2024, Retos, 53, 147-156

Effects of an exercise programme on the autonomy, independence and physical fitness of individuals with Intellectual and Developmental Disabilities – A Pilot Study

Efectos de un programa de ejercicios sobre la autonomía, la independencia y la forma física de las personas con discapacidad intelectual y del desarrollo - Un estudio piloto

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Abstract. The literature clearly highlights the relationship between the levels of autonomy and independence of people with intellectual and developmental disabilities (IDD) and their levels of physical fitness. Thus, the aim of this study was to analyze the effects of a physical exercise program on the levels of autonomy, functionality in activities of daily living (ADL), and physical fitness of people with IDD. 17 participants completed the 9-week intervention, where parameters such as anthropometric data (height, weight, body mass index (BMI) and muscular mass (MM)), functionality in ADL (WHODAS 2.0) and data regarding physical fitness (handgrip test, Sit and Stand and timed up and go) before and after the intervention were evaluated. Significant improvements were found after the physical exercise intervention program in the functionality (self-reports: t=-2.19; p=0.03; $\eta 2$=0,282 and proxy reports: t=-2.64; p=0.01; $\eta 2$=0,410) and body composition variables (BMI: t=-2.08; p=0.05; $\eta 2$=0,254 and muscle mass; t=-1.94; p=0.05; $\eta 2$=0,221), but not in the physical fitness variables. The intervention program seems to have contributed positively to improving the perception of autonomy in ADLs and body composition.
Keywords: intellectual disability; activities of daily living; functionality; physical capacities; physical exercise.

Resumen. La literatura destaca claramente la relación entre los niveles de autonomía e independencia de las personas con discapacidad intelectual y del desarrollo (DI) y sus niveles de condición física. Por ello, el objetivo de este estudio fue analizar los efectos de un programa de ejercicio físico sobre los niveles de autonomía, funcionalidad en las actividades de la vida diaria (AVD) y forma física de personas con DID. 17 participantes completaron la intervención de 9 semanas de duración, en la que se evaluaron parámetros como los datos antropométricos (altura, peso, índice de masa corporal (IMC) y masa muscular (MM), la funcionalidad en las AVD (WHODAS 2.0) y los datos relativos a la forma física (test de agarre de manos, Sit and Stand y timed up and go) antes y después de la intervención. Se encontraron mejoras significativas tras el programa de intervención de ejercicio físico en las variables de funcionalidad (autoinformes: t=-2,19; p=0,03; η^2=0,282 e informes de apoderados: t=-2,64; p=0,01; η^2=0,410) y composición corporal (IMC: t=-2,08; p=0,05; η^2=0,254 y masa muscular; t=-1,94; p=0,05; η^2=0,221), pero no en las de forma física. El programa de intervención parece haber contribuido positivamente a mejorar la percepción de autonomía en las AVD y la composición corporal.
Palabras clave: discapacidad intelectual; actividades de la vida diaria; funcionalidad; capacidades físicas; ejercicio físico.

Fecha recepción: 26-09-23. Fecha de aceptación: 10-01-24
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Introduction

Disability is characterized as a reduction in each domain of functionality, and can be congenital (when the individual is born with it) or acquired throughout life, the most common being motor, mental, and sensory (visual and hearing) disabilities (World Health Organization, 2004). The International Classification of Functioning, Disability and Health (ICF) comprehends incapacity and functioning as a dynamic interaction between health conditions and the personal and environmental contextual factors (World Health Organization, 2004). These disabilities can prevent their full and effective participation in society on equal opportunities with others (World Health Organization, 2004).

Intellectual and Developmental Disability (IDD) is characterized by deficits in intellectual and adaptive functioning in conceptual/academic, social and practical domains, and it usually manifests itself in the beginning or during the developmental period (American Psychiatric Association, 2013), namely before the age of 22 (Schalock et al., 2021). It can be classified in 4 degrees of severity based on an evaluation carried out: mild (55-70), moderate (40-55), severe (25-40) and profound (<25), however, IDD severity classification must take into consideration both the IQ and the adaptive functioning (American Psychiatric Association, 2013). The causes of IDD are unknown in some cases, however, there are known risk factors such as parental health, genetic factors, and environmental factors such as access to health care, socioeconomic status, and education (American College of Sports Medicine, 2021). The average life expectancy of individuals with IDD may be up to 20 years shorter than that of the general population and the leading causes of death are usually related to cardiorespiratory diseases (American College of Sports Medicine, 2021). Therefore, in the last years there have been more concerns about the health, quality of life and well-being of people with IDD, with evidence that higher levels of autonomy and independence in individuals with IDD are associated with better general health (Wise et al., 2020) and a better quality of life and well-being (Alonso-Sardón et al., 2019). Some previous studies have studied the (in)dependence and autonomy levels in people with IDD, showing that higher independence levels in adults with IDD are strongly associated with higher levels of adaptive behaviour (Woolf et al., 2010) and, when compared to typically developed peers, adolescents with IDD clearly have lower levels of adaptive behaviour (Baker et al., 2021).

In general, individuals with IDD do not meet the recommended levels of physical activity (Bull et al., 2020) and, along with high levels of sedentary behaviors (Dairo et al., 2016; Harris et al., 2019), have low functional physical fitness and a greater likelihood of developing diseases such as obesity, dyslipidemia, hypertension, diabetes, among others, when compared to the individuals without disabilities (de Winter et al., 2012; Gawlik et al., 2018; Shin & Park, 2012), worsening their physical and health conditions (Farias Valenzuela et al., 2019; Gilderthorp et al., 2018; Shin & Park, 2012).

In addition, individuals with IDD face barriers in their daily lives for their integration into society because of their disability and level of severity. These barriers are also present in physical activity/exercise and include personal, family, social, financial, and environmental factors, however social barriers seem to be present at higher levels (Jacinto et al., 2021c). Some of these barriers include lack of friends to practice physical activity with, inadequate or non-accessible spaces, activities too difficult to learn, lack of technicians with expertise in adapted physical activity, lack of inclusive opportunities, and social exclusion, among others (Jacinto et al., 2021c; Stanish et al., 2016). On the other hand, Ascondo et al. (2023) observed that the most prevalent barriers to physical activity practice in people with IDD are of an intrinsic nature, such as lack of motivation or lack of time.

There is a need for the creation of exercise programs that work on different components for the improvement of physical aptitude levels of people with IDD (Farías-Valenzuela et al., 2022; Ferreira et al., 2022). One of the first systematic reviews around this topic showed moderate to strong evidence that physical activity positively affected balance, muscle strength and quality of life in individuals with IDD (Bartlo & Klein, 2011). Subsequently, studies have confirmed this relationship between physical activity and the promotion of physical fitness (cardiorespiratory capacity, muscular strength, flexibility and balance), amongst other, namely anxiety reduction and improvement in quality of life (Bartlo & Klein, 2011; Jacinto et al., 2021a; Jacinto et al., 2023a; Jacinto et al., 2023b; Jacinto et al., 2021b, 2023c; Stanish & Temple, 2012).On the other hand, although some studies also refer improvements in body composition (Jacinto et al., 2021b), the effect of physical activity on this variable is inconsistent between previous studies (Bouzas et al., 2019; Shin & Park, 2012; Yan et al., 2022), this variable may be influenced by the type of intervention. When carried out in a systematic, structured, and planned way, physical exercise also has an impact on the aforementioned variables. In a recently published systematic review which systematized the effects of cardiorespiratory training programs, the authors concluded that this type of training improved cardiorespiratory function, lipid, hemodynamic and metabolic profile, body composition, and neuromuscular and cognitive capacity (Jacinto et al., 2023c). In the same sense, another systematic review which systematized the effects of strength training programs, the authors concluded that this type of training improved strength, balance and fat-free mass and decrements in fat mass and waist circumference (Jacinto et al., 2021b).

Autonomy and independence in activities of daily living (ADL) of people with IDD seem to be influenced by changes in physical fitness (Raulino et al., 2014), as physical capacities are essential for the successful performance of ADLs. Studies in the population without disabilities have shown that participants with higher levels of physical activity obtained better levels of functional skills and autonomy, which results in independence in daily life, as well as promoting social bonds and greater satisfaction with their own health (Parra-Rizo & Sanchís-Soler, 2021). On the other hand, significant changes in the body composition variable cannot be excluded (Bouzas et al., 2019; Jacinto et al., 2023a; Shin & Park, 2012). This highlights the importance of physical activity, which directly boosts physical fitness and indirectly autonomy and independence in ADLs, which are key factors in quality of life, however, this relationship has not been studied in the IDD population.

The literature has reinforced the importance of projects that promote the practice of sport/exercise for people with disabilities, analyzing its effects on the physical and mental health of participants (Ferreira et al., 2022), but it has also highlighted the need for projects that, based on sport/exercise, promote attitudes of inclusion in different age groups (Sales, et al., 2024; Campos-Campos, et al., 2023). The present study aims to analyze the effect of a 9-week exercise/adapted sports program on the levels of independence, autonomy, and functionality in ADLs and on the levels of physical fitness of individuals with IDD.

Materials and Methods

This study follows a quasi-experimental design in accordance with the Declaration of Helsinki (World Medical Association, 2013). This study was approved by the Ethics Committee of the Faculty of Sport, Science and Physical Education, University of Coimbra (CE/FCDEF-UC/00872021). All subjects and their families were informed of the purpose and methods of the experimental method and signed an informed consent form.

Participants

The following eligibility criteria for the study were established based on aims and safety considerations: participants had to be at least 18 years old, able to stand and walk without assistance, not involved in any exercise program, institutionalized, diagnosed with IDD, successful in performing movements such as pulling/pushing and the ability to carry out the intended assessments. In addition, participants had to be available for the weekly exercise program session and the assessment periods. For safety reasons, individuals with medical contraindications for adherence to a physical activity program were excluded from participation. Exclusion criteria included participation in less than 75% of the sessions or absence from more than 2

consecutive sessions. Throughout the study, participants were advised to maintain their regular physical activity routines. Baseline and post-intervention assessments were performed by two qualified exercise physiologists. Any existing health groups or issues related to the intervention were managed according to standard medical practices and documented as adverse events. Eligibility criteria were met by 17 adults, institutionalized in a support institution, located in Leiria with ages between 18 and 57 years (mean of 34.8; 9 female and 8 male). All had mild to severe IDD.

Instruments

Anthropometric

Anthropometric data regarding height and body composition (weight, body mass index, fat mass and muscle mass) were collected using a stadiometer (Seca 213) and the bioimpedance method (Tanita Body Composition Analyzer BC-420MA), respectively. All these methods were viable, reliable, and accurate for IDD participants (Casey, 2013; Oppewal & Hilgenkamp, 2018; Temple et al., 2010; Wouters et al., 2017)

Functionality levels in activities of daily living

To assess autonomy and functionality in ADL, the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) (Lin et al., 2020; Üstün et al., 2010; World Health Organisation, 2010) questionnaire was applied. The WHODAS 2.0 is based on the conceptual framework of the ICF and aims to assess the activity limitations and participation restrictions of an individual, regardless of previous health conditions. WHODAS 2.0 assesses the level of functioning in 6 domains of life: cognition, mobility, self-care, interpersonal relationships, life activities and participation. The WHODAS 2.0 consists of three versions (36 items, 12 items and 12+24 items) and each can be administered in three different ways (interviewer-administered, self-administered and proxy-administered), except for the 12+24 item version which can only be interviewer-administered. For this study, the 12-item self-administered and proxy-administered version, which has been translated and validated for the Portuguese population by Moreira et al. (2015), was chosen. The 12-item version (which explains 81% of the variance of the 36-item version) has a mean response time of 5 minutes and was chosen to minimize the questionnaire response time, since some of the study participants have limited attention span. The final score for each questionnaire was obtained using the simple score which, according to the WHODAS 2.0 manual, is sufficient to describe the level of functional limitations. In this version of the questionnaire, the score can range from 12 to 60, and the higher the score, the lower the level of functionality of the individual.

Physical fitness

To assess physical fitness, 3 tests were performed. First, to assess upper limb strength, the handgrip test was performed using a digital dynamometer (CAMRY EH101). The test reliability and validity were confirmed by Cabeza-Ruiz (2019) and Oppewal and Hilgenkamp (2020) and the protocol used was recommended in the Brockport Fitness Test Manual (Winnick & Short, 2014). The second test, TUG - timed up and go, from the Fullerton battery of tests (Rikli & Jones, 1999) and validated for the IDD population (Cabeza-Ruiz et al., 2019), was used to assess speed, balance, and agility, which aims to record the time it takes the participant to get up from a chair, walk 2.44m, and sit down again. The last test, to assess lower limb strength, was the Sit and Stand test from the Fullerton battery of tests (Rikli & Jones, 1999), validated for IDD populations (Cabeza-Ruiz et al., 2019), which aims to record the number of times the individual can rise and sit within 30 seconds.

Procedures

The two versions of the WHODAS 2.0 questionnaire were sent to the institutions, completed by each patient and respective caregiver/technician and returned in the first session of the physical exercise program. Each institution ensured the necessary support to participants to fill out the questionnaire (self version) and ensured that the proxy version was filled out by an element with great proximity to the participant's daily life and had the opportunity to observe them in various life contexts (i.e., for at least six months). At the beginning of the questionnaires, sociodemographic questions were asked, such as gender, age. Consent for data collection and processing was also requested, and confidentiality was guaranteed by the researcher and project collaborators.

Functional fitness tests were performed at the beginning and at the end of the intervention program. For handgrip test the individual should stand with feet slightly apart, holding the dynamometer at thigh level without touching the body. The individual should squeeze the dynamometer as hard as they can without holding their breath (to avoid the Valsava maneuver). The test was repeated twice for each hand and the most favorable value of each hand is considered. For TUG The test begins with the participant sitting in the chair, with their back straight, feet shoulder-width apart, and hands on their thighs. At the starting signal, the participant gets up from the chair, walks to the cone positioned at 2.44m, circles around it, and then sits back in the chair. The timer starts at the start signal and ends when the participant sits down. The Sit and Stand test begin with the participant sitting in a chair, with a straight back, feet shoulder-width apart, and upper limbs crossed at the chest. At the starting signal, the participant rises from the chair to an upright position and returns to the initial sitting position and so on for 30 seconds. The upper limbs must not assist the movement. After the 9-week intervention, questionnaires were once more requested from each institution. All the tests were carried out by exercise professionals who were completely blind to the aim of the study.

Intervention

All practice sessions are conducted and supervised by

two instructors who had graduated in sports science and expertise in working with people with disabilities, especially those with IDD. Both instructors encourage participants to complete exercises and provide guidance and demonstrations. Feedback has been adjusted to ensure correction and safety during the execution of the exercises.

The intervention program consisted of one session of physical activity per week, of 60 to 90 minutes, for 9 weeks. The first session was dedicated to introductory games with the objective of familiarizing the participants with the space, material, and coaches, and to understand what each user is, or is not, capable of doing in terms of motor and cognitive skills. The games consisted of small recreational tasks carried out individually or in pairs, such as the caterpillar game (where the "caterpillar" grows as it catches the participants). The remaining 8 sessions were organized to have two sessions for each general theme: volleyball, basketball, traditional games, and soccer. According to the theoretical assumptions of Bompa & Haff (2009), the general structure of the sessions consisted of an initial introduction/instruction and warm-up (10 minutes), fundamental part (40 to 70 minutes) and return to calm/final instruction (10 minutes), and the fundamental part of the class was further divided into two parts: an introductory part to the sport with more playful games and a part with more specific exercises of the technique of the sport to be worked on. The sessions took place in a logic consistent with the methodological and didactic principles. The aim was to progress from analytical situations related to individual technique (technical gestures of the sport) to competitive situations in reduced group (1x1 or 2x2) to extended group until the formal game (even if adapted from the point of view of content or rules) was foreseen. From a practical point of view, for example in the volleyball sessions, the participants began by manipulating a balloon, without dropping it, and ended with a formal game. As far as the sessions of traditional games are concerned, these took place according to the book: "*Lançar e acertar, diverte-te a jogar!*" (Matos et al., 2022). This book includes traditional games from various countries in the European Union.

Participants were encouraged and monitored at the intensity level to practice the session using validated measures such as the Talk Test (Reed & Pipe, 2014) and the Borg scale (Borg, 1998). It was intended that the participant would increase their intensity from 6 to 7 (moderate intensity) on the perceived exertion scale to scores of 7 and 8 (moderate to vigorous) on the Borg Scale as the intervention program progressed.

Statistical Analysis

A descriptive analysis of the collected data was performed using measures of central tendency and dispersion, including the 95% confidence interval.

To calculate the normality of the data, the Shapiro-Wilk test (for $N<50$) was used, in which no normality of distribution was found in all variables, so non-parametric tests were performed. Subsequently, Wilcoxon hypothesis tests were performed to compare the two moments (before and after the physical exercise program) for the different variables under study. The effect size η^2 (suitable for the *Wilcoxon* test, allowing comparison of two paired groups) was calculated and the assumed reference values were: "small" effect ≥ 0.1, "medium" effect ≥ 0.3, and "large" effect ≥ 0.5 (Cohen, 1988; Fritz et al., 2012)

The significance level for rejecting the null hypothesis was set at 5% and the analysis was performed in IBM SPSS.

Results

Table 1 shows the descriptive statistics of the variables studied, at each of the moments (pre-intervention and post-intervention. Regarding functionality and autonomy variables (evaluated with WHODAS 2.0 questionnaires), we observed that the value of the self-administered test is higher than the proxy-administered test at both moments.

Table 1.
Summary of the descriptive statistics

Variables	M_{pre}	M_{pos}	SD_{pre}	SD_{pos}	$Median_{pre}$	$Median_{pos}$	IQ_{pre}	IQ_{pos}
WHODAS 2.0 (Self)	22.67	18.83	7.956	8.03	20.5	16	12	15
WHODAS 2.0 (Proxy)	21.83	15.5	0.7.39	4.03	21	15	13	6
Handgrip – right	24.98	21.70	12.0563	9.07	21.85	27.75	16.8	15.9
Handgrip – left	22.45	20.70	11.839	12.99	17.85	28.65	15.2	23.4
TUG	7.61	6.07	3.56808	0.61	14	6.03	5.49	89
Sit to Stand	13.72	14.00	4.612	3.14	14	16.5	8	6
BMI	26.34	26.55	5.5036	2.95	24.80	26.1	7.6	5.1
Muscle Mass (kg)	46.09	43.80	8.6613	10.22	42.95	50.55	14.3	19.9

Notes: M = mean; SD = standard deviation; IQ = interquartile range;

Table 2.
Comparison between the two moments (pre-intervention and post-intervention).

	z	*p*	η^2
WHODAS 2.0 (Self)	-2,19	0,03*	0,282 (small)
WHODAS 2.0 (Proxy)	-2,64	0,01*	0,410 (medium)
Handgrip – right	-1,70	0,09	0.17 (small)
Handgrip – left	-0,21	0,83	0.003 (small)
TUG	-0,73	0,46	0.012 (small)
Sit to Stand	-0,82	0,41	0.01 (small)
BMI	-2,08	0,04*	0,254 (small)
Muscle Mass (kg)	-1,94	0,05*	0,221 (small)

Notes: *z* = t test value; *p* = level of significance; * $p \leq 0,05$; η^2 = eta square.

Table 2 presents the comparison between the two moments (pre-intervention vs post-intervention) regarding the variables mentioned above. At time 1 (post-intervention), significant differences are observed in the functionality and autonomy variables (WHODAS 2.0 Self and WHODAS 2.0 Proxy) and in body composition (BMI and muscle mass). Regarding the functionality and autonomy variables, it can be observed a higher decrease in the proxy-administered

version of the questionnaire, compared to the self-administered version. There are no statistically significant differences in any of the physical fitness variables (handgrip, TUG and Sit to Stand) between the two moments.

Discussion

The aim of this study was to analyze the effects of a physical exercise program on the levels of autonomy, functionality in ADL, and physical fitness of people with IDD.

Regarding moment 0 (pre-intervention), considering BMI values, females have a slightly higher mean value (26,21 ± 6,29) compared to males (24,72 ± 3,91) in the population studied. Therefore, this sample lies in the overweight category, in line with most of the literature, in the sense that the population with IDD has unfavorable BMI values (Emerson et al., 2016), indicating a higher risk of developing health conditions such as diabetes, dyslipidemia, hypertension and cancer (American College of Sports Medicine, 2021).

Both handgrip tests (right hand and left hand) show higher mean values for males (32.81 ± 14.94 and 28.68 ± 16.08, respectively) compared to females (19.02 ± 5.50 and 17.10 ± 6.67, respectively), showing values below the 5th percentile for males and females for the average age of the study population (American College of Sports Medicine, 2021; Wong, 2016). The differences observed in handgrip tests between males and females are consistent with the literature, namely that adult females in general achieve levels around 57 to 73% of male handgrip values (Puh, 2010). These differences can be explained by the much higher levels of testosterone in males compared to females, one of the hormones responsible for protein synthesis and thus muscle growth and strength development (Bofosa et al., 2019).

According to Rikli and Jones (Rikli & Jones, 1999), the mean values of both the TUG test (7.60 ± 3.42) and Sit to Stand test (13.57 ± 4.53) are outside the risk zone (>9 and <8, respectively), however, these reference values consider adults older than 60 years. Since sub-tests in the Rikli and Jones battery are validated for the IDD population, there is a need for the creation of reference values. However, reference values for the elderly population were still considered for the study population, as the literature indicates that people with IDD experience premature aging (McKenzie et al., 2017).

The results observed in this study are consistent with the literature indicating that individuals with IDD have reduced levels of physical fitness (Yan et al., 2022) and an increased likelihood of developing health conditions such as obesity, diabetes, dyslipidemia, and/or hypertension (American College of Sports Medicine, 2021; Gawlik et al., 2018; Shin & Park, 2012). These reduced values of all physical fitness can affect their independence and success in carrying out the tasks of daily living.

After 9 weeks of intervention, there were significant improvements only in the functionality and autonomy variables and no significant improvements in any of the fitness variables. These results can be explained according to the self-determination theory (Ryan & Deci, 2017), that states that the human being has three basic psychological needs (autonomy, competence and relatedness) which are highly correlated and interdependent (Rodrigues & Monteiro, 2021). Since the physical exercise/adapted sports programme applied in this study had a big socialization component, we can assume that a positive effect in the need of relatedness could have caused positive effects in all three basic psychological needs. Thus, a better satisfaction perception of relatedness needs could have also led to a better perception of competence and autonomy because of exercise/sports practice, thus showing improvements in functionality perception, not only by the individuals themselves, but also by their caretakers.

As contrasting to the initial expectations and what was observed in previous studies (Jacinto et al., 2023a), there were significant improvements in body composition, more specifically in BMI and muscle mass variables. The results observed in this study were also observed by other authors (Şavkin & Aslan, 2017; Yu et al., 2022), even though the literature is inconsistent regarding the effects of physical activity in body composition (Bouzas et al., 2019; Shin & Park, 2012; Yan et al., 2022; Yu et al., 2022). Farias-Valenzuela et al. (Farías-Valenzuela et al., 2022) observed significant improvements in muscle mass, but not in BMI. This inconsistency between different studies can be explained by differences in methodology regarding the physical practice volume per week (session length and number of sessions per week), the duration of the intervention programmes and the nature of the exercise programmes (ex.: aerobic training, strength training, concurrent training, pilates, etc.).

In a study conducted by Stanish & Temple (Stanish & Temple, 2012) there were no significant results in muscular strength after a 15-week intervention programme with 2 sessions per week, similarly to the results observed in the present study. Therefore, the duration of this intervention programme (9 weeks) and the weekly volume of physical activity practice (60-90 minutes) seem to not have been enough to show significant improvements in the physical fitness variables (balance, agility and muscular strength), however, an essential factor to take into account that was not controlled is the amount of physical activity that the participants practice (or not) outside the intervention programme of this study, which may have had influences in the variables analysed. Thus, one hypothesis is that one session per week during 9 weeks may not be enough to show improvements in physical aptitude, since one physical activity session of 60-90 minutes per week does not reach the minimum recommended physical activity doses for people with IDD (American College of Sports Medicine, 2021). Systematic reviews about this subject suggest intervention programmes of ≥10 weeks with 3 to 5 sessions per week of 40-60 minutes each (Farías-Valenzuela et al., 2022; Shin & Park, 2012).

In addition to body composition influence on physical capacities, both variables are predictors of functionality and contribute to increase longevity and quality of life of individuals with IDD. (Oppewal et al., 2014, 2015). In the same sense, unfavorable body composition and physical capacity values are the main predictor for a decline in ADL performance (Oppewal et al., 2014, 2015). Although individuals with IDD depend on others due to cognitive limitations, body composition and physical capacities are also an important aspect for ADLs, which underlines the importance of using physical fitness tests and fitness improvement programs in the care of individuals with IDD. In a similar way, the structure of the physical exercise/adapted sports sessions needs to be taken into account, since the components of physical aptitude that were evaluated (balance, agility and muscular strength) were not specifically worked on during the physical activity sessions, however, the component that was mostly worked on during the physical activity sessions (cardiorespiratory capacity) was not included in the evaluation process, therefore, no conclusions can be made about the effect of the intervention programme on this physical aptitude component.

Limitations and future recommendations

Despite the promising results, one limitation of this study is related to the sample size being relatively small, thus, any results and conclusions taken from this study are only valid for the sample analysed and cannot be generalised to the rest of the population with IDD. On the other hand, as far as the administration of the questionnaires is concerned, it was up to each institution was responsible for ensuring the support needed by the participants to complete the questionnaire (self-administered version) and ensure that the proxy-administered version was completed by an element with great proximity to the participant in everyday life, for which we cannot guarantee that this support was provided in the same way or that the proxy-administered version was completed by the same institution element in both evaluation moments (pre and post-intervention). The absence of dietary control throughout the program is also a limitation of the study.

Regarding the structure of the sessions in the intervention programme, it is necessary that future studies related to this subject include evaluation and work of other competences and physical and motor capacities, namely muscular strength, balance and flexibility (important capacities for the maintenance of functional independence). Future studies should also explore different intervention options related to space (interior, exterior, gym, etc.) and intervention type (aerobic training, strength training, concurrent training, etc.), to compare which is the most effective in improvement and maintenance of physical fitness of people with IDD. The lack of significant results in physical fitness may also be directly related to the intervention program since the planning of the sessions does not directly influence physical capacity.

Although there are significant differences between both evaluation moments in some variables analysed in this study, it is necessary that institutions could offer to their subjects a more frequent and consistent physical activity practice so that the positive effects of exercise in physical fitness can be observed and constantly maintained, since individuals with IDD with a better physical fitness have higher probability of being more independent in ADL.

Conclusions

The sample of this study shows a mean BMI value in the overweight category for females, however the mean value for males is slightly below the threshold. In addition, the handgrip values for both genders show below the 5th percentile, presenting reduced levels of physical fitness in relation to the cut-off values.

A 9-week adapted physical exercise/sports program (with one session of 60 to 90 minutes per week) seems to be effective in improving functionality and the perception of autonomy in ADLs and in improving body composition (BMI and muscle mass) for this sample; however, no significant differences were observed in the physical fitness variables.

Acknowledgements

The authors would like to thanks to all the participants who took part in the study.

Raul Antunes, Diogo Monteiro, Rui Matos, Filipe Rodrigues, Nuno Amaro and Miguel Jacinto are integrated members of the Research Centre in Sports Sciences, Health Sciences and Human Development (CIDESD), which is supported by National Funds by FCT - Portuguese Foundation for Science and Technology, under the project UID04045/2020, and would also like to thank the following institutions.

Funding

This research was funded by the Portuguese Foundation for Science and Technology, I.P., Grant/Award Number UID04045/2020.

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