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Social Preferences for Learning in Physical Education among Secondary Students with Attention Deficit/Hyperactivity Disorder (ADHD)

Preferencias Sociales de Aprendizaje en Educación Física entre Estudiantes de Secundaria con Trastorno por Déficit de Atención/Hiperactividad (TDAH)

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Abstract

This study examined the effect of a 12-weeks curriculum-based PE (Physical Education) program on social preferences for learning in PE in Spanish secondary students with attention deficit/hyperactivity disorder (ADHD) and typical development (TD). The sample consisted of 13 students with ADHD (9 boys and 4 girls, aged 15 years) and 13 students (9 boys and 4 girls, aged 15 years) without attentional problems (TD). Before (pretest) and after (postest) the PE program, all participants completed the Graupera/Ruiz Scale of Social Interaction Preferences in PE Learning (GR-SIPPEL) which analyzes four learning preference dimensions: cooperation, competition, fellowship, and individualism. After the PE program, the ADHD students showed an increase in their cooperation, competition, and individualism scores. They did not show a significant increase in the fellowship dimension. A curriculum-based PE program could influence the social preferences for learning in PE by being an excellent way to promote their relationships with other classmates.

Key words: Adolescents; Physical education; Attention; Hyperactivity; Learning problems

Resumen

Este estudio examinó el efecto que tuvo la aplicación de los contenidos curriculares de Educación Física (EF) a lo largo de 12 semanas, sobre las preferencias sociales para aprender en Educación Física de estudiantes de secundaria españoles, con trastorno por déficit de atención/hiperactividad (TDAH) y con desarrollo típico (TD), respectivamente. La muestra estuvo compuesta por 13 alumnos con TDAH (9 chicos y 4 chicas, de 15 años) y 13 alumnos (9 chicos y 4 chicas, de 15 años) sin problemas de atención (TD). el efecto que tuvo la aplicación de los contenidos curriculares de Educación Física (EF) a lo largo de 12 semanas, todos los participantes completaron la Escala Graupera/Ruiz de Preferencias de Interacción Social en el Aprendizaje de EF (GR-SIPPEL) que analiza cuatro dimensiones de preferencia de aprendizaje: cooperación, competencia, afiliación e individualismo. Después de la aplicación de los contenidos curriculares, los estudiantes con TDAH mostraron un aumento en sus puntajes de cooperación, competencia e individualismo. No mostraron un aumento significativo en la dimensión afiliación. La aplicación de los contenidos curriculares de EF, podría influir en las preferencias sociales del alumnado con TDAH, para aprender en EF, pues se trata de una excelente manera de promover sus relaciones con otros compañeros.

Palabras clave: Adolescentes; Educación física, Atención; Hiperactividad; Problemas de aprendizaje.

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Introduction

Attention-deficit hyperactivity disorder (ADHD) is one of the most commonly diagnosed childhood psychiatric disorders (Barnard-Brak et al., 2011; Tarver et al., 2014). Children with ADHD are typically characterized by developmentally inappropriate levels of attention, hyperactivity, and impulsivity that cause significant impairment in daily activities such as excessive motor activity, difficulty taking turns in PE classes, excessive talking, interrupting others, etc. (Bowling et al., 2017). Bell et al. (2010) also considered that children with ADHD may show emotional disorders. These researchers found that among Spanish preschoolers, the prevalence of this disorder was 5.4%, lower than in the study of Catalá-López et al. (2012) where these researchers found a 6.8% prevalence in Spanish children and adolescents. The hyperactive-impulsive and combined types (is where both inattention and hyperactivity/impulsivity are present) are the most prevalent ones. Furthermore, these types are related with a wide range of psychosocial problems such as participation and social preferences for learning in school (Suárez-Manzano et al., 2018).

Moreover, even though methylphenidate is the first strategy to treat ADHD (Mahon et al., 2012), treatments based on physical activity have recently emerged (Bowling et al., 2017; Silvia et al., 2015; Suárez-Manzano et al., 2018). Likewise, recent studies have shown that children with ADHD who performed structured and curricular exercise in PE classes, were associated with an improvement in processing speed, working memory, planning and problem solving (Chang, 2012; Chuang et al., 2015; McClain et al., 2018). These benefits allow children with ADHD to improve their adaptation to norms, social skills, self-esteem, care, and feelings of support that are significantly related to the improvement of their participation and social preferences for learning in PE classes (Gapin et al., 2015; Harvey and Reid, 2005; Jensen and Kenny, 2004).

Currently, a large number of scientific studies about the social interaction and learning preferences in PE exist (Ruiz et al., 2010). Likewise, the learning process in PE is a complex psychosocial phenomenon in which elements such as the students and their social preferences for learning, the teacher, the teaching and learning structure, and the affective and emotional climate interact with each other (Newell, 1991). In terms of social preferences for learning in PE, there are four dimensions: cooperation, competition, fellowship, and individualism (Ruiz et al., 2010).

Considering the nature of cooperative learning structures, it is worth highlighting as the main characteristic, that all members of a group have the same objective. Therefore, to achieve this shared objective, team members (whose distinctive characteristics are based on heterogeneity), offer mutual support and help, which establish a small learning community (Johnson and Johnson, 1999).

Cooperative learning, in particular, has a broad base of support among educators and researchers, who have documented increased motivation and academic gains in every academic subject area, grade level, and type of school, especially when certain group elements were present (Johnson and Johnson, 1999; McMaster and Fuchs, 2002). There is some evidence that students with ADHD, who were in schools with cooperative learning, found more friendships than in traditional schools (Stevens and Slavin, 1995). Social benefits are generally student perceptions or attitudes such as social cohesion, acceptance, desirability as a work partner, and task-related behavior such as giving and receiving help and task resources (Gillies, 2003; Gillies and Ashman, 2000).

Competition, as a social dimension for learning within PE, allows students to establish superiority or supremacy while participating in some PE activities (Ruiz et al., 2010). It can likewise be understood as the desire to win in interpersonal situations, linked to a motivational climate oriented to the ego (Weinberg and Gould, 2003), or as a social behavior that is linked to cooperation, job satisfaction and personal growth (Martin and Larsen, 1976; Rychman et al.,1990). However, individualism as a social dimension is characterized by individual progress due to the student not taking the results of his/her peers into consideration (Ruiz et al., 2010). Likewise, there is a relationship between individualism and extrinsic motivation with goals associated with obtaining a social assessment and external rewards. That will undoubtedly highlight the students in PE from the rest of their peers, seeking the reward from them or PE teachers (Hoza et al., 2002).

Moreover, it would be important to talk about fellowship as a social preference for learning in PE because it helps to develop teamwork and cooperation among students (MacPhail et al., 2004) apart from making group decisions and working towards common goals (Metzler, 2005).

Although in Spain there are some studies that analyze social interaction preferences for learning in PE among Spanish Secondary students (Ruiz et al., 2010), there are no studies that analyze it among Spanish Secondary students with ADHD.

The aim of this study was to determine how a 12-weeks curriculum-based PE program affected the social preferences for learning in PE class among students with ADHD and with TD. The 12 weeks were needed because the curricular contents of the PE program, were developed during a school term which duration was three months. It is also important to highlight that during this period, the PE curriculum of 3rd year Spanish secondary education was developed. Thus, all taught content was not specifically designed to develop the social participation and interaction for learning of these students.

Material and methods

Participants

The participants recruited for the study included two groups of students (18 boys and 8 girls) with ages ranging from 15 to 16 years. Group 1 involved children diagnosed with ADHD (n=13, 9 boys and 4 girls) and Group 2 involved TD children without ADHD (n= 13, 9 boys and 4 girls). The bias error was controlled by choosing the same number of boys and girls for each group. These participants were drawn from one public Spanish Secondary School in Madrid (Spain).

Students with ADHD were recruited from local pediatric services and the secondary school's Department of Orientation. The following are the criteria for the inclusion of the students in this study: 1. children had a formal diagnosis of ADHD made by a pediatrician who followed the criteria for ADHD as defined in the *Diagnostic and Statistical Manual of Mental Disorders (*DSM-V) (APA, 2013). 2. Children diagnosed with major psychiatric disorder such as cerebral palsy, autism spectrum disorder, or intellectual disability were excluded. The students in Group 2 were recruited from the student body (3rd year of Secondary) belonged to the same secondary school. None of the students in Group 2 showed evidence of ADHD. None were reported to be on any medication. This study respected the postulates established by the Declaration of Helsinki and the ethical standards suggested to research in the field of sports science (Harriss and Atkinson, 2013). The study was approved as a part of a doctoral thesis. Children and their parents signed informed consent forms.

Instruments

The *Graupera/Ruiz-Scale of Social Interaction Preferences in Physical Education Learning (GR-SIPPEL)* (Ruiz et al., 2004; Ruiz et al., 2010) was used to establish the students' preferences for cooperative, competitive, affiliative, and individualistic learning in PE classes.

The scale is made up of 28 items divided into four dimensions of seven items each: cooperation, competition, fellowship, and individualism. Each item was presented with a four point. The Likert-like scale ranges from 1 *as totally disagree* to 5 *as totally agree.*

Examples of these four dimensions are: (a) competitive dimension: "I like to do things better than the others", (b) cooperative dimension: "I like to say and do things that help others", (c) affiliate dimension: "I like to work in a group that wants me to be with them", and (d) individualized dimension: "I get better grades when I work alone" (Ruiz et al., 2010). Reliability coefficients (Ruiz et al., 2010) were 0.77 (CI 95%: 0.76–0.78) for cooperation; 0.70 (CI 95%: 0.69–0.71) for fellowship; 0.83 (CI 95%: 0.83–0.84) for competition; and 0.77 (CI 95%: 0.76–0.78) for individualism. All coefficients of this questionnaire demonstrated a good internal consistency, being equal to or higher than 0.70 (De Vellis, 2003). All items' homogeneity (corrected correlation item-scale) showed an index higher than 0.30.

Curriculum-based PE program

The curriculum-based PE program were developed based on PE Spanish Curriculum (Legislative Decree number 48/2014). It was characterized by different curricular models: perceptual-motor, physical conditioning, and personal and social development. Learning environments encouraged the development of self-esteem, autonomy, cooperation, and tolerance, based on fair play. The teaching styles that have been applied by teachers depended on the nature of the content taught. PE teachers try to strike a balance between traditional instruction and the use of styles that promote active student participation in order to turn PE spaces into friendly environments and the courses into learning experiences. The Table 1 shows some methodological characteristics of the curriculum-based PE program.

Table 1. Curriculum-Based PE Program: Characteristics

PE content	Teaching style	Example of activity
Fitness	The teacher makes all the decisions (CS).	Circuit training: in groups of 6, students have to work on different stations their endurance, speed and strength.
Track & Field	Teacher demonstrates the task and set up the opportunity for learners to practice and develop skills at their own pace (PS).	High jump: developing games and teaching students how to high jump.
Basketball	Students work together in pairs and take turns observing and giving feedbacks to each other using performance criteria which was provided by the PE teacher (RS).	Ball handling and dribbling drills; passing and shooting games (i.e.: ten passes game).
Foot orieenteering	PE teacher plans a series of questions and tasks that direct students towards discovering a pre-determined answer to the problem or learning target. (GD).	Mirrors: students place a marker in the grounds and mar kits location on a map. They then return and swap maps with someone else. The other student has to find their marker.
Badminton	This is the epitone of independent learning as students take full responsability for their own development and the learning process. (S-C).	Increasing the range: in fours, on a half court the pairs are to stand one in-front of each other and accurately replicate and perform rallies with the other pair-hitting the shuttle over different ranges.
Acrosport	The students decide on the initial area of focus and design their own learning program in relation to their cognitive and practical ability (LI).	Acrosport challenge: in pairs make as many beautiful human figures as you can for two minutes.

Note. CS: Command Style; PS: Practice Style; RS: reciprocal style; GD: Guide Discovery; S-C: Self-Check; LI: Learner Initiated (Mosston & Asworth, 2002).

Moreover, PE teacher tried to avoid students being stationary for long periods waiting their turn to practice increasing the amount of time that the majority of students were physically active. Furthermore, PE teacher used to circulate close to where students were working to offer feedback and demonstration when necessary. He also reinforced that everyone should try to work at their own level at an intensity level felt comfortable. PE teacher also gave the students a wide range of opportunities for individual and small group practice through thoughtful use of equipment.

The PE lessons have been designed to promote high levels of physical activity that will improve health-related fitness, promote movement skills that add to success and enjoyment in physical activity, and encourage positive socialization. The curriculum-based PE program was divided into learning units typically 2 weeks (4-5 lessons) in length. A standard lesson lasts 55 minutes and had three parts: a general warm-up (8 minutes) main part (40 minutes) and cool down (5 minutes). Health-related fitness activities target the development of muscular strength and endurance, cardiovascular endurance, flexibility, and locomotor skills. In this segment, were included circuit training, fartlek, running and jumping games (track & field).

Skill-related fitness activities target the development of generalizable manipulative and sport-related skills. This part of the lesson included three sports units that had the most potential for promoting cardiovascular fitness and for generalizing the child's community (e.g. basketball, badminton and foot orieenteering). Other low-active game, such as acrosport make them more active to encourage cooperative work.

Finally, the 12 weeks curriculum-based PE program was applied between the second week of January (pretest) and the week of March before Easter holydays (postest). Therefore, the were not any vacation or holydays that could have interfered in the curriculum-based PE program. During the curriculum-based PE program, the students had 1,320 minutes of practice time divided into two PE lessons a week (55 minutes per lesson). The Figure 1 shows the overview of the 12-weeks curriculum-based PE program:

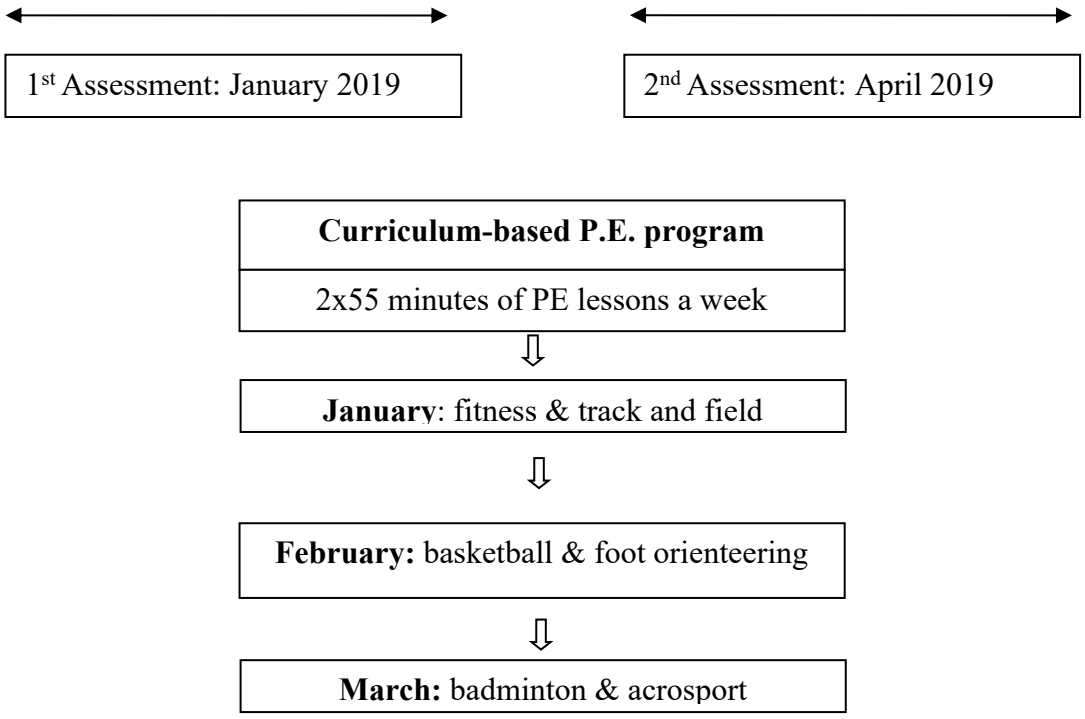

Figure 1. Overview of the 12-week Curriculum-based P.E. Program

Procedures

As the main researcher of this study, the PE teacher from the secondary school where this study was developed/took place, administered the test.

Students were assessed in the gymnasium and PE settings before and after the 12 consecutive weeks of curriculum-based program. The students were informed about the instructions and were asked to be honest in their responses. Students were instructed to report their learning preferences in PE classes. They spent about 15 minutes completing the scale. In addition, the students were reminded that participation was voluntary and that if they wanted to leave the class and wait outside until after the test was finished, they were free to do so (Ruiz et al., 2010).

Analysis

Normal distributions were verified with the Shapiro-Wilk test. The normality requirement was not met; therefore, a non-parametric statistical analysis was performed. *Mann-Whitney U* and the *Wilcoxon* test were performed to compare groups and changes within each group in the initial assessment and the assessment taken with a 12-week interval.

The effect size (ES) was calculated as $\eta 2 = Z2 / (N - 1)$ and $\eta 2 = Z2 / N$, where Z indicates the *Mann-Witney U* test statistic, W^+ indicates the *Wilcoxon* test statistic, and N indicates the total number of samples in all groups examined or the number of observations, respectively (Morse, 1999). Their interpretation was based on the following criteria: $0.01 \leq ES < 0.06$ small effects, $0.06 \leq ES < .014$ moderate effects, $ES \geq 0.14$ large effects (Cohen, 1988). The statistical software package SPSS 21.0 (IBM Corp., Armonk, NY, USA) was used. The significance level was set at .05 and to control for Type I error, the significance level was divided by the number of comparisons. A result was considered to be significant if $p < 0.017$.

Results

Table 2 presents the descriptive data for ADHD students (Group 1) and for TD children (group 2) in the different GR-SIPPEL dimensions for the two assessments. Both in the initial and final assessment, the ADHD group showed significantly higher scores than the TD group in the competition dimension ($Z = 2.28$, $p = 0.013$, $\eta^2 = 0.21$ for initial assessment; $Z = 4.11$, $p < 0.001$, $\eta^2 = 0.68$ for final assessment), fellowship dimension ($Z = 4.38$, $p < 0.001$, $\eta^2 = 0.77$ for initial assessment; $Z = 4.38$, $p < 0.001$, $\eta^2 = 0.77$ for final assessment), and individualism dimension ($Z = 4.09$, $p < 0.001$, $\eta^2 = 0.67$ for initial assessment; $Z = 4.38$, $p < 0.001$, $\eta^2 = 0.77$ for final assessment). The ADHD group showed significantly lower scores in cooperation ($Z = 3.87$, $p < 0.001$, $\eta^2 = 0.60$ for initial assessment; $Z = 3.96$, $p < 0.001$, $\eta^2 = 0.63$ for final assessment).

Table 2. Descriptive Statistics (Mean and Standard Deviation) for the GR-SIPPEL Dimensions of the Student Groups.

	Initial				Final			
	ADHD		TD		ADHD		TD	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cooperation	3.22*†	0.15	3.65	0.22	3.36*	0.15	3.68	0.12
Competition	3.10*†	0.26	2.87	0.17	3.27*	0.25	2.84	0.14
Fellowship	3.32*	0.20	1.80	0.21	3.33*	0.19	1.81	0.19
Individualism	2.44*†	0.22	1.88	0.19	2.60*	0.16	1.86	0.12

Note. ADHD: Attention Deficit/Hyperactivity Disorder; TD: Typical Development.

Only the group with ADHD (Group 1) showed an increase in their scores after 12 weeks of PE classes in the cooperation dimension ($Z = 2.24$, $p = .013$, $\eta 2 = 0.19$ for ADHD group; $Z = 0.68$, $p = 0.250$ for group TD), competition dimension ($Z = 2.32$, $p = 0.011$, $\eta 2 = 0.21$ for ADHD group; $Z = 0.69$, $p = 0.490$ for TD group), and individualism dimension ($Z = 2.66$, $p = 0.004$, $\eta 2 = 0.27$ for ADHD group; $Z = 0.50$, $p = 0.307$ for TD group). Fellowship dimension scores were unchanged in either group ($Z = 0.45$, $p = 0.327$ for ADHD group; $Z = 1$, $p = 0.159$ for TD group).

Discussion

The present study sought to analyze 1) the social interaction preferences for learning in PE among Spanish secondary students with ADHD and with TD and 2) the effect of a 12-week curriculum-based PE program on both groups of students (ADHD and TD). Results indicated that: (1) Before and after the PE program, students with ADHD scored higher in competition, individualism, and fellowship dimension scores than students with TD; (2) Before and after the 12-week of curriculum-based PE program, students with ADHD scored lower in cooperation dimension than their peers with TD; (3) After the 12-week of curriculum-based PE program, only the students with ADHD increased their scores in cooperation, competition, and individualism dimension; (4) After the program, student groups increased their fellowship dimension scores. Students with ADHD are characterized by their wish to work in a group to hide their failures and thus feel sheltered, even if it is not motivated by the task (Hoza et al., 2015). In this way, their anxiety about error is diminished, thus helping them to feel socially accepted (Daley and Bichwood, 2010). Therefore, it could be one of the reasons why students with ADHD scored higher in the fellowship dimension than their peers with TD (before and after the 12-weeks of curriculum-based PE program). Likewise, it is well-known that students with ADHD are usually exposed to social rejection problems in school, which may hinder their inclusion in cooperative environments (Brown et al., 2013; Moore et al., 2017). This would explain the cooperation dimension results because students with ADHD scored less than students with TD (before and after the 12-weeks of curriculum-based PE program). However, after 12 weeks of the curriculum-based PE program, the results supported those of some authors (Barret et al., 2016; Dobbins et al., 2013; Dyson, 2010; Orlick, 2013) whom expressed that the curricular contents characterized by cooperative learning structures could benefit students with ADHD in social and pedagogical terms. Likewise, Greenspan et al. (2019) showed that PE context is a good environment to work and develop social cooperative skills. It may be possible to say that the improvement in the physical activities may cause students to have more feelings of competence and success during educational situations and daily activities. This positive self-evaluation may encourage the students to participate in group activities and cooperation with peers (Paluska, 2000).

Moreover, the high fellowship levels of the students with ADHD could be another reason why after the program, their cooperation levels increased. Likewise, authors such as MacPhail et al. (2004), and Ruiz et al. (2010), expressed that fellowship in PE classes, in addition to encouraging social relations among students, encourages teamwork and cooperation.

Being with others, feeling others being next to them, competing with others, and being encouraged to cooperate may be strong incentives for children to do physical activity (D´Anna et al., 2021). Through playing, ADHD children see themselves with others, while they are warmly welcomed. Hoza et al. (2015) have found that the formation of a sense of friendship among students participating in sports reduces their behavioral problems. Otherwise, it is curious to observe how the TD group's cooperation levels, despite the cooperative work dynamics established in the curriculum-based PE program, did not improve after this kind of program. This may be attributed to the fact that their fellowship levels were notably lower than the levels shown by their ADHD peers.

In general, cooperative learning structures are more productive in relation to the school's social development than competitive or individualistic learning situations (Johnson et al., 1994; Pühse and Gerber, 2005). Therefore, the TD group competitiveness and individualism levels are lower than their cooperation levels.

Analysis of the literature has shown that the majority of studies have expressed that students with ADHD may be more prone to social problems as related to their low competitiveness, insecurity levels, and perceived motor competence levels (Catalá-López et al., 2012). Furthermore, Ruiz et al. (2010), affirmed that Spanish adolescents preferred cooperative learning structures followed by structures of competition, fellowship, and individualism. Nevertheless, the findings highlight the maintained high levels of competition scored by students with ADHD compared with their peers with TD. Therefore, these findings led us to ask ourselves the following question: How can the students with ADHD are considered competitive in PE classes when they perceive themselves as being not competent in motor and physical skills, and show a certain degree of anxiety about the possibility of making mistakes? It is complicated to answer this question due to the lack of previous research about it. However, Weinberg and Gould (2003) indicated that an isolated trait of competitiveness does not adequately predict how the student will respond to a particular competitive situation, but will depend on other variables, such as the type of activity, teachers, parents, teammates, learning environment, etc. (Remor, 2007; Silva et al., 2013). In the same way, Ohan and Johnston (2002), affirmed that the overvaluation of performance shown by students with ADHD could benefit them by allowing them to obtain a more positive image of themselves (illusory positive self-concept). Likewise, Spitzer and Hollman (2013) support the theory of "inflated self-perception" since they maintained the idea that after offering positive feedback about the students' performance in PE class, students with ADHD were able to offer a more adjusted and realistic self-assessment this fact could affect their learning preferences regarding competitiveness.

Finally, a new finding from this study is that the individualism scores obtained by the students with ADHD were higher than those obtained by the group with TD (before and after the 12-weeks of curriculum-based PE program). According to Hoza et al. (2002), 56% of students with ADHD do not have reciprocal friendships. When students with ADHD make friends, they tend to be of poorer quality and less stable than their peers with TD. Moreover, a study with a group of ADHD students, along 6 months of duration (Normand et al., 2017), found that one in four students with ADHD lost his/her friend. Other authors (Hodgens et al., 2000) expressed that students with ADHD can experience social rejection within a few hours of meeting their peers. In addition, Norman et al. (2017), affirmed that students with ADHD tend to participate more in individual play and sport activities.

Although this study may verify the effects of 12-weeks curriculum-based PE program on social preferences for learning in PE among students with ADHD and without it, some limitations must be considered. First, self-reported data can contain several potential sources of bias. Second, the longitudinal effect; 12 weeks of application of curriculum-based PE program, may not be enough to measure changes or stability over time. Further research is needed to provide evidence of the effectiveness and feasibility of longitudinal and more robust PE programs to improve the social preferences for learning in PE among students with ADHD and without it. Likewise, designed and validated PE interventions are also needed.

Conclusions

This study found that ADHD psychosocial characteristics could not contribute to students' learning and enjoyment in PE classes. However, the application of the curricular PE contents may provoke them to be more competitive, individualistic, and cooperative. Further research would be beneficial to help determine the importance of PE among school children and adolescents in order to avoid a wide range of psychosocial, physical, and emotional problems. Community-based and school classes should be made aware of the importance of PE with particular attention paid to improving the quality of PE classes, attending to the current student´s heterogeneity, and contributing to the ADHD student´s overall development.

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