

Original Research

The feasibility of an early-years motor skill school-based intervention research project in a low-resource area of South Africa

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Abstract

Introduction: Innovative, inclusive and resource-efficient screening and intervention methods are essential to address motor skill impairment among preschool children and prevent long-term consequences. This study explores the feasibility of implementing a unique motor skill program for preschool children in low-resource rural areas of South Africa, addressing the heightened risk of motor skill impairment in this demographic.

Methods: Employing a quantitative pre–post quasi-experimental design with convenience sampling, the research involved assessing children using the second edition of the Movement Assessment Battery for Children (MABC-2) to evaluate their motor skills. Key objectives included assessing the program's recruitment, consent, attrition, adherence, and attendance rates, alongside determining its effect on motor skills. Children who scored less than the 5th percentile of the MABC-2 total score were included in the study and schools were randomly assigned to an intervention and control group. The Hopscoth program was facilitated by an occupational therapist over 8 weeks. Two weekly group sessions focused on gross and fine motor skills through obstacle courses, ball games and craft activities. All participants in the groups were re-assessed following the intervention. The control group received the same intervention following the post-assessment. Quantitative attendance checklists were analyzed to determine consent, assent, attrition and attendance rates. The feasibility of the MABC-2 as a data collection instrument and outcome measure was reported according to test completion rate and cost. The initial effect of the program was determined through analysis of the pre-and post-

intervention MABC-2 scores using descriptive statistics while independent samples *t*-test were used to determine statistical significance of between-group differences. The minimal important difference (MID) for MABC-2 scores was considered to determine the clinical significance of the results.

Results: The results revealed a high consent rate (98.08%) and a 0% attrition rate, with significant attendance at program sessions (93.75%). While independent samples *t*-tests indicated no statistically significant differences in motor skill improvements between the intervention and control groups, analysis considering the MID demonstrated clinically significant improvements in overall motor skill proficiency and balance for the experimental group. The cost of the MABC-2 exceeded the planned budget and amounted to 77% of the total study cost. The duration for testing was one school morning for each pre- and post-test when done by five researchers.

Conclusion: The study highlights the feasibility of conducting intervention research in low-resource settings. It notes the challenges of using the MABC-2 due to its cost and time requirements and reports on the initial effect of the program on the motor skills of the participants. Statistical significance of positive results was affected by the small sample size; however, the MID was useful in indicating clinical significance of progress made in general motor skill proficiency and balance. The feasibility study provides valuable insights to effectively plan and conduct a research project and implement a school-based motor skill intervention program in a low-resource area.

Keywords

feasibility, low-resource areas, motor skill assessment, motor skill impairment, motor skill program, preschool children, school-based intervention, South Africa.

Introduction

Motor skill development through physical play is an essential part of child development¹. Motor skill impairment refers to concerns about motor skill development²⁻⁴ due to neurological, physical or developmental conditions among children⁵⁻⁷. Motor skill impairment poses significant challenges, impacting functional, social and educational development.

While advances in interventions for children with motor skills challenges are encouraging, research is mostly conducted in middle- to high-income settings^{8,9}. Studies that focus on exploring treatment options in low-resource areas, such as rural regions or low socioeconomic communities, are both limited in number and often do not meet the stringent criteria required for classification as level I or II research evidence in systematic reviews. This results in a gap in the literature regarding effective interventions for children in low-resource settings, where the need for accessible and sustainable solutions may be greatest¹⁰.

Children in low socioeconomic and rural low-resource settings seem to be at a disadvantage¹¹⁻¹³. This is concerning as the prevalence of motor skill impairments is higher in these settings,

and therapy resources and access to specialized services are typically scarce^{14,15}. Therapy approaches and methods therefore need to be innovative, inclusive and resource-efficient¹⁶⁻²⁰.

The need for early intervention is evident from the literature – preschool children need to develop motor skill proficiency to promote school readiness¹⁸; without intervention, children with motor skill challenges potentially face long-term functional, behavioral, social and educational challenges^{21,22}. Given the complexity and many causes of motor skill impairments, assessment and intervention approaches are often diverse²³. Eddy et al found that assessments used frequently in studies within schools included the Test of Gross Motor Development second edition, Peabody Developmental Motor Scale second edition, Bruininks–Osteresky Test of Motor Proficiency second edition, Beery–Buktenica Developmental Test of Visual-Motor Integration and Evaluation Tool of Children's Handwriting-Manuscript. The Movement Assessment Battery for Children (MABC-2) was most valuable when assessing changes in performance^{9,23}.

Recent systematic reviews suggest a preference towards body-function-oriented interventions with an activity-based, functional focus or task-oriented approaches as the most effective strategies²³⁻²⁵. Evidence also suggests that any form of treatment

is more beneficial than none²⁶⁻²⁹. Group-based intervention has been explored as a strategy typically employed to be more resource-efficient¹⁶⁻²⁰. However, studies reporting on group-based interventions for preschool children are not well represented in systematic reviews and are difficult to compare due to the heterogeneity of participants and outcome measures used¹⁰. School-based interventions have also been shown to be effective settings for motor skill interventions⁹, and they could be a way to broaden access, especially in rural low-resource settings.

The West Coast of South Africa is an example of a rural, low socioeconomic region that faces many social and health challenges and has limited therapeutic resources³⁰. The region has a high prevalence of motor skills impairment (14.5%) among preschool children attending government schools³¹, likely due to poor nutrition³² and a high prevalence of foetal alcohol spectrum disorder³³ and HIV³⁴. Poorly equipped playgrounds and limited awareness and recognition of delayed development among parents and teachers are further challenges³¹). This motivated the development of the Hopscotch motor skill program.

The Hopscotch program utilizes a task-shift model³⁵, enabling teachers to implement the intervention within the existing curriculum and using available resources, while motor skill experts such as occupational therapists, physiotherapists and kinderkineticists provide support and guidance³⁶. The program makes use of an activity-based body-function-oriented approach, using visual-perceptual motor, sensory integration and task-specific training principles³⁶. The program was developed through a method of complex program development, including a prevalence study³¹, scoping review³⁷ and Delphi study³⁸ in the development phase, in preparation for the current phase, namely the piloting/feasibility phase³⁹. This study aimed to determine the feasibility of implementing the program as a small-scale pilot study in a rural area and to better understand the logistics involved in planning and executing a large-scale randomized controlled trial to determine its effect.

The primary objectives for this study were to evaluate the:

- assessment utility of the MABC-2 as pre- and post-intervention tool for a research study
- feasibility of the Hopscotch motor skill program with regard to recruitment, consent, assent, attrition, adherence, attendance and initial effect.

Methods

Research design

The study forms part of the Hopscotch program and was guided by a full-scale randomized controlled trial (RCT) protocol³⁶ and the Consolidated Standards of Reporting Trials (CONSORT)⁴⁰. A quantitative pre-post quasi-experimental design was applied while using convenience sampling. Preschool children in their grade R year (5–7 years) from two schools with 25–30 grade R learners and within the same municipal area within the West Coast district of South Africa were invited to participate, with schools randomly assigned to experimental or control groups. Five final-year occupational therapy students assessed all the participating children using the MABC-2 under the supervision of qualified occupational therapists. The Hopscotch motor skill activity program was presented at the experimental school by a qualified occupational therapist to a group of children who presented with motor skill impairment as identified by the MABC-2. Attendance was monitored using a register, and consent, assent and attrition

rates were recorded. The same program was presented at the control school to ensure equal opportunity following the post-intervention assessments.

Population

Grade R children aged 5–7 years from two schools in a rural, low-resource area on the West Coast of South Africa were invited to participate in the study. Only schools with 30 or fewer grade R children were considered due to time and resource constraints.

Sampling

Convenience sampling was used for this study based on the number of children who met the inclusion criteria for the study ($n=60$). As a previous prevalence study conducted in the area³¹ indicated motor skill impairment among grade R children on the West Coast at 14.5%, and manual dexterity impairment at 24.6%, we estimated that 9–15 children of this study's sample would experience motor skill impairment. The small sample size was adequate for assessing feasibility, but it limited the ability to evaluate program outcomes. The outcomes were therefore considered as a pilot for the planned RCT, rather than as a full outcome study.

Inclusion and exclusion criteria

All grade R children in the two schools were invited to participate. While all children with consent were assessed using the MABC-2, the standardized criteria of the MABC-2 were then utilized to identify children with motor skill impairment to participate in the motor skill program. Children would be excluded from the study if they were diagnosed with neurological or muscular conditions, because of the specialized nature of assessment, possible precautions and specialized therapy input required.

Recruitment

Following ethics approval from the relevant Health Research Ethics Committee and permission from the Western Cape Education Department, the researchers telephonically obtained permission from the school principals to conduct the study. Then online meetings were arranged to explain the details of the study to the principals and grade R teachers. Information letters with consent forms were distributed to the children's parents or guardians by the grade R teachers. On commencement of the program, the activity program was explained to the children. All participating children had the opportunity to provide verbal assent to participate in the assessment process and the program. Written assent forms were available to make provision for children who were older than 7 years. Finally, the motor proficiency of all the children at both schools was assessed using the MABC-2, and children were included in the Hopscotch program intervention or control groups if their test scores were less than the 15th percentile.

Data collection

The initial pre-intervention assessments were conducted at the schools in the first quarter of the school year. The scores from these initial assessments informed the recruitment rate, identified the children who would participate in the program, and served as the pre-test scores to determine the relative effect of the Hopscotch program on the children's motor skills. While conducting the pre-intervention assessment, data collection procedures using the MABC-2 were recorded to determine the assessment and test completion rates. Data included the number

of children assessed at each school, the number of assessors and the total time to complete the assessments for the group of children.

The intervention program was facilitated by an occupational therapist at the school of the experimental group, including all children who scored less than the 15th percentile of the MABC-2. The school assigned as the control group continued with only the standard physical education classes as usual. A quantitative attendance checklist was used to assess the assent and attendance components of feasibility over the 8-week duration of the intervention. Reasons for discontinuation of participation were recorded by checklist and included in the data analysis. The facilitator used a manual with descriptions of the activities for each session to ensure adherence to the intervention protocol, and any deviations from the intervention protocol were documented.

Following the 8-week intervention period, both groups were re-assessed using the MABC-2. The post-intervention procedures for data collection and the use of the MABC-2 outcome measure was once again documented according to the assessment and test completion rates.

Pre-intervention assessments were conducted outdoors, and post-intervention assessments were conducted in an undercover quad indoor setting due to season changes and wet weather conditions. Instructions were given in English or Afrikaans, depending on the children's first language.

Data collection tools

The MABC-2 is a standardized assessment and consists of motor skill performance tasks categorized into three groups: manual dexterity, aiming and catching, and balance⁴¹. The raw performance score of each item is recorded and converted into a scaled score and percentile. The total of the individual impairment scores can range between 0 and 40, with a lower score representing better motor skill outcomes. The scaled score ranges from 0 to 5, with the higher scores indicating a poorer performance. Scores less than the 15th percentile indicate possible motor skill impairment, while scores less than the 5th percentile indicate definite motor skills impairment. Scores greater than the 15th percentile indicate the typical development range.

A quantitative attendance checklist was used for the assessment of assent and attrition throughout the intervention while also documenting the assessment rate and test completion rate.

The intervention program

The Hopscotch program is an 8-week motor skills group intervention designed to be used in the school environment³⁶. The program consists of two 45-minute sessions per week – one session focuses on fine motor skills and the other on gross motor skills. Sessions were run during school hours in conjunction with the current curriculum in the second quarter of the school year.

Sessions typically began with a warm-up activity. Gross motor sessions included an obstacle course and ball game while fine motor skill sessions included arts and crafts activities. The sessions were concluded with a stretching and cool-down activity. Weather permitting, gross motor sessions were conducted on the school playground and utilizing existing play equipment, while fine motor sessions were conducted indoors.

Data analysis

The results from the quantitative attendance checklist were analyzed in terms of assent, attrition and attendance. Feasibility components were reported using primarily descriptive statistical measures according to the CONSORT guidelines⁴⁰. The consent rate was reported as the percentage proportion of the frequency of consent forms that were returned and parental permission obtained in comparison with the frequency of consent forms that were distributed to parents. Based on our sample (ie grade R children whose parents gave consent and who scored less than the 15th percentile on the MABC-2), the recruitment rate is reported as a percentage proportion of the frequency of children within this description in comparison to the frequency of Grade R children whose parents gave consent. Assent rate was reported as the mean frequency of children who assented to participation in proportion to the frequency of children within the appropriate sample. The mean frequency of children within the appropriate sample attending the sessions was reported for attendance. Participant attrition for this study was determined by a child's absence from four or more sessions during the Hopscotch program. Attrition statistics were based on the attendance data collected and reported as the mean frequency of children withdrawing from the program over the 8 weeks.

The feasibility of the MABC-2 as a data collection instrument and outcome measure was reported as assessment rate (frequency of children assessed within a set time frame) and test completion rate (proportion of children who completed the full assessment). The cost of assessment for the research project was considered according to the number of children assessed and the duration of assessments against the number of assessors. To measure the initial effect of the program, data collected from the pre-and post-intervention MABC-2 test scores were analyzed using descriptive statistics to calculate the mean and standard deviation of motor skills MABC-2 scores for each group, while an independent samples *t*-test was used to determine if there were statistically significant differences in the mean changes in motor skills between the two groups. The minimal important difference (MID) for the total score and subtest scores of the MABC-2⁴¹ were also considered and compared to the scores of the experimental and control groups to determine the clinical significance of the results.

Ethics approval

The research project was approved by the Stellenbosch University Human Research Ethics Committee with approval number U23/11/298.

Results

Demographics

Forty-seven children participated in the study, from the experimental school ($n=27$) and control school ($n=20$). The initial study group ($n=52$) was reduced by 7.69% due to non-consent ($n=1$) and absentees during initial and final assessments ($n=4$). All participants were in the age band of 5–6 years, with similar age groups of 6 years, 0 months (standard deviation (SD) 0.3) for the experimental group and 5 years, 11 months (SD 0.36) for the control group. The overall mean age was 5 years, 11 months (SD 0.32). Gender distribution was relatively balanced across schools, with 59% males and 41% females in the experimental school, and 45% males and 55% females in the control school, resulting in a total of 53% males and 47% females.

Differences were noticed between the two schools with regard to home languages and ethnic composition, as described in Table 1

Table 1: Demographic information of study participants

Participant characteristic	Variable	Experimental school (n=27)	Control school (n=20)	Total sample (n=47)
Age band (5–6 years), n (%)		27 (100)	20 (100)	47 (100)
Age (years:months), mean±SD		6:0±0.3	5:11±0.36	5:11±0.32
Gender, n (%)	Male	16 (59)	9 (45)	25 (53)
	Female	11 (41)	11 (55)	22 (47)
Home language, n (%)	English	0 (0)	13 (65)	13 (28)
	Afrikaans	27 (100)	6 (30)	33 (70)
	IsiXhosa	0 (0)	1 (5)	1 (2)
Ethnicity, n (%)	Black	0 (0)	10 (48)	10 (21)
	White	0 (0)	2	2 (4)
	Asian	0 (0)	0 (0)	0 (0)
	Coloured	27 (100)	8 (38)	35 (75)

Feasibility factors

Fifty-two consent forms were distributed – 22 to the control group and 30 to the experimental group. There was a 98.08% consent rate, as 51 children, except for one child from the experimental group, returned consent forms. All participants were younger than 7 years, so written assent was not required; therefore, the written rate of assent was 0%. However, verbal assent was taken from all participants before beginning both the pre- and post-intervention assessments, as well as before the intervention, with a subsequent verbal rate of assent at 100%.

The recruitment rate for this study was defined as the percentage of eligible children who qualified to be enrolled in the intervention – those whose score was less than the 15th percentile on the MABC-2. In the experimental school the parents of 29 children in a class of 30 children (97%) consented for their children to participate in the study, while 27 children were present for the pre-intervention assessment (Table 2). Five out of the 27 children (19%) had scores less than the 15th percentile on the MABC-2 pre-intervention, indicating motor skill impairment or being at risk for impaired motor skills. These five children were enrolled in the intervention program as the intervention group. In the control school (Table 2), the parents of all 22 children consented for their children to participate in the study and 21 children were present

for the pre-intervention assessment. Seven children (33%) had scores less than the 15th percentile on the MABC-2 pre-intervention. For the total population size of 48, 12 children (25%) were identified according to the sampling criteria as experiencing general motor skill impairments and in need of intervention.

The conditions of withdrawal from this study were outlined as children being absent for four consecutive sessions or more (being absent for 2 weeks of the intervention). Consequently, a 0% attrition rate was indicated for this study, and the full sample (n=12) was included in the study. Attendance rates of the 8-week motor skill intervention by the intervention group (n=5) indicate that a total of five sessions were missed across four of the participants. A mean of 15 sessions (93.75%) were attended by the participants. The minimum number of sessions attended was 14 (87.5%) and the maximum number of sessions attended was 16 (100%).

Cost and time were considered as logistic components to use the MABC-2 as an assessment instrument. The cost related to the use of the MABC-2 was first considered. For this study, the cost of the test exceeded the originally planned budget and amounted to 77% of the total study cost. Furthermore, the time taken to assess the children at both schools was considered. This amounted roughly to one school morning for pre-school children when done by five researchers.

Table 2: Recruitment statistics of participating schools

Group	Number of children given consent to participate in the study (who were present for assessment)	Number of children who scored below 15th percentile	Percentage of children recruited for the sample
Experimental group (school A)	27	5	19
Control group (school B)	21	7	33

Initial effect of the program

Descriptive statistics were used to analyze the MABC-2 scores of the intervention group pre- and post-intervention (Table 3). The intervention group displayed an increase in variability from pre-test (SD 0.894) to post-test (SD 3.347). Although the control group also displayed an increase in variability from pre-test (SD 0.756) to post-test (SD 1.574), this was smaller when compared to the intervention group. Both groups showed an increase in mean percentile post-intervention. For the control group, there was an increase of 13.28 in the mean percentile (from 6.29 to 19.57), while for the intervention group, there was an increase of 22.6 in the mean percentile (from 6.8 to 29.4).

When considering the individual subtests, both groups improved in all sections on the mean standard scores, with the most improvement in the balance subtests, where the experimental group improved from 6.20 pre-intervention to 10.60 post-intervention and the control group from 7.29 to 10.43.

Independent samples *t*-test data analysis indicated no statistically significant difference between the two groups before the intervention ($t=0.240$, $p=0.815$) or post-intervention ($t=0.459$, $p=0.656$). The greatest difference in individual subtests mean standard scores between groups was with the aiming and catching subtest (1.98), where the experimental group improved (with 2.4 on the mean standard score), while the control group improved (with 0.42).

Due to the small sample size, the clinical significance of the results was also considered by utilizing the MID for the MABC-2 total standard score as 2.36 and the MID for the MABC-2 subtests as 1.5, 2.5 and 0.5 for manual dexterity, aiming and catching, and balance, respectively⁴¹. The intervention group displayed an increase of 2.4 in mean total standard scores, and increases of 0.2, 2.4 and 4.4 between pre- and post-test standard scores for manual dexterity, aiming and catching, and balance, respectively. This indicates that there was a genuine positive change in the total standard score (ie overall motor skill proficiency) and the mean

balance standard score following the 8-week intervention period. The control group displayed an increase of 1.85 in mean total standard scores, and increases of 0.85, 0.42 and 3.14 between pre- and post-test standard scores for manual dexterity, aiming and catching, and balance, respectively. This, in contrast, indicates a

genuine positive change only in the mean balance standard score following the 8-week intervention. The degree of positive change in balance between the groups reflects that the change in the intervention group (4.4) is 252% of the MID more than the change in the control group (3.14).

Table 3: Descriptive statistics of MABC-2 scores

Characteristic	Variable	Pre-test mean±SD		Post-test mean±SD	
		Experimental	Control	Experimental	Control
Total score	Standard score	5.40±0.894	5.29±0.756	7.80±3.347	7.14±1.574
	Percentile	6.80±3.194	6.29±2.752	29.400±33.2009	9.571±10.8759
Manual dexterity	Standard score	5.00±2.121	4.29±1.113	5.20±2.280	5.14±1.952
	Percentile	8.20±9.960	3.57±2.936	9.60±10.574	8.71±12.763
Aiming and catching	Standard score	8.20±2.950	8.29±3.200	10.60±4.278	8.71±2.563
	Percentile	34.602±7.537	34.573±1.490	49.800±38.6096	36.429±26.7635
Balance	Standard score	6.20±1.789	7.29±1.890	10.60±3.647	10.43±1.512
	Percentile	13.201±3.646	21.711±9.491	52.80±37.473	55.43±19.043

SD, standard deviation

Facilitator observations

Across the 8 weeks, a total of 20 deviations and considerations were noted. These were categorized into environmental adjustments, material substitutions and activity modifications, as shown in Table 4. Environmental adjustments included changing the venue due to winter weather conditions and limiting disturbance for other classes at the schools. Deviations involving the substitution of materials for activities with other available

resources were noted to be effective. Lastly, activities were adapted to correlate with the available resources while still achieving the intended aim.

In addition to the reported deviations, it was noted that the 45-minute sessions held twice a week were effective for implementing the program. Participating schools were able to provide and source the equipment and materials needed for the intervention. The group size of five participants was deemed suitable and the facilitator noted that managing a group larger than six participants may be challenging.

Table 4: Program deviations noted by facilitator

Program deviation categories	Example of deviation	Frequency
Environmental adjustments	Moving gross motor session to an indoor venue due to rain	8
Material substitutions	Using towels instead of a rope for tug of war	7
Activity modifications	Use of two tires instead of one for each child (only two tires were available)	5

Discussion

This study considered the feasibility of implementing a preschool motor skill, school-based program in a rural low-resource area, in preparation for larger-scale research. The results highlight several important aspects to consider when planning similar research in low-resource areas.

Recruitment

Twelve children of the study's total population size ($n=48$) were found to be experiencing or were at risk of motor skill impairment, equating to 25% of the population size. This prevalence rate is higher than the predicted 14.5% prevalence of motor skill impairments when considering data from a prevalence study conducted on the West Coast of South Africa in 2016³¹ and high when compared to global figures of development coordination disorder prevalence²³. Furthermore, the study's sample size of 12 children was higher than the proposed sample size of five children (9%)⁴². When considering the MABC-2 as a reliable diagnostic tool for motor skill impairment, these results predict that an adequate sample for a larger study would be possible to recruit in the region, and possibly in other areas of similar socioeconomic status and challenges.

There was a difference in the number of children whose scores were less than the 15th percentile between the two schools at the recruitment stage (pre-intervention). The higher recruitment rate of 33% (seven children) in the control school, compared to 19% (five children) in the experimental school, may have been influenced by several variables. First, non-attendance by

participants on the day of assessment might have affected the final numbers per class. The demographic information (Table 1) reflects a difference between the two grade R classes' home language, language of teaching, and ethnicity. Furthermore, although not recorded as part of the official data collection, it was noted that there was a difference in space available for indoor and outdoor play, and in playground equipment available to the two classes, which may affect the acquisition of motor skills⁴³. These confounding factors are important to document for future studies to reduce the risk of bias and to consider when interpreting results.

Consent procedures

Standard procedures for conducting research in a government school were followed by obtaining consent from the provincial education department, after which consent was confirmed with the respective school principals. The parental consent, obtained through the distribution of 52 consent forms to the recruited schools, was 98.08%. The high consent rate indicated a positive outcome for following the standard structured procedures and providing clear information about the procedures and requirements to the different parties involved, to encourage the active involvement of educational authorities and parents as key stakeholders.

The obtainment of parental written consent rather than written assent of the children was most suitable in consideration of the young age of the participants and the nature of this investigation. However, verbal assent was obtained from the children participating in this study for the assessment process and each program session. The 100% assent rate for this study supports the

inclusion of children in the consent/assent process through verbal participation as essential for valid and reliable data collection and ethical research procedures, regardless of the age of the child⁴⁴. This also demonstrated willingness of the children to actively participate in the program, hence supporting client-centered practice where active participation can enhance therapeutic outcomes.

Data collection procedures

The MABC-2 is considered a reliable assessment tool for diagnosing motor skills impairment and has been widely used for research globally, including in South Africa⁴⁵⁻⁴⁷. This feasibility study highlighted several aspects to consider when using the MABC-2 as a data collection tool in a low-resource area such as the West Coast. From the test results (Table 2) it is clear that children scored significantly higher in the ball skills subtest than the other subtests, which correlates with the findings of a previous prevalence study in the area³¹. In a low-resource area, children often do not have access to play equipment, toys or extramural activities, but are creative in finding ways to play and to substitute what they do not have with what is available⁴⁸. Ball play is a common play or leisure activity that can be done anywhere and in various ways at no or minimal cost. In low-resource areas, it is thus possible that ball skills develop as a splinter skill and the MABC-2 subsequently may not be a true reflection of holistic motor skills development.

This study had a small sample size, most probably affecting the overall pre–post intervention test results. Sample size is often not considered as important for feasibility or pilot studies where the focus is not on the test outcomes, but rather on the feasibility of the procedures⁴⁰. An advantage of the MABC-2 is that it provides opportunity to calculate clinically important difference rather than statistical significance by looking at the MID. The MID increase for the mean total standard scores (2.4), and the balance subtests standard score (4.4), indicate a genuine positive change in these areas for the experimental group post-intervention, with the balance MID being significantly higher for the experimental group than the control group (3.14).

The significance of the timing of data collection is highlighted by the test results indicating a natural motor skill development maturation for the children in the control group (Table 2). In South Africa, children start their grade R year in late January. For many children, this will be their first time attending a preschool environment and having access to a broader range of play equipment. There are 1.3 million children in South Africa between the ages of 3 and 5 years who do not attend an early learning program⁴⁹ while 34% of early learning programs do not have access to an outdoor playground⁵⁰. Considering the positive impact of play and playground equipment on the development of motor skills^{16,31,51}, it is argued that children are expected to show a maturation in physical development once exposed to more playground equipment. While this study assessed the children in the first term of school, evaluation in the second term may be a more accurate indication of significant motor skills impairment.

The logistic issues to access the MABC-2 for a research project need to be considered. For this study, these first included high cost. The MABC-2 is imported and the fluctuating exchange rates make it difficult to predict expenses. Test booklets are purchased for each child individually. The test requires qualified administrators and, as it is performed individually for each child, the time of a qualified administrator adds to the cost of a study. The cultural sensitivity and validity of the assessment for the

specific group of children require further investigation and are affected by play opportunities and access to extramural activities and other resources.

Finally, as suggested by Smits-Engelsman et al⁴⁵, it is important to reflect on the scope of the MABC-2 when using the performance test in isolation. Following the Hopscotch program, parents and teachers commented on the positive functional and emotional changes they observed in the children; however, these changes were not reflected in the statistical analysis of the results, and valuable information might have been missed.

The reliability of the MABC-2 thus needs to be weighed up against feasibility aspects of cultural validity, cost and time. When considering the design of a future RCT or similar studies, validity research to consider alternative assessment methods is indicated. Screening tools, such as the Developmental Coordination Disorder Questionnaire – 2007⁵², may be a viable option, specifically when considering teachers as facilitators for the program.

Attendance and attrition

Attendance and attrition rates were positive (an inclusion rate of 100%), low absenteeism (a mean assessment attendance rate of 93.75%) and a maximum of two sessions missed by one of the participants, with an intervention attendance rate of 87.5%. Sessions missed were due to illness – the program took place during the autumn/winter season when there is a higher rate of colds and flu in the area. The attendance statistics indicate that high attendance and low attrition rates are attainable, suggesting that positive outcomes for participant engagement and retention for future similar studies are likely achievable.

Relative effect of the program

Statistical evidence for this feasibility study is not strong enough to support the effectiveness of the Hopscotch program, most probably due to the small sample size⁵³. However, with the focus on the improvement of motor skills and subsequently quality of life for these children, clinical significance holds high value⁵³. It is therefore encouraging that the experimental group presented with clinically significant improvement in total motor skills and balance when compared to the control group, when considering the MID of the MABC-2. Furthermore, both the intervention and control groups improved from the 'being at risk of motor impairment' (6th to 15th percentile) or 'presenting with motor impairment' (5th percentile or less) zones of the MABC-2, to the 'typical development' (16th percentile or greater) zone. For the control group, the 13.28 increase in mean percentile (from 6.29 to 19.57) may be indicative of the 'typical' maturation rate for grade R children along the West Coast. The experimental group showed an additional improvement of 8.24 over and above the presumed maturation rate (6.8–29.4).

Additional insights concerning the MID indicated that there was a genuine positive change in the total standard score (ie overall motor skill proficiency) and in the mean balance standard score following the 8-week intervention period, but less so on manual dexterity, and aiming and catching, during these 8 weeks. Several possible factors could have affected these results: the content of the program itself, the specific motor skill profile of the individual children, or their general environment and play opportunities. However, these factors need further research and investigation, and need to be considered in future research.

Facilitator's insights

The findings noted by the facilitator of the intervention program provided valuable insight into the feasibility of the Hopscotch program itself. The program was developed to be a cost-effective and accessible motor skill intervention for low-resource areas, and although the facilitator had to make various environmental adjustments, material substitutions and activity modifications, these were all possible within the resources available and indicate flexibility within the program without affecting the aims and outcomes. The 45-minute time slots, twice a week for the 8-week intervention, were described as sufficient and practical within the school environment, and the availability of resources at the school supports the overall logistical suitability of the program. The availability of resources and flexibility without disrupting the program's aims and flow are important factors in the feasibility and outcomes of the program and clear guidance would be important to future facilitators of the program. As the facilitator for this study was a qualified occupational therapist, the acceptability of the program for grade R educators as facilitators needs further assessment and consideration.

Conclusion

This feasibility study provided valuable insights and preliminary data, laying the groundwork for subsequent research to evaluate the effect of the Hopscotch program. The high recruitment and consent rates suggest effective recruitment strategies and inclusion criteria. The low attrition rate and high attendance rate of program participation indicate that the program design and delivery were effective in capturing the children's interest and maintaining their motivation. Small sample size affected the statistical significance of the program as a pilot study; however, positive clinical significance was measured utilizing the MID of the MABC-2.

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The MABC-2 needs further consideration with regards to cost-effectiveness and as a data collection tool for motor skill research projects. The high cost undermines the assessment's suitability and viability for quantitative research, particularly in lower socioeconomic areas where funding is often limited. Alternative culture-specific assessments should be considered to capture more holistic outcomes including functional changes and self-perceived competence in a cost-effective way. This, however, calls for further investigation into the cultural adaptation of existing tools, such as the Developmental Coordination Disorder Questionnaire – 2007, to make high-quality research affordable.

The Hopscotch program itself was developed to be cost-effective while adopting a task-shift model. This excludes the MABC-2 as an assessment tool for the intervention program because its high cost and the need for specialized training limit its feasibility for widespread use by teachers in low-resource settings. Further investigation is needed to establish a culture-specific, cost-effective screening tool that can be easily administered by teachers without requiring extensive training. Future research should focus on identifying or developing a screening tool that is both culturally relevant and accessible, ensuring it supports effective task-shifting in low-resource environments.

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Conflicts of interest

The authors declare no conflicts of interest.

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