, and iv) physical activity levels.

Method

Study Design

A quasi-experimental, longitudinal pilot study of a 12-week intervention was conducted. The study included two evaluation moments: pre-intervention, which occurred the week before the intervention began, and post-intervention, which occurred the week after it ended. The study was conducted following the Declaration of Helsinki and approved by the Ethics Committee of the Research Unit of the Polytechnique University of Santarém (approval number 21-2023ESDRM).

Participants

Participants were recruited by the SOS Family Support Centre in a city in central Portugal, which integrates the SOS Children's Villages Association. The convenience sample included 10 children and young people of both sexes (two boys), with ages between six and 13 years old (10.61±2.40 years).

Intervention Program

The intervention lasted 12 weeks, with a weekly frequency of one session. The sessions consisted of aerobic and muscular endurance exercises, as well as rotating recreational sports activities (e.g., target shooting, skating, skateboarding, and team sports). The exercise programme was developed by a team of exercise specialists, including four PhDs in Sports Science with specializations in Exercise Physiology (one), Motor Behaviour (one), and Fitness (two), as well as a professor with a specialist degree in Fitness. In the initial phase, the training methodologies to be adopted, the objectives throughout the programme, and its periodisation were thoroughly discussed. In the subsequent phase, the specialist fitness

instructor operationalised the lesson plans, which were then reviewed and refined collaboratively by the group. The sessions were planned and led by a professor in sports, who is specialized in fitness and were assisted by a master's student in Physical Activity and Health. All sessions took place in a sports hall and lasted approximately 60 minutes. Each session consisted of an initial 10 to 15 minutes of warm-up, composed of individual postural and breathing corrections, low to moderate aerobics exercises, including also low-intensity strength exercises to remember the technical aspects. The main part comprised 30 to 35 minutes of aerobic and strength training, the aerobic exercises were performed at a moderate to intense intensity, while the resistance exercises were performed at 8-15 submaximal repetitions of moderate intensity (ACSM, 2021). This main component also included several fitness games that were employed to foster social interaction among participants, and coordination games were also integrated, to target key motor skills such as balance, agility, timing, reaction time, hand-eye coordination, foot-eye coordination, and spatial awareness, for example, the Rhythm Wheel Game, The Chair Game, Coordination Fitness Drills, Statue Game, Numberball Game, Bring down the tower Game, Fitness activities with music (Simões & Ramos, 2016). The final 15 minutes included the return to calm and stretching phases, with stretching, breathing and postural correction exercises. These sessions aimed to improve both cognitive and physical aspects of coordination, contributing to the overall effectiveness of the intervention. Additionally, music was incorporated into all sessions to enhance motivation and engagement (Clark et al., 2016; Karageorghis & Terry, 1997).

After 10-30 minutes of the training session, individual information on the rating of perceived exertion (RPEE) was collected, using a scale of 0-10 arbitrary units (Borg, 1970), by tapping the respective score on a tablet. The RPE value was then multiplied by the duration of the session in minutes (Foster et al., 1995; 2001). The RPE values ranged from 2 to 10, with an average of 7- arbitrary units.

In parallel with the intervention for children and young people, a monthly activity of one hour was developed for parents/guardians, with the aim of providing them with information and tools in various areas, such as the importance of physical activity, healthy nutrition, and emotional control.

Protocols and Procedures

To assess anxiety, the Portuguese version (Fonseca, 1992) of the Revised Manifest Anxiety Scale for Children (Reynolds & Richmond, 1978) was used. The anxiety measurement instrument consists of 37 items designed to determine the presence (Yes = 1 point) or absence (No = 0 points) of a wide variety of symptoms in children and adolescents from 3rd to 12th grade. The questionnaire's score varies between 0 and 37 points, meaning that the higher the score, the greater the anxiety trait measured. Of these 37 items, 28 belong to an anxiety scale and 9 are a lying or social desirability scale. The questionnaire demonstrates good internal consistency and test-retest reliability in the original version (Reynolds & Richmond, 1978) and in the Portuguese version (Fonseca, 1992). This questionnaire was administered under the supervision of a member of the Portuguese Psychologists' Association, who was also a researcher on this project.

Body composition was assessed by taking the following anthropometric measurements: body mass, height, triceps skinfold, calf skinfold, relaxed arm circumference, waist circumference, and calf circumference. All anthropometric measurements were taken by anthropometrists certified by the International Society for Advancement Kinanthropometry (ISAK), following its protocols (Norton & Eston, 2019). Body mass was measured using a scale (Tanita BC - 545), the statute using a portable stadiometer (Seca 220, Hamburg, German), and the other measurements using an anthropometric folder (Rosscraft, Canada). Anthropometric data was collected in the late afternoon, after the participants' school hours, and the schedule was kept in all the assessments in order to minimize the influence of food intake. After collecting the anthropometric data, body mass index (BMI) was calculated and classified according to the percentiles of the World Health Organization (WHO, 2006).

Physical fitness was assessed using the FITescola® battery (Henriques-Neto et al., 2020), which is validated for Portuguese children and young people. The tests were applied for upper limb strength (push-ups), horizontal jump, agility, shoulder flexibility and lower limb flexibility. All these tests were classified as "unhealthy zone", "healthy zone" or "athletic profile" according to the normative tables for age and sex.

Physical activity levels were measured by the child's own perception using the Portuguese version (Mercê et al., 2022) of the Children's Physical Activity Pictorial Questionnaire (Morera-Castro et al.,

2018). This questionnaire consists of six closed questions with a pictographic scale. The first five questions assess the child's perception level of physical activity (PA) over the last seven days, in various contexts: 1st question - during the week, 2nd question - at weekends, 3rd question - during school breaks, 4th question - when not at school, and 5th question during physical-motor activity classes (Morera-Castro et al., 2018). All the answers to the questions are presented in the form of pictures of girls or boys (depending on the gender of the child answering), with each illustration representing a level of PA. The first image represents a "sedentary" state, the second image represents a "little active" state, the third image represents an "active state" and the fourth is a "very active" state. Finally, the 6th question focuses on the means of transport used to get to school, with the following answer options: on foot, by bus, by car, by bicycle or other. The final score for the level of physical activity is obtained from the arithmetic mean of the scores obtained in the first five questions. The closer the value is to four, the more physically active the child perceives themselves to be, and the closer the value is to one the more the child tends to perceive themselves as sedentary (Mercê et al., 2022; Morera-Castro et al., 2018).

Statistical Analysis

Descriptive statistics, i.e., mean, standard-deviation, minimum and maximum, were used to describe the sample and the variables being analyzed. The Wilcoxon test was applied to check for possible pre- and post-intervention differences in the total score variables of the RMASC and physical activity questionnaires, anthropometric variables and FitEscola® results. Whenever significant differences were identified, Cohen's d effect size was calculated and its magnitude was interpreted as follows: trivial < 0.19; small 0.2-0.29; moderate 0.6-1.19; large 1.2-1.9; very large 2.0-3.9; extremely large > 4.0 (Cohen, 1992). To compare the answers to the RC questionnaire one by one, the McNemar test was applied, specifically for the paired comparison of binary answers (Field, 2013). A significance level of p≤0.05 was adopted.

Results

Anxiety

Analyzing the descriptive statistics for the total score of the RMASC questionnaire (Fonseca, 1992), a decrease was observed after the intervention (Table 1), indicating a lower anxiety trait, although this change was not statistically significant (z=-1.832, p=0.067). When comparing the results of the questionnaire question by question, no significant differences were found (p>0.05).

Table 1. Descriptive statistics of RMASC questionnaire's total score pre- and post-intervention.

RMASC score	N	Min	Max	M	SD	*p*
Pre-intervention	10	10.00	22.00	15.40	4.43	0.067
Post-intervention	8	5.00	20.00	11.00	5.71	

Notes: N – participants, Min – minimum, Max – maximum, M – mean, SD – standard deviation

Body Composition

The descriptive results of the various anthropometric measurements carried out at the two evaluation moments are presented in the table 2. Not all children and young people participated in both assessment moments. Considering only those who did, there was a significant increase in stature (z=-2.197, p=0.028, d=-0,491), from an average of 152.07±11.45 cm in the pre-intervention to 153.57±11.83 cm in the post-intervention. There was also a significant decrease in BMI (z=-2.366, p=0.018, d=-0,529), with mean values dropping from 22.32±2.76 kg/m^2 to 21.90±2.73 kg/m^2, and in waist circumference (z=-2.201, p=0.028, d=-0,492), with mean values decreasing from 73.73±8.55 cm to 71.54±8.36 cm.

Considering the 10 children included in the initial evaluation, only five (50%) of them had a BMI classified as healthy, two (20%) were overweight and three (30%) were classified as having obesity. In the post-intervention evaluation, one of the children who was classified as having obesity moved to the overweight category, improving his body composition; and another child, who was classified as healthy weight, became overweight, worsening his body composition.

Table 2. Descriptive and inferential statistics of anthropometric measures in pre- and post-intervention.

Anthropometry Measures	Evaluation Moment	N	Min	Max	M	SD	*p*
Body Mass (kg)	Pre-	10	23.90	69.90	47.79	11.65	0.553
	Post-	7	42.10	70.40	51.71	9.61	
Stature (cm)	Pre-	10	128.40	167.00	148.34	12.13	0.028*
	Post-	7	131.40	168.70	153.57	11.83	
BMI (kg/m2)	Pre-	10	14.50	25.06	21.48	3.60	0.018*
	Post-	7	18.18	24.74	21.90	2.73	
Tricipital skinfold (mm)	Pre-	8	7.00	22.00	14.90	5.09	0.893
	Post-	7	8.00	24.50	14.86	5.01	
Geminal skinfold (mm)	Pre-	8	8.00	30.60	20.01	6.93	0.138
	Post-	7	7.00	21.50	16.33	4.57	
Relaxed arm circumference (cm)	Pre-	10	17.10	29.00	25.15	3.42	0.14
	Pre-	7	23.50	28.10	25.90	1.86	
Waist circumference (cm)	Post-	10	54.30	89.60	70.73	9.73	0.028*
	Pre-	7	61.50	86.30	71.54	8.36	
Calf circumference (cm)	Post-	10	7.50	36.90	27.88	9.41	0.203
	Pre-	7	30.00	36.80	32.83	2.42	

Notes: N – participants, Min – minimum, Max – maximum, M – mean, SD – standard deviation, BMI – body mass index, * – significant difference

Physical Fitness

All physical fitness tests, except the agility tests, showed improvements after the intervention (Table 3). However, this improvement was statistically significant only for the push-up test (z=-2.023, p=0.043, d=-0.452), in which participants who fulfilled the two evaluation moments started with an average of 6.14±6.4 and increased to an average of 10±9 push-up repetitions.

Table 3. Descriptive and inferential statistics of the fitness tests pre- and post-intervention in pre- and post-intervention.

FitEscola® Tests	Evaluation Moment	N	Min	Max	M	SD	*p*
Push-ups (rep)	Pre-	10	4.80	5.85	4.80	16	0.043*
	Post-	7	10.00	9.00	10.00	27.00	
Horizontal Impulsion (cm)	Pre-	10	116.90	34.18	56.00	160.00	0.499
	Post-	7	116.14	22.64	74.00	143.00	
Agility (seconds)	Pre-	10	16.51	2.79	12.72	19.40	0.128
	Post-	7	14.75	1.13	12.88	16.25	
Right Sit and Reach (cm)	Pre-	10	19.80	8.15	11.00	36.00	0.398
	Post-	7	19.86	5.37	14.00	28.00	
Left Sit and Reach (cm)	Pre-	10	17.60	6.19	6.00	29.00	0.866
	Post-	7	18.71	4.42	15.00	28.00	

Notes: N – participants, Min – minimum, Max – maximum, M – mean, SD – standard deviation, rep – number of repetitions, * – significant difference

Table 4. Frequency data for the classification of each physical fitness test.

FitEscola® Tests	Evaluation Moment	N	Unhealthy zone N (%)	Healthy zone N (%)	Athletic profile N (%)
Push-ups*	Pre-	8	6 (75%)	1 (12.5%)	1 (12.5%)
	Post-	6	2 (33.3%)	3 (50%)	1 (16.7%)
Horizontal Impulsion*	Pre-	8	3 (37.5%)	5 (62.5%)	0 (0%)
	Post-	6	3 (50%)	3 (50%)	0 (0%)
Agility*	Pre-	8	7 (87.5%)	1 (12.5%)	0 (0%)
	Post-	6	6 (100%)	0 (0%)	0 (0%)
Right Sit and Reach *	Pre-	8	5 (62.5%)	1 (12.5%)	2 (25%)
	Post-	6	5 (83.3%)	1 (16.7%)	0 (0%)
Left Sit and Reach *	Pre-	8	7 (87.5%)	0 (0%)	1 (12.5%)
	Post-	6	5 (83.3%)	1 (16.7%)	0 (0%)
Right Shoulder Mobility	Pre-	10	2 (20%)	8 (80%)	--
	Post-	7	1 (14.3%)	6 (85.7%)	--
Left Shoulder Mobility	Pre-	10	7 (70%)	3 (30%)	--
	Post-	7	4 (83.3%)	3 (16.7%)	--

Notes: N – participants, Min – minimum, Max – maximum, M – mean, SD – standard deviation, * test with no classification below 9 years which conditions the N

In FitEscola® battery, besides the score, the test's results are also classified as being within an unhealthy zone, a healthy zone and, for some tests, in the athletic zone. This classification data is presented in Table 4.

Physical Activity

Considering the levels of physical activity, before and after the intervention, it´s possible to see (table 5), that they don't suffer significant changes.

Table 5. Descriptive statistics of physical activity questionnaire's total score in pre- and post-intervention.

PAQ score	N	Min	Max	M	SD
Pre-intervention	10	2.40	3.80	2.80	0.48
Post-intervention	3	2.00	3.20	2.67	0.611

Notes: PAQ – physical activity questionnaire; N – participants, Min – minimum, Max – maximum, M – mean, SD – standard deviation

Discussion

Multi-problematic families have been studied in the literature with a substantial increase in recent years. Children and young people who come from these families tend to have more limited future opportunities in life (Evenboer et al., 2018). Some studies and programs have been implemented with this population, e.g., integrating formal and informal care to increase resilience and avoid out-of-home placements (Koper et al., 2024; Koper et al., 2020); community intervention based on problem-base approaches (Sousa et al., 2007); or an integrative family therapy with a structure-related, mentalization-based, psychoanalytic orientation (Bachler et al., 2016). However, according to our research, this is the first study to intervene with these at-risk children and young people through exercise training, while also involving parents in activities that provide them with information and tools in various areas (e.g., nutrition, emotional regulation). The practice of exercise is a privileged means of developing numerous physical skills, such as motor experience, motor competence (Hulteen et al., 2018; Stodden et al., 2008), aerobic fitness, muscular fitness (Lee, 2021), as well as social skills, e.g., development of relational, communication and socialization skills (Biddle & Asare, 2011). In this way, exercise is a "magic pill" with a salutogenic effect that improves physical and mental health, enhances body composition and prevent numerous diseases (ACSM, 2021).

The present study analyzed the effects of implementing a physical exercise program, the Move4Future pilot program, for children and young people at risk from multi-problematic families. The results showed a slight decrease in anxiety traits, although not statistically significant (z=-1.832, p=0.067). In a systematic review about the effect of physical activity on anxiety in children and young people (Carter et al., 2021), it was also found that physical activity led to a moderate improvement in state anxiety when comparing the intervention group with the control group. It is relevant to highlight that the previous systematic review included studies with a range of interventions between one and 52 weeks (mean of 11 weeks) and a range of training frequency between one and six times, and duration from 10 – 75 minutes. In particular, there were six studies included in the previous systematic review with only one training session per week which is the same frequency of the present study, but they have different interventions (e.g., Tai chi, Yoga, self directed exercise, behavioural activation based physical activity, mindfulness, physical education or a combination of the previous) (Caldwell et al., 2016; Falsafi, 2016; Gallego et al., 2015; Melnyk et al., 2013; Papp et al., 2019; Parker et al., 2016). Another study concluded that physical activity showed a small beneficial effect on reducing anxiety in children, but the evidence base is limited, the research designs are often weak and the effects of physical exercise are small to moderate (Biddle & Asare, 2011). It Is possible that the reduced number of sessions in our program was not enough for a significant difference in anxiety levels. Considering that this is a pilot study, we recommend that future interventions of this type include more sessions per week.

Besides anxiety, the present study also aims to analyze the effect of physical activity on body composition, physical fitness and physical activity levels. The results showed a significant difference only in body mass index (z=-2.366, p=0.018) and waist circumference (z=-2.201, p=0.028). These results are in line with a systematic review conducted by Chen et al. (2024). (2021), which shows that physical activity

has effects on reducing waist circumference. There is some evidence that physical activity is effective in reducing body mass index in children (Rajjo et al., 2017). However, there is a piece of strong evidence suggesting that a multicomponent intervention, including diet and physical activity, is more effective and appears to have the best overall outcomes in children and adolescents with overweight and obesity (Godoy-Cumillaf et al., 2020; Lavelle et al., 2012; Rajjo et al., 2017). Although one of the monthly sessions of this program covers topics related to nutrition, a more effective approach may be needed, carrying out weekly actions that combine physical activity and nutrition.

The results of physical fitness tests show an improvement in all areas except for agility, however significant differences were found only in the push-up test. There are a lot of studies that show an improvement in physical fitness regarding exercise and physical activity programs (Boreham & Riddoch, 2001; Neil-Sztramko et al., 2021). The reduced duration of the intervention and the fact that children had only one session per week might not have been sufficient to show significant differences in other tests besides the push-up. Despite this, it is important to highlight that the majority of tests carried out achieved improvements in average values after applying the program, which is a positive indicator.

Considering the levels of physical activity, no differences were observed before and after the intervention. Since the parents play a significant role in influencing their children's habits and routines, it may be important, in future interventions, to include sessions about the importance of physical activity and also to incorporate some family physical activities, such as fun games and suggestions for being more active in the family. This type of programs can also promote family cohesion and organization, which can be very important to multi-problematic families (Rhodes et al., 2021; Rhodes et al., 2024).

The main limitation of this study was the small sample size. All the families referred by the city's SOS Family Support Center were contacted, with a total of 33 children from 16 families, but only 7 families agreed to take part and 10 children were included. One difficulty mentioned by the parents was the challenge of transporting the children and young people. Considering that these families already face several intense and complex problems at the same time (Evenboer et al., 2018; Tausendfreund et al., 2016), arranging transportation for their children to attend a new activity could be a further source of concern. For this reason, it is recommended that future studies consider including the transportation of participants, if possible, to improve adherence to the program. Consequently, for the same reasons, there was no control group. Still, this is a case study with special characteristics which reinforce the novelty of the present research.

In addition to the small sample size, not all the children took part in the final assessment, which may have contributed to the lack of statistical significance for several variables. The abandonment or intermittent participation of these families in intervention programs has been evidenced in literature (Bachler et al., 2017), and it is necessary to reflect on the best strategies to mitigate it.

Conclusions

Multi-problematic families should be the subject of investigation, particularly to understand the factors that help overcome many of the negative effects on the development of children and young people. In this regard, multidimensional intervention programs involving physical exercise, nutrition and techniques to reduce anxiety disorders simultaneously should be utilized. In this pilot study, Move4Future program, with only one session per week to maximize attendance, slightly improvements were found in the average values of anxiety levels, and statistical differences were found in body composition, and upper body strength in physical fitness; however, an intervention with multiple components, including the families and with higher duration and more sessions per week, may be important for achieving better results.

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