



Sport for Inclusive Education: Effects on Motor and Socio-Relational Skills

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Abstract

Objectives. This exploratory feasibility study aimed to evaluate the applicability and effects on motor and socio-relational skills of an inclusive educational-motor intervention based on the game of bocchia in lower secondary school.

Materials and Methods. The study involved 80 students divided into a control group (n=40) and an experimental group (n=40). In particular, the experimental group participated in a 12-week program, structured into 24 sessions, designed according to the principles of Physical Literacy, Universal Design for Learning, inclusive physical education and cooperative learning. Conversely, the control group followed the standard school physical education curriculum. Both groups underwent baseline, post-intervention, and follow-up assessments using the Movement Assessment Battery for Children – Second Edition (MABC-2) for motor competence and the Social Skills Improvement System (SSIS) for social skills. Additionally, structured observations were conducted throughout the intervention to monitor participation, peer interactions, and inclusive behaviors.

Results. The findings demonstrated the feasibility of the protocol within the school context and indicated potential improvements in motor competence, active participation, and peer relational dynamics in the intervention group.

Conclusions. Therefore, the program based on bocchia emerges as a valuable educational strategy capable of promoting inclusive motor environments and supporting the overall development of students.

Keywords: inclusion, special educational needs, motor competence, inclusive physical education.

Introduction

Motor activities can perform a function not only oriented towards the development of physical abilities, but also an educational function, promoting social learning and inclusive participation (Nzuza & Chitiyo, 2024; Özkan & Kale, 2023). Although the available evidence indicates that structured physical activity may contribute to cognitive functioning, academic achievement, and well-being (Latino et al., 2025b; Kliziene et al., 2023), school-based research also highlights the relevance of the timing and organisation of movement for cognitive performance (Latino et al., 2025a). Further studies are therefore needed to examine interventions capable of simultaneously acting on motor and

socio-relational outcomes. Particular attention is directed towards students with Special Educational Needs (SEN) who, however, may encounter barriers to participation related to motor competence, communication, social interaction, or behavioural regulation, with the potential effect of limiting involvement in group activities and opportunities to establish relationships with peers (Schürer & van Ophuysen, 2022; Martin Ginis et al., 2016; Haegele & Sutherland, 2015). Therefore, inclusive physical education and sport contexts require attention to equity, individual needs, and appropriate adaptations (Ainscow, 2020; Di Palma & Tafuri, 2016; Jardinez & Natividad, 2024), while structured cooperative activities, peer support, and appropriately adapted tasks may facilitate participation and social interaction among students with and without disabilities (Liu et al., 2025; Dalgaard et al., 2022). Motor activity therefore represents a fundamental component of the development of children and adolescents,

contributing to physical health and motor competence (Beni et al., 2017; Burton et al., 2023; Logan et al., 2012), as well as to psychological well-being, social interaction, and participation in everyday life contexts (Fu et al., 2025; Wade et al., 2026). In the school context, physical education constitutes an important setting for promoting inclusive experiences, as movement-based activities can foster cooperation, peer relationships, and a sense of belonging (Qi & Ha, 2012; Kuspratiwi et al., 2026; Ojeda-Troncoso & Campos-Campos, 2025). From a broader health perspective, consideration of physical, behavioural, and physiological dimensions can support a multidimensional understanding of well-being and health-related outcomes (Di Maio et al., 2026). In light of these considerations, the present study aimed to explore the feasibility and preliminary effectiveness of a structured inclusive motor intervention, based on boccia, aimed at lower secondary school students; more precisely, the study analysed changes in motor competence, assessed through the Movement Assessment Battery for Children–Second Edition (MABC-2) (Brown, 2021), and in socio-relational skills, assessed through the Social Skills Improvement System (SSIS) (Elliott & Gresham, 2021), at the three assessment time points (T0, T1, and T2), while simultaneously monitoring participation and peer-oriented behaviours through a structured observational checklist. In this regard, a motor-educational programme based on the discipline of boccia was structured, particularly suitable for this purpose due to its high degree of adaptability and the potential involvement of students with different levels of motor ability. Boccia in fact requires the integration of skills such as precision, planning, movement control, and decision-making, which can nevertheless be exercised through differentiated strategies and levels of difficulty; in particular, playing distances, equipment, rules, and participation roles can be adapted according to the characteristics and individual needs of the students, allowing shared objectives to be maintained within heterogeneous groups. These characteristics make boccia a potentially appropriate context for promoting participation, cooperation, and peer interaction in an inclusive motor environment.

Materials and Methods

Study Design

The study was designed as a feasibility and exploratory preliminary effectiveness study, with a controlled pre-post design and an 8-week follow-up assessment. It involved 80 students attending lower secondary school, divided into an experimental group ($n = 40$), which participated in the inclusive motor activity program, and a control group ($n = 40$), which continued the usual school activities included in the curriculum. Among the participants, 20 students had Special Educational Needs (SEN), equally divided between the two groups. The specific objective of the work was to evaluate the feasibility of an inclusive motor activity program based on the game of bocce in lower secondary school, analyzing participants' adherence, the feasibility of the protocol and participation during the activities and, in parallel, the secondary objective was to explore the potential effects of the intervention on students' motor coordination and socio-relational skills. The study was classified as a feasibility and

exploratory preliminary effectiveness study rather than as a definitive effectiveness trial because the primary purpose was to assess the practicality, acceptability, adherence, retention, and implementation of the intervention and to obtain preliminary estimates of its potential effects. This approach is consistent with methodological recommendations for randomised pilot and feasibility studies, which emphasize the assessment of feasibility, acceptability, implementation, retention, and preliminary estimates of outcomes before a definitive trial (Eldridge et al., 2016). The controlled design was adopted to provide preliminary information on outcome variability, intervention-related changes, and the suitability of the assessment procedures for informing future adequately powered studies; accordingly, the effectiveness analyses were considered exploratory, and the findings were interpreted as preliminary estimates rather than as confirmatory evidence of intervention efficacy. Precisely, the assessments were carried out at three specific time points, an initial time (T0) representing the baseline, at the end of the intervention (T1) and a third time interval represented by the follow-up (T2) 8 weeks after the conclusion of the program. More precisely, the exploratory outcomes were assessed through the Movement Assessment Battery for Children (MABC-2) for motor coordination and the Social Skills Improvement System (SSIS) for socio-relational skills and the feasibility of the intervention was assessed through the participation rate in the sessions, adherence to the program, completion of the planned assessments and structured observation of participation during the activities.

Participants

The study involved 80 participants from lower secondary school, all regularly attending school activities. The mean age of the sample was 12.1 ± 0.8 years; more precisely, the experimental group consisted of 22 males (55%) and 18 females (45%), while the control group included 21 males (52.5%) and 19 females (47.5%). Overall, 20 students, representing a heterogeneous sample, presented Special Educational Needs (SEN), including specific learning disorders, attention deficit/hyperactivity disorder, neurodevelopmental disorders and other certified conditions, equally distributed between the experimental group and the control group ($n = 10$ per group). Given the relatively small size and heterogeneity of the SEN subgroup, separate inferential analyses were not considered sufficiently robust for the purposes of the present exploratory study; therefore, the SEN subgroup was described in terms of its distribution across the experimental and control groups, while no separate estimates of intervention effects were calculated for students with SEN. This approach was adopted to avoid potentially unstable or misleading subgroup estimates arising from the limited sample size. The sample size was determined a priori based on the feasibility and exploratory objectives of the study. In accordance with methodological recommendations for pilot studies, the sample size was intended to provide sufficient information on recruitment, participation, adherence, assessment completion, retention, and preliminary estimates of outcome variability and effect sizes rather than to provide definitive evidence of intervention efficacy (Julious, 2005). Accordingly, a target sample of 80 students, equally allocated between the experimental

and control groups ($n = 40$ per group), was considered appropriate for evaluating the feasibility of implementing the intervention in the school setting and for informing the design of future adequately powered studies. No formal *a priori* power calculation was therefore performed, as the study was not designed to provide definitive evidence of intervention efficacy. The estimates obtained from this study may inform the sample-size planning of future adequately powered controlled studies. Specifically, the inclusion criteria comprised regular school attendance, the ability to participate in the proposed motor activities and the availability of informed consent signed by parents or legal guardians; whereas the exclusion criteria included medical or physical conditions that prevented safe participation in the activities included in the study protocol, as well as the unavailability of informed consent. Therefore, before the start of the activities, signed informed consents from parents or legal guardians were collected for participation and all procedures were conducted in compliance with the ethical principles of educational research.

Procedure

Following recruitment and eligibility screening, participants were individually randomly allocated in a 1:1 ratio to the experimental or control group using a simple randomization procedure, the random allocation sequence was generated in Microsoft Excel using a random-number function, and participants were assigned to the experimental or control group according to the resulting sequence. The allocation was performed before the beginning of the intervention, with 40 participants initially allocated to each group and among the 20 students identified as having Special Educational Needs (SEN), 10 were allocated to the experimental group and 10 to the control group as a result of the random allocation.

The intervention lasted 12 weeks, with two weekly 60-minute sessions (24 sessions; 24 hours). A follow-up assessment was conducted 8 weeks after completion. The intervention took place in the school gym during regular school hours. The control group carried out the usual motor education activities included in the school curriculum, while the experimental group participated in the structured intervention protocol. Before the beginning of the intervention, all participants underwent a baseline assessment (T0) under the same standardized conditions. The assessment protocol included the Movement Assessment Battery for Children–Second Edition (MABC-2) for motor competence and the Social Skills Improvement System (SSIS) for social skills and behavioural characteristics related to peer interaction. At the end of the 12-week intervention period, both groups were reassessed (T1) using the same procedures, instruments, and administration conditions adopted at baseline. An additional follow-up assessment (T2) was conducted eight weeks after the conclusion of the intervention using the same instruments and standardized procedures to explore the short-term maintenance of changes observed after the intervention.

Throughout the intervention, students' participation, engagement and social interactions during motor activities were monitored through structured observational procedures. Attendance, completion of assessment

procedures, and adverse events were recorded throughout the study. In addition, the intervention instructor maintained a session diary documenting attendance, activities implemented, adaptations introduced, and relevant descriptive observations concerning participation and interaction. These records supported the evaluation of feasibility and implementation. UDL-based adaptations concerned task difficulty, playing space, equipment, rules, scoring, and participation roles. Each session followed the same four-part structure: (i) general motor activation (10 minutes); (ii) development of bocchia-specific skills (20 minutes); (iii) inclusive and cooperative game situations (20 minutes); and (iv) feedback and reflection (10 minutes). Across the 12 weeks, activities progressed from familiarization and basic participation to technical skill development, strategic and cooperative problem-solving, consolidation and autonomous participation, and a final inclusive event. The detailed progression is reported in Table 1. The intervention was informed by Physical Literacy, Inclusive Physical Education, Universal Design for Learning (UDL) and cooperative learning principles (Catama, 2025; Zach et al., 2023; Latino et al., 2025b). Accordingly, tasks, equipment, rules, playing distances and participation roles were adapted when necessary to allow students with different abilities (Di Palma & Tafuri, 2016; Kasari, et al., 2012) to work toward shared objectives within the same activity environment (Valle-Muñoz et al., 2025).

Intervention

The intervention was structured as a progressive inclusive educational-motor programme based on bocchia, designed to promote motor learning, participation, and peer collaboration, the programme was organized into sequential phases, with specific objectives and activities tailored to progressively develop students' motor and social skills, as summarized in Table 1.

Measures

Assessments were carried out at three time points: before the beginning of the intervention (T0), at the end of the 12-week intervention (T1), and at follow-up (T2), conducted eight weeks after the conclusion of the program. Consistent with the feasibility and exploratory nature of the study, the outcomes were categorized as feasibility outcomes, process outcomes, and exploratory effectiveness outcomes. The primary outcomes concerned the feasibility of implementing the inclusive motor activity program within the school context. Feasibility was assessed through the participation rate, calculated as the percentage of completed sessions out of the total number of scheduled sessions, the completion rate of the assessment procedures at T0, T1, and T2, participant retention throughout the study, and the occurrence of adverse events during the intervention. Process outcomes were assessed through a structured observation checklist developed for the purposes of the present study based on indicators described in the literature on inclusive physical education, participation, and adapted motor activity (Roberts & Fairclough, 2012; Cairney et al., 2019; Gilmore et al., 2019). The checklist was developed to capture observable dimensions of participation and social interaction that were

Table 1. Structure of the inclusive educational-motor intervention based on boccia

Phase	Period	Main objectives	Planned activities
1. Familiarization and construction of the inclusive context	Weeks 1–2	To promote knowledge of the discipline, create a positive group climate, and encourage the participation of all students. To develop initial skills in equipment manipulation and control.	Presentation of boccia and fundamental rules; free and guided exploration of materials; exercises involving grasping, carrying, and throwing; individual and pair activities; cooperative games without scoring aimed at promoting mutual knowledge and peer collaboration.
2. Development of specific motor skills	Weeks 3–5	To enhance the motor components involved in boccia: hand-eye coordination, force control, precision, and movement planning.	Progressive throwing exercises towards static and dynamic targets; variation of distances from the jack; activities aimed at regulating throwing force and direction; precision tasks with individualized feedback; adaptation of space, materials, and difficulty according to students' ability levels.
3. Application of skills and strategic development	Weeks 6–8	To integrate technical skills with cognitive and social processes such as decision-making, problem-solving, and communication with teammates.	Simplified game situations progressively increasing in complexity; pair and small-group activities; selection of throwing strategies according to the position of the boccia balls; discussion of possible solutions; cooperative exercises with differentiated roles (player, observer, peer support).
4. Consolidation, autonomy, and inclusive participation	Weeks 9–11	To promote autonomy in game management, a sense of responsibility, and active participation within the group.	Adapted matches with heterogeneous teams based on ability levels; progressive autonomous management of rules; role rotation; team strategies; peer feedback activities; use of cooperative scoring systems to value the contribution of each participant.
5. Final event and reflection on the experience	Week 12	To consolidate the acquired motor and social learning outcomes and enhance the inclusive pathway developed throughout the intervention.	Implementation of a final inclusive boccia tournament with adapted rules; collaborative game activities; guided final discussion on the experiences lived; individual and group reflection on motor, relational, and participatory aspects.

Note: UDL principles were applied throughout the intervention through adaptations of tasks, environment, materials, and participation roles.

considered directly relevant to the feasibility and inclusive implementation of the intervention. Four behavioural domains were included: (i) active participation in activities; (ii) collaboration with peers; (iii) spontaneous interaction with peers; and (iv) compliance with rules and turn-taking. These indicators were selected because they represent observable behaviours associated with active participation, peer interaction, cooperation, and engagement in inclusive motor activities. The checklist was completed during the intervention sessions by two independent observers, who independently rated the observed behaviours. Each indicator was scored on a 5-point Likert scale ranging from 1 to 5 (1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = always). An overall checklist score was calculated as the mean of the four indicator scores, with higher scores indicating greater observed participation and more frequent socially inclusive behaviours. For process evaluation purposes, observations were conducted during the initial phase of the intervention (sessions 1–3) and during the final phase (sessions 22–24),

allowing changes in observed participation and interaction to be described over the course of the intervention. The checklist was not intended to function as a psychometrically validated outcome measure and was therefore used exclusively as a process and feasibility assessment tool, complementing the standardized MABC-2 and SSIS measures. To assess the consistency of ratings between observers, interobserver agreement was evaluated using the Intraclass Correlation Coefficient (ICC 2,1). The exploratory effectiveness outcomes included motor coordination and socio-relational skills, which were assessed at T0, T1, and T2 using standardized instruments. Motor competence was assessed using the Movement Assessment Battery for Children–Second Edition (MABC-2), a standardized instrument assessing manual dexterity, ball skills, and balance. Socio-relational skills were assessed using the Social Skills Improvement System (SSIS), a standardized measure of social skills and adaptive behaviours, including social interaction, cooperation, self-control, and peer relationships.

Data Analysis

Statistical analyses were conducted using a two-sided significance level of $p < 0.05$. Descriptive statistics (mean, standard deviation, frequencies and percentages) were calculated for all study variables. Because the study included three assessment occasions (T0, T1 and T2) and repeated observations within the same participants, the primary longitudinal analysis was performed using linear mixed-effects models (LMMs). Separate LMMs were fitted for MABC-2 and SSIS scores, with Group (experimental vs. control), Time (T0, T1 and T2) and the Group $\times$ Time interaction specified as fixed effects and participant specified as a random intercept to account for the correlation among repeated observations within participants. The Group $\times$ Time interaction was prespecified as the principal test of whether the trajectories of change differed between the experimental and control groups. This approach was selected because it allows all three measurement occasions to be modeled simultaneously, accounts for within-participant dependence, and provides a direct test of differential change between groups over time. Estimated marginal means, model-based contrasts and 95% confidence intervals were used to characterize the longitudinal pattern of change. Before the parametric analyses, the distribution of the outcome variables and model residuals was assessed using visual inspection of Q-Q plots and histograms and the Shapiro-Wilk test. Homogeneity of variance across group-by-time cells was examined using Levene's test. The assumptions were considered acceptable when no substantial departure from normality or heteroscedasticity was observed. In addition, residual diagnostics were inspected after model fitting. Baseline group characteristics were examined descriptively. Changes from baseline to post-intervention were also expressed as change scores ($\Delta = T1 - T0$) to facilitate descriptive interpretation of pre-post differences. The change scores were not considered the primary inferential evidence of intervention effectiveness, which was assessed using the longitudinal linear mixed-effects models and the Group $\times$ Time interaction. Pearson's correlation coefficient was used as an exploratory analysis to examine the association between changes in MABC-2 and SSIS scores ($\Delta = T1 - T0$). Feasibility indicators and observational checklist scores were analyzed descriptively; the initial-versus-final observational comparison was treated as a process evaluation. Interobserver reliability was assessed using ICC(2,1).

Results

Longitudinal analysis

Longitudinal changes were examined using linear mixed-effects models, with Group, Time, and the Group $\times$ Time interaction specified as fixed effects and participant included as a random intercept. The Group $\times$ Time interaction was considered the primary test of whether the longitudinal trajectory differed between the experimental and control groups. For MABC-2, the model showed a significant Group $\times$ Time interaction, $\chi^2_{(2)} = 6.78$, $p = 0.034$, indicating that changes across the three assessment occasions differed between the experimental and control groups. The estimated

between-group difference in change was significant at T1 ($\beta = 3.80$, $SE = 1.46$, 95% CI [0.94, 6.66], $p = 0.011$), whereas the corresponding estimate at T2 remained positive but did not reach conventional statistical significance ($\beta = 3.30$, $SE = 1.89$, 95% CI [-0.40, 7.00], $p = 0.085$). For SSIS, the model also showed a significant Group $\times$ Time interaction, $\chi^2_{(2)} = 6.18$, $p = 0.046$. The estimated between-group difference in change was significant at T1 ($\beta = 3.70$, $SE = 1.49$, 95% CI [0.78, 6.62], $p = 0.015$), whereas the corresponding T2 estimate remained positive but was not statistically significant ($\beta = 2.90$, $SE = 1.83$, 95% CI [-0.69, 6.49], $p = 0.118$).

Motor Competence (MABC-2)

Table 2. MABC-2 scores at baseline, post-intervention, and follow-up in the experimental and control groups

Group	T0	T1	T2	Δ T1-T0
Experimental	64.2 $\pm$ 8.9	68.7 $\pm$ 9.1	67.9 $\pm$ 8.7	+4.5
Control	63.8 $\pm$ 9.2	64.5 $\pm$ 9.0	64.2 $\pm$ 8.7	+0.7

Note. The primary inferential analysis was the linear mixed-effects model. The Group $\times$ Time interaction was significant, $\chi^2_{(2)} = 6.78$, $p = 0.034$. The estimated between-group difference in change was $\beta = 3.80$ ($SE = 1.46$, $p = 0.011$) at T1 and $\beta = 3.30$ ($SE = 1.89$, $p = 0.085$) at T2.

Socio-relational Skills (SSIS)

Table 3. SSIS scores at baseline, post-intervention, and follow-up in the experimental and control groups

Group	T0	T1	T2	Δ T1-T0
Experimental	87.3 $\pm$ 10.5	92.1 $\pm$ 10.8	91.5 $\pm$ 10.6	+4.8
Control	86.9 $\pm$ 10.1	88.0 $\pm$ 10.3	88.2 $\pm$ 10.4	+1.1

Note. The primary inferential analysis was the linear mixed-effects model. The Group $\times$ Time interaction was significant, $\chi^2_{(2)} = 6.18$, $p = 0.046$. The estimated between-group difference in change was $\beta = 3.70$ ($SE = 1.49$, $p = 0.015$) at T1 and $\beta = 2.90$ ($SE = 1.83$, $p = 0.118$) at T2.

Feasibility indicators

The intervention showed favorable feasibility indicators. The mean session participation rate was 88.5% in the experimental group, and no adverse events were recorded during implementation. Assessment completion was 100% at baseline (T0), 96.2% at post-intervention (T1), and 93.7% at follow-up (T2). These completion rates indicate good retention and feasibility of the assessment procedures throughout the study period. The observed participation and completion rates, together with the absence of adverse events, provide preliminary evidence that the intervention protocol could be implemented within the regular school context over the study period. At T1, 38/40 experimental participants and 39/40 control participants completed the assessment (77/80 overall). At T2, 37/40 experimental participants and 38/40 control participants completed the assessment (75/80 overall). The three T1 non-completions

(two experimental and one control) and the two additional T2 non-completions (one experimental and one control) were treated as missing observations; no values were imputed.

Results of Structured Observation

The structured observational checklist was used as a process evaluation measure to characterize students' participation, peer interaction, and inclusive behaviours during the intervention. The analysis showed a descriptive increase in behaviours associated with participation and social inclusion between the initial and final sessions. Inter-rater agreement was good, with an ICC of 0.84 (95% CI = 0.78–0.89). The four observed indicators showed higher descriptive values during the final sessions compared with the initial sessions (Table 4). Because the checklist was developed specifically for process evaluation and was not intended as a psychometrically validated outcome measure, these findings are reported as descriptive implementation indicators rather than independent evidence of intervention efficacy.

Table 4. Structured observation checklist scores

Indicator	Initial sessions	Final sessions
Active participation	3.35 ± 0.54	3.92 ± 0.51
Peer cooperation	3.21 ± 0.56	4.02 ± 0.48
Spontaneous peer interaction	3.02 ± 0.60	3.78 ± 0.55
Compliance with rules and turn-taking	3.54 ± 0.49	4.10 ± 0.43

Note. Checklist data were used exclusively as process indicators and were not treated as a primary efficacy outcome.

Exploratory Correlation Analysis

An exploratory correlation analysis examined the association between changes in motor competence and socio-relational skills from T0 to T1 among participants with complete T0–T1 data for both MABC-2 and SSIS ($n = 77$). The three participants who did not complete the T1 assessment were therefore excluded from this complete-case analysis. No missing values were imputed. The change in MABC-2 scores was moderately and positively correlated with the change in SSIS scores ($r = 0.34$, $p = 0.002$). This finding indicates that greater improvements in motor competence were associated with greater improvements in socio-relational skills during the intervention period. However, because this analysis was correlational, it does not establish a causal relationship between changes in the two domains.

Discussion

The present feasibility and exploratory study examined the potential contribution of a structured inclusive motor intervention based on boccia to the development of motor competence and socio-relational skills among lower secondary school students. The presence of a Group $\times$ Time interaction for MABC-2 and SSIS scores also indicates that the trajectories of change over time differed between

students who participated in the boccia-based intervention and those who continued with regular school activities. Moreover, the improvement observed in motor competence can be interpreted in relation to the specific characteristics of boccia and, although it is an activity accessible to students with different levels of motor ability, effective participation requires the integration of precision, force regulation, visuomotor coordination, postural control, anticipation, and movement planning (Herlitz et al., 2020; Qu, 2022; Hale et al., 2021). Therefore, the progressive organisation of the intervention provided students with repeated opportunities to practise these components through appropriately structured situations of increasing difficulty. From a Physical Literacy perspective, repeated and meaningful engagement in motor tasks may contribute not only to the development of motor competence, but also to greater confidence and willingness to participate in physical activities (Stodden et al., 2008; Piotrowski et al., 2025). The results concerning socio-relational skills are also particularly relevant when considered in relation to the educational structure of the intervention and, in this regard, boccia was not proposed exclusively as a motor activity, but as a cooperative learning environment in which students were required to communicate, share decisions, alternate roles, and pursue common goals. These characteristics may have created repeated opportunities for peer interaction, cooperation, and self-regulation. The improvement observed in SSIS scores may therefore be interpreted in relation to the social organisation of the intervention, rather than being considered exclusively as a consequence of participation in a sporting activity. This interpretation is consistent with previous evidence highlighting the role of inclusive physical education and meaningful cooperative experiences in promoting social interaction and participation among students with and without disabilities (Qi & Wang, 2018; Bertills et al., 2019; Sedláčková et al., 2025). A particularly relevant feature of the intervention was the possibility of maintaining common educational objectives while, at the same time, adapting the conditions of participation; therefore, playing distances, equipment, rules, task difficulty, and participation roles could be modified according to individual characteristics, without excluding students from the shared activity. From this perspective, the findings highlight the potential of boccia as a practical tool for applying the principles of Inclusive Physical Education and Universal Design for Learning within regular school activities. The observed association between changes in MABC-2 and SSIS scores also provides an interesting indication of the possible relationship between the motor and socio-relational dimensions. Although the correlational nature of this finding does not allow a causal relationship to be established, this evidence is consistent with a conception of motor activity as a multidimensional educational experience, in which physical, social (Wang et al., 2025), and relational processes may develop in an interconnected manner. Structured observations provided complementary information on participation and peer interaction during implementation. Another relevant aspect concerns the inclusion of students with Special Educational Needs within the same intervention framework. The participation of students with SEN in the same motor programme highlights the practical feasibility of implementing a common activity within a heterogeneous school population. Although the

small size of the subgroup does not allow specific conclusions to be drawn regarding differential intervention effects in relation to the presence of SEN, the possibility of involving these students in the same structured activities represents a relevant aspect of the programme and supports the need for future research involving larger samples of students with SEN. The follow-up assessment also provides a preliminary indication of the evolution of the changes observed after the end of the intervention; indeed, at T2, the experimental group maintained numerically favourable values compared with baseline in both assessment domains, although the magnitude of the differences was reduced compared with the post-intervention assessment. Future studies could therefore investigate whether longer programmes or maintenance-oriented interventions may contribute to consolidating the effects observed at the end of the intervention. In light of the exploratory nature of the study, however, some limitations should be taken into account when interpreting the findings. First, the sample size, although considered appropriate for the feasibility objectives, provided limited statistical power for a definitive assessment of effectiveness, and no formal a priori power calculation was performed because the study was designed primarily to assess feasibility and provide preliminary estimates of intervention effects. Second, the school context may have introduced variability related to students' previous motor experiences, previous opportunities for physical activity, and exposure to organised sports, which could not be systematically controlled. Overall, the findings provide preliminary support for the feasibility of an inclusive boccia-based motor intervention in the school context and suggest its potential to promote both motor competence and socio-relational development.

Conclusions

The present study supports the feasibility and potential effectiveness of an inclusive motor intervention in promoting motor competence and social inclusion in the school context, in line with the objectives and outcomes of the study. From a pedagogical perspective, these findings support the value of motor education as a context for promoting active participation, peer collaboration and an inclusive classroom climate, with opportunities for shared learning and meaningful participation.

Ethics Approval

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of the University of Naples Parthenope (DiSMMeB, Prot. No. 88592/2024).

Informed Consent

Informed consent was obtained from all participants involved in the study.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

AI Transparency Statement

The authors used AI-assisted tools for language editing only and take full responsibility for the content.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Спорт для інклюзивної освіти: вплив на рухові та соціально-реляційні навички

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 10 с., 4 табл., 42 джерела.

Мета дослідження. Це пошукове дослідження доцільності мало на меті оцінити застосування та вплив інклюзивної освітньо-рухової інтервенції на основі гри в бочку на рухові та соціально-реляційні навички учнів молодших класів середньої школи.

Матеріали та методи. У дослідженні взяли участь 80 учнів, які були розділені на контрольну групу (n=40) та експериментальну групу (n=40). Зокрема, експериментальна група брала участь у 12-тижневій програмі, структурованій із 24 занять. Цю програму було розроблено відповідно до принципів фізичної грамотності (Physical Literacy), Універсального дизайну в освіті (UDL), інклюзивного фізичного виховання та кооперативного навчання. Натомість контрольна група займалася за стандартною шкільною програмою з фізичної культури. Обидві групи пройшли первинне, постінтервенційне, а також повторне оцінювання через певний час за допомогою Батарей тестів для оцінки рухової активності дітей – друге видання (MABC-2) з метою визначення рухової компетентності та Системи вдосконалення соціальних навичок (SSIS) для оцінки соціальних навичок. Крім того, протягом усього періоду інтервенції проводилися структуровані спостереження для моніторингу рівня залученості, взаємодії з однолітками та інклюзивної поведінки.

Результати. Отримані дані продемонстрували доцільність впровадження протоколу в умовах шкільного контексту, а також вказали на потенційне покращення рухової компетентності, активної залученості та реляційної динаміки з однолітками в інтервенційній групі.

Висновки. Таким чином, програма на основі гри в бочку виступає як цінна освітня стратегія, здатна забезпечувати інклюзивне рухове середовище та підтримувати всебічний розвиток учнів.

Ключові слова: інклюзія, особливі освітні потреби, рухова компетентність, інклюзивне фізичне виховання.

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