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Effects of an introductory swimming programme based on aquatic motor games on body and socio-affective self-esteem in 5- and 6-year-olds

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Abstract

This study sought to examine the success of the application of two introductory swimming programmes in enhancing the body and socio-affective self-esteem of 5- and 6-year-olds, and to determine which of these programmes was more effective in this improvement. Both programmes were administered over three months and were designed under the stage approach of the Royal Spanish Swimming Federation. The first was implemented in the control group (31 girls and 27 boys), and the second in the experimental group (29 girls and 23 boys). The experimental group included the application of aquatic games designed to promote cooperative play and children's knowledge of their own bodies. The results showed significant improvements in both types of self-esteem in the experimental group, while only body self-esteem improved in the control group. In the between-group comparison, the experimental group showed significantly more robust results in both types of self-esteem. No gender differences were found. We conclude that the use of motor games oriented towards collaborative games and knowledge of one's own body are more effective in improving both types of self-esteem. Thus, their use is recommended in introductory swimming classes.

Key words

Initiation to the aquatic environment; Traditional Games, Early childhood swimming, Collaborative games.

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Efecto de un programa de iniciación a la natación basado en juegos motores acuáticos sobre la autoestima corporal y socio afectiva en niñas y niños de 5 y 6 años de edad.

Resumen

Este estudio analizó si la aplicación de dos programas de iniciación a la natación conseguía mejorar la autoestima corporal y socio afectiva de alumnos de cinco y seis años, y conocer cuál era más efectivo en dicha mejora. Sendos programas se aplicaron durante tres meses. Los programas se diseñaron bajo el planteamiento de etapas de la Real Federación Española de Natación. El primero se estableció en el grupo control (31 niñas y 27 niños), y el segundo en el grupo experimental (29 niñas y 23 niños). El grupo experimental incluyó la aplicación de juegos motores acuáticos diseñados para fomentar el conocimiento del propio cuerpo y el juego cooperativo. Los resultados mostraron que en el grupo experimental se lograron mejoras significativas de ambas autoestimas, mientras que en el grupo control solo mejoró la autoestima corporal. En la comparación entre grupos, el grupo experimental fue significativamente más eficiente en ambas autoestimas. No se encontraron diferencias en función del sexo. Se concluye que la utilización de los juegos motores orientados al conocimiento del propio cuerpo, y los juegos cooperativos son más eficaces para la mejora de ambas autoestimas. De este modo es conveniente su uso en las clases de iniciación a la natación.

Palabras clave

Iniciación medio acuático; Juego tradicional; Natación infantil, Juego cooperativo.

Introduction

Studies on the effects of swimming programmes for pre-schoolers have reported evidence that swimming is a valuable tool for individuals' holistic development (Quintanilla-Bautista, Simón-Piqueras, León-González, & Contreras Jordán, 2018). This holistic development covers aspects linked to child safety in aquatic environments (Langendorfer, 2011; Langendorfer, Moran, & Stallman, 2018; Moran & Gilmore, 2018), the development of motor skills and competences (Juárez, Osvaldo Rocca, Navandar, & Murcia, 2022; Pratt, Duncan, Morris, & Oxford, 2021; Simón-Piqueras, Prieto-Ayuso, Gómez-Moreno, Martínez-López, & Gil-Madrona, 2022) and factors related to the beneficial effects of such interventions based on salutogenic and personal well-being approaches (McCuaig, Quennerstedt, & Macdonald, 2013; Mittelmark & Bauer, 2022; Willcox-Pidgeon, Peden, & Scarr, 2021).

These improvements in personal well-being range from the establishment of positive social relationships (Löhmus et al., 2022) to variables such as intrinsic motivation (Bozorbaevna, 2020; Sánchez-Oliver, Navarro-Martínez, & Simón-Piqueras, 2018), perceived competence (Barnett, Abbott, Lander, Jidovtseff, & Ridgers, 2022; De Pasquale, De Sousa Morgado, Jidovtseff, De Martelaer, & Barnett, 2021), and self-efficacy (König, Krude, & Muensterer, 2022). However, few studies have been conducted under this approach on the impact of introductory swimming programmes on enhancing self-esteem. This is surprising, since studies in general, and on physical education, show that enhanced personal well-being is a predisposing factor for high self-esteem (Golan, Tzabari, & Mozeikov, 2022; Myers, Willse, & Villalba, 2011; Shillingford & Mackin, 1991).

Self-esteem can be defined as the affective or emotional aspect of how we feel in our personal evaluation (Tabernero, Serrano, & Mérida, 2017). It is a personal conceptualization that is constructed through interaction with the environment, and has affective and evaluative connotations (Mérida, Serrano, & Tabernero, 2015). Self-esteem was initially studied unidimensionally (Rosenberg, 1965), although, following the work of Shavelson, Hubner, & Stanton, (1976), current research predominantly adopts a hierarchical and multifaceted approach, where self-esteem is manifested in numerous aspects of an individual's life, including the academic, social, personal, and physical domains (Rentzsch, Erz, & Schütz, 2022; Shavelson et al., 1976).

In relation to the emotional aspects of learning to swim at an early age, the main emotion that hinders learning is that known as fear of water (Ostrowski et al., 2022). As causes of the appearance of fear of water, authors highlight variables such as age and gender, and physical, motor, mental and social development, as well as environmental conditions in educational practice. The latter include the teacher and their vocabulary (Bisquerra & Filella, 2018), and the teaching methods used (Berukoff & Hill, 2010; Ostrowski et al., 2022; Pharr, Irwin, Layne, & Irwin, 2018; Weiss, McCullagh, Smith, & Berlant, 1998).

In their study, Simón-Piqueras, García López, Fernández-Bustos & Gil-Madrona (2023) report that fear of water is also generated by various factors related to the novelty of the activity, due to the environment in which it is implemented (sensory modifications, changes in body awareness, modification of tonic-postural balance activity) and the students' lack of autonomy, initiative, competence and confidence, thus generating unsatisfactory emotions that lead to fear of water.

Fear of water is gradually overcome as students develop their perceptual motor skills (Quintanilla-Bautista, Simón-Piqueras, León-González, & Contreras-Jordán, 2018), and learn to use their bodies in the water, developing their swimming skills and gaining competence in the aquatic environment (Simón-Piqueras et al., 2022; Stallman, Moran, Quan, & Langendorfer, 2017). Thus, the students' unsatisfactory emotions are replaced by positive ones as they progress in the program and begin to enjoy the activity (Moura et al., 2022; Simón-Piqueras et al., 2022; Vogt & Staub, 2020).

Additionally, as regards methodologies, those that use cooperative motor games foster greater enjoyment, intrinsic motivation, positive emotions and generate better learning outcomes than those based on mere individual motor repetition, given childrens' symbolic and cognitive involvement in the activity (Chatzipanteli & Adamakis, 2022; Gil-Madrona, Carrillo-López, Puebla-Martín, & Morcillo-Martínez, 2022; Simón-Piqueras et al., 2022; Zamorano-García, Gil-Madrona, Prieto-Ayuso, & Zamorano-García, 2018). Cooperative games can be defined as those that demand players act in a group-oriented way, with each participant collaborating with the others to achieve a common goal (Omecaña & Ruiz, 2016). Such games may also be more effective in improving children's self-esteem if they are specifically designed for this purpose.

Learning to swim involves improvements in children's competences, motivations, and personal self-perceptions, as well as in their holistic development. Moreover, it may contribute to their personal well-being. Thus, relating these elements to studies in other areas of sport, physical education, and psychomotor development (Gil-Madrona, 2003) that show that personal well-being is a determinant of high self-esteem, it is not unreasonable to think that swimming might improve the self-esteem of children who learn to swim. Few studies have associated the effect of introductory swimming programmes with the enhancement of self-esteem in young children. Perhaps lies in the fact that since children learn to swim in the early years of life, validated instruments to measure children's self-

esteem in different populations are scarce, in addition to being poorly adapted to the characteristics of such students (Mérida et al., 2015).

The present study is motivated by the lack of research seeking to analyse the impact of introductory swimming programmes on the self-esteem of children at an early age. The aim is to quantitatively analyse whether swimming initiation programmes influence the self-esteem of young children (5- and 6-year-olds years old), and, furthermore, to examine whether a programme with elements designed to improve self-esteem yields better results than a programme focused solely on the acquisition of aquatic motor skills.

Method

Desing

A quasi-experimental design was implemented, since, although pre and post measurements were taken in the two groups of participants (control and experimental), convenience sampling was used for ethical reasons (Ato, López-García, & Benavente, 2013). Two community introductory swimming programmes were used as independent variables, one with methodologies focused on the specific development of aquatic skills, and another that also included adaptations of methodologies based on motor games, in which emphasis is placed on children's knowledge of their own body, establishing relationships through cooperative games, and adaptations of traditional cooperative games to water. Two factors were used as dependent variables: body self-esteem and socio-affective self-esteem.

Participants

A total of 132 5- and 6-year-olds participated in the study ($M = 5.85$, $SD = 0.58$), conveniently selected based on their enrolment in the different courses. For ethical reasons, they were not randomised. Of these 132 children, 22 were lost to the study, either dropping out or declining to participate in data collection. The final sample thus comprised 110 participants. Of these, 46% were boys and 54% girls. Two groups (control and experimental) were formed at two swimming pools in a city in the southeast of Spain. The control group (CG) consisted of 58 participants (31 girls and 27 boys), and the experimental group (EG) comprised 52 (29 girls and 23 boys). Children with motor impairments (5%) and autism spectrum disorder (2%) participated in the programme. None of the participating students had previous experience of the activity.

Each group (control and experimental) was divided into six subgroups and their corresponding swimming teacher. All the participating teachers had university training in sport and/or education. Each teacher was supported by a final-year physical education undergraduate. The principal investigator of this study was responsible for coordinating the teachers.

Instruments

As assessment instruments, we used two factors from the Questionnaire for the Evaluation of Self-Esteem in Childhood (EDINA, in its Spanish acronym), a scale designed and validated for Spanish populations aged between 3 and 7 years. The validation process of this questionnaire yielded a reliability of .70 (Cronbach's alpha). In terms of model fit, the goodness-of-fit index (GFI) showed a value of 0.875 and the adjusted goodness-of fit index (AGFI) was 0.834. Chi-squared was 287.407 with 129 degrees of freedom. Finally, the root mean square error of approximation (RMSEA) indicates the model had a good fit, with an index of 0.072 ($Lo = 0.06$ - $Hi = 0.08$) (Mérida et al., 2015). The full scale consists of 18 items represented by a text statement accompanied by a representative pictogram (Figure 1), with

three response options (yes, no, sometimes), which were coded in the data entry process as 1 (no), two (sometimes) or 3 (yes). The questionnaire comprises four factors (body self-esteem, academic self-esteem, socio-affective self-esteem and family self-esteem).

The dependent variables used in this research were body self-esteem and socio-affective self-esteem. The body self-esteem factor consists of three items that assess how children feel about their bodies. An example of these items would be: "I like my body". In the validation of the instrument, all the items are well explained by the hypothesised construct, as demonstrated by a minimum saturation of .31, and a maximum of .5. The socio-affective self-esteem factor comprises six items that measure how children feel about and value their relationships with other children. Examples of these items include: "I have a good time with other children". In the validation of the instrument, all the items of this scale presented an adequate saturation of .32 to .53, except for two items corresponding to negative aspects of self-esteem (Mérida et al., 2015).

Figure 1.

Examples of items from the EDINA questionnaire. (2), I'm important; (6), I think I'm nice-looking).



The children completed the questionnaire in the first and last two sessions of the programme. As it was administered before the swimming sessions, in the swimming pool itself, the pictograms were laminated and the children marked their answers using circular stickers.

Procedure

The study was implemented in conjunction with an introductory swimming programme organised by the municipal sports authority, from which the necessary authorisations were obtained. Subsequently, informed consent forms were given to the parents at a meeting in which the principal investigator informed them of the details of the programme. The programme was implemented outside school hours.

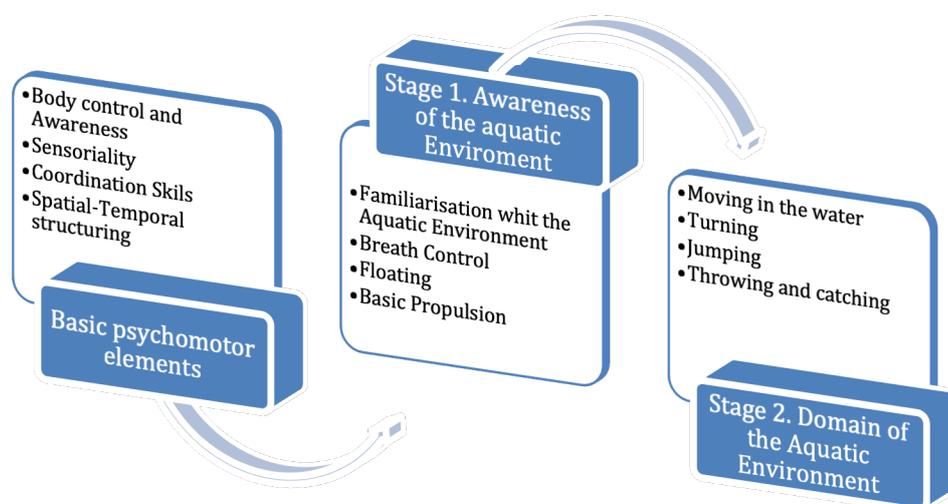
The programme was delivered in 24 sessions over a period of three months, with two 50-minute sessions per week. Each session was divided into three blocks, an initial part, a main part in which most of the motor games were played, and a final part to close the session. The number of games in the session varied from three to five, depending on the objectives and the learning stage of the children. Before starting the programme, a coordination meeting

was held with the teachers and the PE undergraduates, in which the aquatic skills programme to be implemented was established.

As all the swimming teachers participating in the study typically use the approach proposed by the Royal Spanish Swimming Federation (Gosálvez & Joven, 2014), they were not required to make excessive changes to their working methods. This proposal is based on the approach of three learning stages; due to the age of our participants, the aim was for them to have mastered the aquatic skills included in the first two stages by the end of the study. The first stage is called awareness of the aquatic environment and addresses the basic skills. The second stage is called domain of the aquatic environment and consists of more complex skills, which require the full acquisition the aquatic skills included in the first stage (Figure 2).

Figure 2.

Proposed swimming teaching approach by Gosálvez and Joven (2014). Taken from (Simón-Piqueras et al., 2023)



The approach broadly uses exercises based on individual motor repetitions and focused on global motor patterns. The control group intervention was framed under this approach. The experimental group followed the same programme, with two significant variations, as shown below (Table 1). To boost body self-esteem, we introduced games that fostered students' knowledge of their bodies and identification of their body parts, and of those of the others in their group.

To encourage the development of socio-affective self-esteem, many motor games involved the whole group of children in cooperative games, some based on adaptations of traditional field games to an aquatic environment, where all members had an important role to play. This aspect involved significant coordination between the swimming teachers and the undergraduates for the activities to be correctly devised and implemented uniformly across the different experimental subgroups of the experimental.

Table 1.

Brief examples of modifications to activities in the experimental group aimed at improving body and socio-affective self-esteem.

Aquatic skill acquisition stage	Aquatic skill practised	Control Group	Experimental Group
Stage 1	Breathing (Apnea)	Holding on to the edge of the pool with one hand, the children submerge and hold their breath for five seconds	Body knowledge: In pairs, holding on to the edge of the pool with one hand and looking at each other, the children submerge at the same time. One of the children makes a gesture (smiling, blowing out cheeks, sticking out tongue, etc.). The other copies them.
Stage 1	Floating and breathing (exhalation)	The children have to adopt the hedgehog position (legs bent to chest, arms hugging their legs, and holding their breath). In this position, they float and exhale for as long as possible.	Cooperative game, rescue submarines: The aim of the game is to gather objects of different shapes and colours from the bottom of the pool, which they have to rescue. The children pretend to be submarines that submerge by adopting the hedgehog position. The captain of the group chooses the object and colour. They have to exhale in that position to submerge, picking up the objects and bringing them to the surface. They classify the objects.
Stage 2	Jumping (jumping into the water from floating water mats)	The children swim to a water mat, climb onto it, stand up and when they reach the other end, trying to lose their balance as little as possible, they jump feet-first into the water.	Adaptation of the traditional cooperative game “el manteo de Sancho (blanket tossing)”: In a group of five children, the aim is for one of the children to stand on the mat, while the other four hold the mat at each corner, moving it around the pool while trying to avoid the child losing their balance for as long as possible. When the child loses their balance, they have to jump back into the water. At this point, another partner changes places with the child.
Stage 2	Movements on and below the surface. Throwing and catching	Moving with a ball and throwing it at a box. Catching the ball from a classmate and moving it in different positions.	Cooperative game: Touches. The aim of the game is for all the children in the group to manage to touch a ball or similar object as many times as possible without it falling into the water. They will have to move around in different positions, turn around, throw, catch, jump, etc. The object must be large and easy to lift. The common goal is to cooperate with each other to keep the object in the air for as long as possible. They must shout out the number of times they touch it. The game is adapted to different levels of difficulty.

Statistical analyses

The first analysis involved calculating the minimum sample size using the G*Power 3.1 statistical software. The expected effect size (.50), the associated likelihood of error (.05) and the desired statistical power (.80) were considered. A minimum participation of 106 students in two groups of 53 students was required. Subsequently, pre-tests were conducted using the IBM SPSS 28.0 software for Mac. The Kolmogorov-Smirnov test was used to analyse the normality of the sample. Subsequently, we tested for prior differences between groups

and genders using the Mann-Whitney U test for the variables of body self-esteem and socio-affective self-esteem.

Once the programme was finished, the data were analysed using the Wilcoxon test for related samples to see whether there existed significant within-group differences. Subsequently, the Mann-Whitney U test was used to search for between-group differences. Finally, using the G*Power 3.1 programme, we calculated the effect size of each test and the size of the effects obtained (error α .05) to determine whether they were low (\approx .20), medium (\approx .50) or large (\approx .80) (Cárdenas Castro & Arancibia Martini, 2016).

Results

The initial results described above show that the sample did not follow a normal distribution ($p < .01$). There were no significant pre-study differences between the control and experimental groups in the dependent variables of body self-esteem ($U = 1200.00, p > .05$) and socio-affective self-esteem ($U = 1264.50, p > .05$), and neither did we find significant gender differences in the dependent variables of body self-esteem ($U = 1398.5, p > 0.05$) and socio-affective self-esteem ($U = 1223.50, p > 0.05$).

Post-programme, the results of the within-group comparisons (Table 2) showed that the control group had improved body self-esteem ($p < .01$) but revealed no significant differences in socio-affective self-esteem ($p > .05$). In contrast, the experimental group showed enhancements in both body self-esteem and socio-affective self-esteem ($p < .01$). The effect size for all significant differences was large ($> .80$).

Regarding the between-group differences obtained after the programme (Table 3), the results showed that the experimental group had achieved significant improvements in the variables of body self-esteem and academic self-esteem ($p < .01$), compared to the controls. The effect sizes for the body self-esteem scores were moderate ($\approx .50$), and large ($> .80$) for the socio-affective self-esteem variable.

No significant differences were found in the comparison by gender in the control group in the dependent variable of body self-esteem ($U = 416.00, p > 0.05$) nor in that of socio-affective self-esteem ($U = 346.50, p > 0.05$). Neither did we find significant differences in the same comparison for the experimental group in the dependent variable of body self-esteem ($U = 287.50, p > 0.05$) nor in that of socio-affective self-esteem ($U = 247.00, p > 0.05$).

Table 2.
Pre- and post-test within-group comparisons

	N	M	DT	Z	P	(1- β like. err.)
Pre_GC. AEC.	58	1.97	.150			
Post_GC. AEC.	58	2.56	.160	-6.636	<.001*	1.000
Pre_GE. AEC.	52	2.03	.159			
Post_GE. AEC.	52	2.66	.471	-6.033	<.001*	1.000
Pre_GC. AESA.	58	2.17	.290			
Post_GC. AESA.	58	2.25	.158	-1.525	.127	.423

Pre_GE. AESA.	52	2.20	.209			
Post_GE. AESA.	52	2.37	.139	-5,233	<.001*	.992

Note: CG. = control group, EG.= experimental group, BSE.=body self-esteem, SASE.= socio-affective self-esteem, N = number of participants, M=mean, SD = standard deviation, Z= Wilcoxon test *(p<.001) **(p<.01)***(p<.05), (1-β like. Err.) = effect size.

Table 3.

Post-test between-group comparisons.

	N	M	DT	U	P	(1-β like. err)
CG. BSE	58	2.56	.160			
EG. BSE	52	2.66	.471	1043.00	<.001*	.42
CG. SASE	58	2.25	.158			
EG. SASE	52	2.37	.139	939.00	<.001*	.99

Note: CG. = control group, EG.= experimental group, BSE.=body self-esteem, SASE.= socio-affective self-esteem, N = number of participants, M=mean, SD = standard deviation, U= Mann-Whitney U test *(p<.001) **(p<.01)***(p<.05), (1-β like. Err.) = effect size.

Discussion and conclusions

The aim of this study was to determine whether the participation of 5- and 6-year-olds in introductory swimming programmes can help develop their body self-esteem and socio-affective self-esteem. Furthermore, our intention was to ascertain whether the inclusion of aquatic motor games oriented towards body awareness and cooperative motor games might contribute to the enhancement of body self-esteem and socio-affective self-esteem, respectively, to a greater extent than conventional motor games based on individual motor repetitions. Additionally, the study sought to demonstrate that correctly designed swimming initiation programmes would not result in gender differences in the improvement of self-esteem but would produce equivalent effects between girls and boys. To the best of our knowledge, this is the first study to specifically analyse the relationship between introductory swimming programmes, body self-esteem and socio-affective self-esteem in swimmers of these ages.

As regards body self-esteem, the results show that both programmes were effective. The control group and the experimental group both presented significant differences between the initial and the final evaluations. However, the inclusion in the experimental group of motor games designed to develop the children's knowledge of their own bodies, the children in this group obtained moderately better results than the controls. Arguably, however, despite such games not being included in the control group's programme, the teaching of swimming itself often involves the use of specific body segments, underlined by the teachers, such that part of this work is already covered in conventional aquatic motor games (Gosálvez & Joven, 2014; Quintanilla-Bautista et al., 2018).

In beginners' swimming classes, teachers transmit a great deal of information in relation to the learners' bodies and their functions (close your mouth, breathe out through your nose, kick your feet hard, etc.), so it is likely that students learn more about their body in relation to the aquatic environment and how to use it (Varveri et al., 2016). This, added to the rapid learning that occurs in water once fear is overcome (Ostrowski et al., 2022), leads children to feel more competent, autonomous, and confident (Moran et al., 2012; Simón-Piqueras et al., 2022) and body self-esteem is thus improved. Nonetheless, albeit with a moderate effect, introducing specific motor games contributed to better results in the experimental group. The methodical introduction of such games may mean that achieving the desired results depends less on the type of swimming teacher, their experience, and the type of feedback they provide to the student, contributing to these improvements (Feleghi, Abedanzadeh, & Saemi, 2023).

In relation to socio-affective self-esteem, no significant improvements were found in the control group. Such improvements were, however, obtained in the experimental group. In the between-group comparison, significant differences were observed at the end of the programme. The experimental group used motor games in which the children were required to perform tasks designed to encourage the acquisition of aquatic skills in a cooperative way, and this appears to have contributed to their feeling appreciated and integrated in the group, generating positive emotions linked to their social self-esteem. Similar results in terms of positive emotions have been reported in physical education studies using these types of cooperative games (Chatzipanteli & Adamakis, 2022; Gil-Madrona et al., 2022; Zamorano García et al., 2018). In the control group, the swimming teachers likely approached the tasks as individual motor repetitions (Gosálvez & Joven, 2014), which does not encourage cooperation between the children.

Regarding gender comparisons, as expected, we found no differences between girls and boys. Physical education should not generate gender inequality in emotional aspects, although there may be differences depending on maturation (Matarma, Lagström, Löyttyniemi, & Koski, 2020; Veijalainen, Reunamo, & Heikkilä, 2021). In fact, PE has been shown to be an effective tool for combating inequality and enhancing integration (García López & Kirk, 2022a, 2022b). In the case of initiation to swimming, the work involved makes absolutely no distinctions between genders, and so all the children in the study were fully integrated in the activities. Moreover, current swimming costumes for these ages are highly similar, and the teaching material is wholly free of gender connotations. Thus, as expected, the level of self-esteem in both girls and boys advanced in the same way, affected only by the programme used in each study group.

As regards conclusions, in relation to the children's body self-esteem, the use of aquatic motor games aimed at improving body knowledge yielded moderately more robust effects than conventional aquatic motor games. A further conclusion is that the use of co-operative games and adaptations of traditional co-operative games generates significant improvements in socio-affective self-esteem compared to conventional aquatic motor games. A final conclusion is that the introductory swimming programmes implemented generated no differences according to the gender of the participants.

As a limitation of the study, it would have been desirable to randomise the study sample. Another limitation, which may be considered for future lines of research, is that it would have been useful to evaluate the children after each stage of aquatic skill acquisition in order to analyse the evolution of both groups. We know the differences obtained at the end of the programme, but not the speed at which these differences began to occur. This type of measurement would also make it possible to associate the changes generated in the different self-esteem factors of with the changes in aquatic skills.

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