

THE EFFECT OF A PHYSICAL ACTIVITY PROGRAMME ON THE SELF-ESTEEM OF PRE-PRIMARY HIV-DIRECTLY AFFECTED LEARNERS

Dorita DU TOIT & Niekie VAN DER MERWE

Faculty of Education, North-West University, Potchefstroom, Republic of South Africa

ABSTRACT

Literature shows that HIV/AIDS greatly affects the self-esteem of HIV/AIDS affected learners (these affected learners are either directly infected, or one or both parents are or had been infected). Studies also show that developmentally appropriate physical activities can have a positive influence on a child's self-esteem. The purpose of this study was to determine the effect of a developmentally appropriate physical activity programme on the gross motor and perceptual motor skills and the self-esteem of HIV/AIDS-affected learners. Eight gross motor and perceptual motor skills, as well as self-esteem was evaluated among 30 directly-affected learners in a pre-primary school for terminally sick children in Potchefstroom. Evaluation took place before and after the implementation of a 12-week long developmentally appropriate physical activity programme. The motor scores as well as the self-esteem scores of the experimental group showed statistically significant ($p \leq 0.05$) improvements after the completion of the programme, in contrast with the scores of the control group which showed no significant improvements. These improvements entailed certain fundamental locomotor and balance skills, and self-perceived competence with reference to certain movement skills, as well as peer acceptance. The results imply that by improving the gross motor and perceptual motor skills of HIV/AIDS-affected learners by means of a developmentally appropriate physical activity programme, the self-esteem and related aspects of these learners may be enhanced.

Key words: Developmentally appropriate physical activity; Gross motor; Perceptual motor; HIV/AIDS; Pre-primary; Self-esteem.

INTRODUCTION

HIV-infected and affected children have received increased attention during the past few years, due to their rising numbers in South Africa and around the world (Wiener *et al.*, 1999; Lwin & Melvin, 2001; Human Sciences Research Council, 2004). The prevalence of HIV among the 2-9 year age group is currently estimated to be 6.7% (Human Sciences Research Council, 2004).

The extent of children not necessarily infected, but also directly affected by HIV (having lost one or both parents due to AIDS), can be seen in the number of AIDS-orphans in South Africa which in 2001 was estimated to be between 190 000 (Vass, 2003) and 420 000 (Bradshaw *et al.*, 2002) and predicted to rise to over 1.5 million in 2010 (Bradshaw *et al.*, 2002; Vass, 2003; Frederiksen & Kanabus, 2004). Of the total population of AIDS-orphans, an estimated 4% to 12% are orphaned when they are between 2 and 7 years old (Johnson & Dorrington, 2001).

With continuing research and progress in the treatment of HIV/Aids, HIV-positive children are, however, living longer and fuller lives (Wiener *et al.*, 1994; Bacha *et al.*, 1999). According to Brown *et al.* (2000), international advances in therapies have led to more than 65% of children with HIV living past five years of age. In the USA, it is estimated that over 49.5% of HIV-positive children receiving basic medication, survives their ninth year (Wiener *et al.*, 1994). According to the Milennuim HIV/Aids Project (GNMTCP, 2000), 25% of South African children who are HIV-positive live past five years of age. According to Lwin and Melvin (2001), the picture of paediatric HIV is increasingly one of living long term with the virus rather than dying from its effects.

Due to both the higher life expectancy of HIV-positive children and the increasing number of Aids-orphans, intervention and social programmes aimed at improving quality of life are increasingly emphasizing the psychological needs and issues of these children (Bacha *et al.*, 1999; Brown *et al.*, 2000; GNMTCP, 2000; Lwin & Melvin, 2001; Bicego *et al.*, 2003). Studies have shown that children infected and/or affected by HIV experience higher levels of anxiety and lower levels of self-esteem than their unaffected peers, independent of their knowledge of their HIV-status (Havens *et al.*, 1994, Wiener *et al.*, 1994). In an extensive review of studies which address HIV infection and its psychological and social implications, Brown *et al.* (2000) point out reasons for anxiety and low self-esteem in HIV-infected children such as the disclosure of HIV-infection, social ostracism, fears of death, family conflict and family instability.

The above review supports the view that support and intervention programmes should be encompassing, addressing not only the medical and physical but also their psychological needs in order to improve the quality of life of HIV-directly affected children. According to Bacha *et al.* (1999), Brown *et al.* (1999) and Lwin and Melvin (2001), the ideal treatment model for children affected by HIV would involve pediatricians, social workers, psychologists, psychiatrists, occupational therapists, physical therapists and language therapists. Many such programmes already exist in the USA (Bacha *et al.*, 1999; Brown *et al.*, 1999) and in Europe (Lwin & Melvin, 2001).

In South Africa, however, circumstances are very much different from those in the USA and other countries due to higher prevalence rates of HIV. In the absence of such complete multidisciplinary intervention programmes, the person who often plays the most important role in supporting the HIV-infected and affected child in the ways described above, is the teacher in school.

In the current South African educational system, and in the Foundation phase especially, one developmental aspect that is currently emphasized more in the Foundation phase than in the other phases, is physical and motor development. The reason for this is that the age period of 2-7 years is considered to be the critical years of a child's motor development, as, through play and physical activities, the fundamental gross motor skills develop during this period (Gabbard, 1998; Gallahue & Ozmun, 1998). Children living with HIV often show delays in achieving motor milestones and experience perceptual-motor delays (Wiener *et al.*, 1994; Melvin, 1996; Brown *et al.*, 1999).

Several studies pertaining to the improvement of motor skills and self-esteem among young children focus on the improvement of motor skills through physical activity, and the

relationship there-of to self-esteem (Corbin, 2002; Rose & Larkin, 2002; James & Collier, 2004; Miyahara & Wafer, 2004). According to Bunker (1991), there is a dynamic interaction between motor skill competency and self-esteem in the young child (2 to 10 years), and the results of several studies support this statement (Thomas, 1999; Miyahara, 2004; Rose & Larkin, 2004).

No studies could be found pertaining to the self-esteem of pre-primary learners affected by HIV in South Africa, and no studies could be found on the effect of physical activity on the self-esteem of pre-primary learners directly affected by HIV in South Africa.

In the light of the psychosocial problems developed by HIV-infected and directly affected children and the need for more holistic intervention programmes in South Africa, the question arises whether a physical activity programme in the form of gross motor and perceptual motor activities will improve the levels of self-esteem of pre-primary HIV-directly affected (infected or having lost one or both parents due do HIV/AIDS) children. The answer to this question could confirm the value of a well-structured physical activity programme for Foundation phase teachers in enhancing the quality of life for HIV-infected and affected children.

The objective of this study involved a developmentally appropriate physical activity programme in the form of gross motor and perceptual motor activities for HIV-affected pre-primary children. The focus was twofold: firstly, to determine whether the programme would improve the gross motor and perceptual motor skills of the participants, and secondly, to determine whether the programme would improve the self-esteem of the participants.

METHOD

Participants

The original sample consisted of 28 pre-primary children of the ages four (N=12, seven male and five female), five (N=8, three male and five female) and six years (N=7, two male and five female), from a school which accommodates terminally-ill children in Promosa, a suburb of Potchefstroom in South Africa. Age was defined by the participant's birthday in the year of the study. Of these 28 participants, 18 had been tested HIV-positive and the remaining 10 were tested negative but were directly affected, having lost one or both parents due to AIDS. All the participants were from a lower socio-economic status or previously disadvantaged background.

The participants were paired according to their ages and HIV-status (whether the participant was infected or affected) and the pairs were randomly assigned to an experimental (N=14) and control group (N=14), resulting in two groups with the same number of HIV-infected and HIV-affected learners and an even distribution of ages. Two participants from the experimental group died during the course of the study due to AIDS, resulting in a number of 12 participants in this group. The mean age of the final experimental group was 5.00 years (± 0.74) and the age of the control group 4.71 years (± 0.99).

Assessment procedures

All the participants were tested before and directly after the implementation of the programme. Testing was done on the school premises, and assistants and translators were used for this purpose. The assistants were Movement Education students in their final year, and had been extensively trained in the assessment of motor skills and self-esteem of learners in the Foundation phase. The participants were tested by the same test administrator before and after the programme. The translators went through an in-depth training session before the assessments started, and assisted during the self-esteem assessment in translating the instructions or questions of the test administrator to the participant, as English was not the first language of many of the participants.

Gross motor and perceptual motor assessment

Standing long jump, hopping, skipping, one leg balance, balance walk, catching and throwing-for-distance were selected as the gross and perceptual motor skills to be tested. These skills were selected for three reasons:

- 1) They represent the three categories of movement, namely basic locomotion (standing long jump, hopping and skipping), balance (one leg balance and hopping), and manipulation (throwing and catching) (Gallahue & Ozmun, 1998);
- 2) they are used extensively in established motor test batteries for children of these age groups (Bruininks, 1978; Folio & Fewell, 1983; Frankenburg, 1990; Henderson & Sugden, 1992; Pyfer, 1990; Ulrich, 1985); and
- 3) they are suitable to use in the form of a screening test in a physical activity programme consisting of gross and perceptual motor activities because of their simplicity and compatibility with the type of activities used in the programme.

The skills were evaluated based on the following procedures:

Standing long jump (Bruininks, 1978; Ulrich, 1985). The test measured how far the child could jump horizontally, using a two-foot takeoff and landing. The score was the highest of three trials.

Hopping (Frankenburg, 1990; Mutti *et al.*, 1998). The test entailed two trials of hopping forward on each leg as many times as possible, up to a maximum of 12 hops. The higher score was taken.

Skipping (Mutti *et al.*, 1998; Pyfer, 1990). The skipping pattern (step, hop, step, hop) was demonstrated by the researcher and then the participant was asked to skip across the room. According to Gallahue and Ozmun (1998), 20% of five year olds and nearly all six year olds can skip proficiently. Therefore, skipping was only evaluated among the five and six year olds. The number of skipping steps done correctly, to a maximum of four, was taken as the score.

One leg balance (Henderson & Sugden, 1992; Mutti *et al.*, 1998). The test entailed two trials of balancing on one foot, with the arms hanging at the sides, for as long as possible up to a maximum of 12 seconds. The participant was instructed to stand with the free leg bent backwards at the knee and kept off the floor. Swaying was allowed, and the arms were allowed to move to maintain balance. Balancing was tested on both legs, and the better of the two trials taken as the score.

Throwing (Folio & Fewell, 1983; Haubenstricker & Seeveldt, 1986). The test entailed throwing a tennisball as far as possible, using the overhand technique. The longer distance of two throws was scored.

Catching (Bruininks, 1978; Folio & Fewell, 1983; Pyfer, 1990). The test measured the ability to catch an aerial, underhand thrown 20 cm ball with two hands. The thrower was positioned 2 meters from the participants and aimed the ball at the participant's chest. The score was the number of successful catches off five throws.

Assessment of self-esteem

The Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (PSPCSA) (Harter & Pike, 1984a) was used to evaluate the self-perceived competence and social acceptance of the participants. This standardized scale is designed for assessing the self-esteem of children of the ages 4-7 and has four separate subscales: Cognitive Competence, Physical Competence, Peer Acceptance and Maternal Acceptance. Each of these subscales is comprised of six items constituting a total of 24 items. The items are bound as a booklet of pictures depicting children. The participant is asked to choose between paired pictures, and indicate which one is more like him or her, for example a boy or girl surrounded by several friends, or a child with only one friend. The test contains separate picture plates for male and female participants, depicting boys or girls in the pictures with the aim of enhancing the identification of the participant with the picture. Each item is scored on a scale of 1 to 4 where a score of 1 indicates low perceived competence and a score of 4 indicates high perceived competence. The test was presented individually to the participants, by the tester and the translator according to the instructions in the test manual. Acceptable validity and reliability is reported for the scale (Harter & Pike, 1984b).

As many of the participants were maternal orphans, before the assessment started the participant was asked whom he or she lived with, and where applicable the word "mother" was replaced with the title of the guardian of the participant in the test items of the Maternal Acceptance subscale. Therefore, this subscale in fact measured guardian acceptance. One item, where the picture plate depicts a child getting stars on his or her papers, was excluded due to the fact that the participants in this study were not familiar with this method of rewarding papers in school as the school didn't apply it. The score of the cognitive subscale was therefore calculated on the basis of 5 items, according to the guidelines of Harter and Pike (1984a).

The physical activity programme

The physical activity programme was presented in the form of gross and perceptual motor activities, by trained fourth year Movement Education students and consisted of 12 lessons of 30 minutes each. Each lesson consisted of six to eight activities addressing the main gross motor and perceptual motor components of total body co-ordination, static and dynamic balance, hand-eye co-ordination, foot-eye co-ordination, spatial orientation and body awareness. Activities addressing these components varied across lessons and different apparatus were used in every lesson. The lessons and activities were compiled according to the guidelines of Gallahue (2003) and were adapted to fit the developmental level and ages of each group.

The control group stayed in the class room during each physical activity session, watching age-appropriate, fictional videos provided by the researchers.

For each lesson, the apparatus to be used in the next lesson was manufactured by the learners and the teachers during classes, with the purpose of motivating learners to be proud and excited and to look forward to use the apparatus during the physical activity lesson. The self-made apparatus made it possible for the learners to take it home and practise the skills after the lesson. An example lesson from the programme as well as instructions on making such apparatus for the lesson are included in Appendix A.

Statistical analysis

All calculations of means (M), standard deviations (SD), degrees of freedom (df), p -values and t -values were done using the Statistica for Windows (6.0) computer programme (Statsoft, 1995). A dependent sample t -test was used to determine pre and posttest score differences for each item of the motor skill tests, the PSPCSA as well as the four subscales and the total score of the PSPCSA. The Wilcoxon Sign Rank Test, a nonparametric statistic test appropriate for small range scores, was also administered to confirm the results of the dependent t -tests pertaining to the PSPCSA. Statistical significance was set at $p \leq .05$.

RESULTS

Motor skill assessment

Descriptive statistics for the motor assessment for both control and experimental conditions are presented in Table 1. Independent sample t -test of pretest scores indicated no significant differences between the control and experimental groups in any of the motor skill or PSPCSA scores before the implementation of the movement programme.

TABLE 1: MEAN SCORES AND STANDARD DEVIATIONS OF MOTOR TESTS IN AFFECTED CHILDREN ($N=26$) BEFORE AND AFTER THE PHYSICAL ACTIVITY PROGRAMME

	Experimental group ($N=12$)				Control group ($N=14$)			
	Before		After		Before		After	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Long jump	48.17	21.36	65.58	25.29	47.14	29.09	55.21	36.36
Hop L leg	5.75	3.22	9.58	4.85	6.57	4.67	7.43	6.12
Hop R leg	8.00	3.81	9.42	5.25	8.00	5.25	6.64	5.60
Skip	3.50	1.17	3.33	2.45	3.42	1.16	3.20	1.69
One leg balance L	7.00	3.98	8.50	3.32	4.93	4.16	6.43	3.98
One leg balance R	6.67	3.73	9.17	2.04	5.00	4.21	7.21	3.93
Catching	4.33	0.98	4.67	0.65	4.21	1.37	4.43	0.76
Throwing distance	6.73	3.16	7.56	4.18	6.59	3.38	6.70	4.42

Note: L = left; R = right, SD = standard deviation.

As indicated in Table 2 which shows the statistical analysis of the differences between the scores of the first and second motor skill evaluation, statistically significant differences were found with reference to the standing long jump, hopping on the left leg, and balancing on the left and the right leg in the experimental group. The scores of the motor tests of the control group showed no significant differences ($p \leq 0.05$) in any of the motor skill tests.

TABLE 2: RESULTS OF THE DEPENDENT T-TESTS IN THE MOTOR SKILL TESTS: T-VALUES, DEGREES OF FREEDOM AND P-VALUES DEPICTING DIFFERENCES BETWEEN THE BEFORE AND AFTER SCORES OF AFFECTED CHILDREN (N=26)

	Experimental group (N=12)			Control group (N=14)		
	t	df	p	t	df	p
Long jump	-2.427	11	0.034*	-1.132	13	0.278
Hop L leg	-2.972	11	0.013*	-0.882	13	0.394
Hop R leg	-1.028	11	0.326	1.133	13	0.278
Skip	0.408	8	0.694	1.481	9	0.173
One leg balance L	-2.721	11	0.020*	-1.902	13	0.080
One leg balance R	-2.307	11	0.042*	-2.136	13	0.052
Catching	-1.483	11	0.166	-0.467	13	0.648
Throwing distance	-1.568	11	0.145	-0.221	13	0.829

Note: * = statistically significant at $p \leq 0.05$; df = degrees of freedom.

Self-esteem assessment

Descriptive statistics for the individual items of the self-esteem assessment for both control and experimental conditions are presented in Table 3. As indicated in Table 4 which shows the dependent t-tests and the Wilcoxon Sign Rank test, both the experimental group and the control group showed significant differences between the scores of the pretests and posttests in the cognitive subscale item "Knows names of colours" and in the experimental group, the physical competence subscale item "Good at skipping".

TABLE 3: MEAN SCORES AND STANDARD DEVIATIONS OF ITEMS IN THE PSPCSA ASSESSMENT OF AFFECTED CHILDREN (N=26) BEFORE AND AFTER THE PHYSICAL ACTIVITY PROGRAMME

	Experimental group (N=12)				Control group (N=14)			
	Before		After		Before		After	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Good at puzzles	3.33	0.98	3.75	0.45	3.14	1.10	2.64	1.15
Has lots of friends	3.08	1.08	3.42	0.79	2.71	1.38	3.14	1.23
Good at swinging	3.67	0.65	3.75	0.45	3.57	0.76	3.86	0.37
Mom smiles at you often	3.75	0.62	3.25	0.97	3.36	1.08	3.50	0.94

	Experimental group (N=12)				Control group (N=14)			
	Before		After		Before		After	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Stays overnight at friends	2.33	1.23	3.00	1.13	1.86	1.41	1.86	1.10
Good at climbing	3.33	0.98	3.50	1.00	3.21	1.19	3.71	0.61
Mom takes you places	3.25	1.06	2.75	1.42	3.29	1.14	3.14	1.29
Knows names of colours	2.83	1.19	3.67	0.49	2.29	1.33	3.21	0.89
Has friends to play with	2.92	1.24	3.83	0.39	2.64	1.45	3.50	1.09
Can tie shoes	3.08	1.31	3.75	0.45	2.86	1.23	3.29	1.14
Mom cooks favourite foods	3.17	1.27	3.25	1.06	3.21	1.12	3.50	0.94
Good at counting	3.25	1.06	3.50	0.80	2.29	1.33	2.93	1.14
Has friends on playground	3.17	1.34	3.92	0.29	3.14	1.41	3.50	0.76
Good at skipping	3.08	1.38	3.92	0.29	3.00	1.18	3.50	0.94
Mom reads to you	3.33	0.98	3.25	1.22	3.21	1.12	2.93	1.14
Knows alphabet	2.25	1.42	3.17	1.19	1.86	1.41	2.64	1.51
Gets asked to play by others	3.08	1.31	3.00	1.35	3.14	1.29	3.57	0.76
Good at running	3.08	1.00	3.17	1.03	3.14	1.23	3.29	0.99
Mom plays with you	2.58	1.31	3.08	1.24	2.14	1.23	2.50	1.29
Knows first letter of name	2.42	1.44	2.58	1.38	1.57	0.85	1.93	1.14
Eats dinner at friends' houses	2.58	1.08	3.08	1.24	2.57	1.45	2.21	1.19
Good at hopping	3.33	0.98	3.58	1.00	3.43	0.85	3.43	1.09
Mom talks to you often	2.83	1.19	3.42	1.00	2.43	1.34	2.64	1.22

TABLE 4: RESULTS OF THE DEPENDENT T-TESTS AND THE WILCOXON SIGN RANK TEST OF INDIVIDUAL ITEMS IN THE PSPCSA ASSESSMENT OF AFFECTED CHILDREN(N=26)

	Experimental group (N=12)				Control group (N=14)			
	Dependent t-test		Wilcoxon test		Dependent t-test		Wilcoxon test	
	t	df	p	p	t	df	p	p
Good at puzzles	-1.332	11	0.210	0.237	1.836	13	0.089	0.093
Has lots of friends	-1.483	11	0.166	0.178	-1.144	13	0.396	0.484
Good at swinging	-1.000	11	0.339	0.412	-1.472	13	0.165	0.178
Mom smiles at you often	2.171	11	0.053	0.076	-0.563	13	0.583	0.715
Stays overnight at friends	-1.146	11	0.276	0.285	-0.493	13	1.000	1.000
Good at climbing	-0.484	11	0.638	0.686	-1.612	13	0.131	0.138
Mom takes you places	1.198	11	0.256	0.272	0.618	13	0.547	0.584
Knows names of colours	-2.419	11	0.034*	0.043*	-2.687	13	0.037*	0.050*
Has friends to play with	-2.200	11	0.051	0.060	-1.472	13	0.165	0.203
Can tie shoes	-1.773	11	0.104	0.106	-1.031	13	0.321	0.286
Mom cooks favourite foods	-0.200	11	0.845	0.834	-0.773	13	0.453	0.499
Good at counting	-0.672	11	0.515	0.612	-2.590	13	0.069	0.139
Has friends on playground	-1.827	11	0.095	0.106	-0.924	13	0.373	0.353
Good at skipping	-2.278	11	0.044*	0.048*	-1.336	13	0.205	0.205
Mom reads to you	0.185	11	0.857	0.834	0.773	13	0.453	0.441
Knows alphabet	-1.608	11	0.136	0.173	-2.242	13	0.119	0.069
Gets asked to play by others	0.192	11	0.851	0.917	-1.195	13	0.254	0.208
Good at running	-0.172	11	0.866	0.859	-0.458	13	0.655	0.735
Mom plays with you	-0.920	11	0.377	0.374	-1.000	13	0.336	0.327
Knows first letter of name	-0.321	11	0.754	0.675	-1.046	13	0.315	0.273
Eats dinner at friends' houses	-2.345	11	0.309	0.056	0.812	13	0.431	0.441
Good at hopping	-0.540	11	0.600	0.612	0.000	13	1.000	0.893
Mom talks to you often	-1.103	11	0.294	0.327	-0.543	13	0.596	0.594

Note: * = statistically significant at $p \leq 0.05$.

Table 5 shows the descriptive statistics of the four subscales as well as the total scale scores of the PSPCSA. As the results of the dependent t-tests pertaining to these scores show (Table 6), no significant differences were found between the total scores of any of the four subscales from the first and second evaluation of either groups, but statistically significant differences were found between the total scale scores of the experimental group in contrast with those of the control group.

TABLE 5: MEAN SCORES AND STANDARD DEVIATIONS OF THE FOUR SUBSCALES AND THE TOTAL SCALE SCORE OF THE PSPCSA IN AFFECTED CHILDREN (N=26) BEFORE AND AFTER THE PHYSICAL ACTIVITY PROGRAMME

	Experimental group (N=12)				Control group (N=14)			
	Before		After		Before		After	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cognitive	14.08	4.29	16.67	2.74	11.64	3.77	13.43	4.26
Peer	17.17	2.98	20.75	2.56	16.07	5.47	18.14	2.25
Physical	19.58	4.29	21.67	2.46	19.21	2.83	21.07	3.12
Maternal	18.92	4.01	19.00	4.67	17.64	3.61	18.21	3.75
Total score	69.33	11.42	78.67	10.93	68.79	11.02	71.07	8.53

TABLE 6: RESULTS OF THE DEPENDENT T-TEST IN THE FOUR SUBSCALES AND THE TOTAL SCALE SCORES OF THE PSPCSA

	Experimental group (N=12)			Control group (N=14)		
	t	df	p	t	df	p
Cognitive	-1.845	11	0.092	-2.033	13	0.063
Peer	-3.654	11	0.141	-1.331	13	0.206
Physical	-1.428	11	0.181	-1.958	13	0.072
Maternal	-0.049	11	0.962	-0.540	13	0.598
Total scale score	-2.578	11	0.026*	-2.141	13	0.052

Note: * = statistically significant at $p < 0.05$.

DISCUSSION

The standing long jump is a skill which represents the gross motor component of total body coordination, but is also a skill which involves specific technique which can be improved with practice (Gallahue & Ozman, 1998). The physical activity programme involved a variation of jumping from two legs in every session which possibly contributed to the improvement of this skill in the experimental group. The improvements in the scores of the items of hopping on the left leg and one leg balance are encouraging, as these are balance skills which are the basis for the development of all gross motor skills (Auxter *et al.*, 1997; Gallahue & Ozmun, 1998) and therefore can have a positive influence on the development of other gross motor skills.

Pertaining to the results of the PSPCSA, a possible explanation for the significant differences in both groups found with reference to the “Knows names of colours”-item could be the fact that the use of colours formed part of the predetermined work schedule of the specific age groups during the period of the intervention programme. The significant difference in the item “Good at skipping” in the experimental group indicates that this group felt that their skipping ability had improved, possibly because skipping formed a major part of the physical activity programme and was practised often in the programme. According to Mahoney *et al.* (2004), the improvement of motor skills and other aspects by means of a physical activity programme in the form of gross motor and perceptual motor activities is a long term process, and the success of such a programme depends on the individual child and the status of his or her motor skill levels (Sugden & Chambers, 2003; Mahoney *et al.*, 2004). In studies involving the effects of motor skill programmes on several aspects of children including motor skills and self-esteem, it is suggested that such a programme should entail at least three sessions per week to be effective (Pless & Carlsson, 2000; Sugden & Chambers, 2003; Mahoney *et al.*, 2004). While the results of the motor tests in this study indicate that the gross and perceptual motor programme had an effect on some gross and perceptual motor skills and the total self-esteem of the experimental group, it is possible that the effect of the programme might have been greater had the programme been longer and had it been involved more sessions per week.

CONCLUSION

The results obtained with this study should be evaluated in the light of the following limitations, lessening the measure of generalizability. Firstly, a comparatively small, and a selected, group of participants was used due to the law preventing the revelation of HIV-status of children in mainstream schools. Secondly, due to circumstances in the school no third assessment was done to test the measure of retention, and thirdly the gross motor and perceptual motor programme could be presented only once a week and for only 12 weeks whereas more sessions per week for a longer period of time could have yielded clearer results. Additionally, the PSPCSA has not been adapted for children of a different culture with reference to the suitability of the picture plates.

Bearing these limitations in mind, but also the significant differences found in this study, it is suggested that future research should be conducted to further examine the question, but that they should make use of larger, and if possible randomly selected populations. Furthermore, it is recommended that a third assessment is done to determine the measure of retention and also that the intervention programme is presented at more frequent intervals for longer than twelve weeks.

If using the PSPCSA as a testing tool for South African children from a different culture, the picture plates should be adapted to reflect children similar to the participants’ own culture. Therefore, it is recommended that the scale be standardized for South African children from different cultures, as to enhance the generalizability of results when using this instrument in a South African context.

In light of the relatively high scores in the PSPCSA test in this study, further investigation of the self-esteem of HIV-infected pre-primary children is recommended.

From the statistically significant improvement in the total PSPCSA score of the experimental group, the tentative conclusion can be made that the intervention programme had an effect on the self-esteem of this group. On the grounds of this conclusion and also judging by the positive reception of the programme by the teachers in the school, in principle the programme does seem to have been suitable to have addressed the aims of this study.

To summarise, the results of this study suggest that a developmentally appropriate physical activity programme can contribute to the improvement of gross and perceptual motor skills, as well as the self-esteem in HIV-infected and affected children in the pre-primary phase. Additionally, the programme used in this study can be recommended for use in pre-primary schools and programmes for HIV-infected and affected children with the aim of improving their quality of life, and also in mainstream schools where the numbers of HIV-infected and affected children are increasing.

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APPENDIX: EXAMPLE OF ONE LESSON FROM THE PHYSICAL ACTIVITY PROGRAMME

Lesson 1: Balls and bean bags (bb)

Outcome: Life orientation Learning outcome 4: Physical development

Assessment standard: Describes what own body can do; explores different ways to locomote, rotate, elevate and balance; performs expressive movements using different parts of the body

Homework: Throw and catch ball by himself – see how high he can throw and still catch it.

Instructions on the making of a ball: Cut out 2 “O”s from a carton box, place against each other and thread wool through the middle. Cut the wool on the sides, remove carton.



COMPONENT	APPARATUS	ORGANISATION	ACTIVITY	What the leader says
Body awareness	Bb, balls	Each learner stands at a beanbag, holds	Roll ball over body parts and	"Who can roll the ball?"
Warm-up, locomotor/total body coordination	Bb, cones	Each learner places his ball next to his bb and stands close to his bb. A cone is placed \pm 10m. from each bb.	<ul style="list-style-type: none"> • Learners run to the cone and back • Learners gallop to the cone and back • Hop on one leg to the cone, back on other • Skip to the cone (young ones try in their own way) and back 	"See the orange / yellow cones there? Let's see who can run really fast to your cone! And back!" etc.
Static balance	Paper balls, bb	Each learner stands close to his bb	<ul style="list-style-type: none"> • Stand with one foot on the ball, arms sideways and balance for 10 counts (everyone count together) L and R • Balance on one leg for 10 counts (L and R) 	"Now we put our foot on the ball - who can stand like this without falling? Whoooa! Let's all count to 10! 1,2,3...."
Dynamic balance and spatial awareness, total body coordination	Bb, 1 skipping rope, 4 hoops, 3 mats	Learners stand in line at circuit: bb rope ♣♣♣♣♣----- --- O O hoops O mats ㊦ ㊦ ㊦ O	<ul style="list-style-type: none"> • 1st 2 rounds: Walk tiptoe on bb, walk with feet straight on skipping rope, 2leg hop in hoops, walk on all fours over mats • 2nd 2 rounds: Walk all fours on bb, backward on skipping rope, 1 leg hop in hoops, 	"These are stones in the river, we have to step only on the stones so that we don't fall in the river (there are crocodiles / monsters in the river). Now we walk across the bridge (don't fall off,

COMPONENT	APPARATUS	ORGANISATION	ACTIVITY	What the leader says
Body awareness	Bb, balls	Each learner stands at a beanbag, holds	Roll ball over body parts and crabwalk over mats	"Who can roll the ball?" the crocodiles will eat you). Now we have to jump in the rabbits' holes like this, and then walk like a monkey on the mats"
Hand-eye- and foot-eye co-ordination	Bb, paper balls	Each learner stands at his own bb, holds his ball	<ul style="list-style-type: none"> • Throw and catch ball by himself, keep eyes on the ball (\pm 10-15 times, then higher) • Drop ball, kick it (\pm 10-15 times, then try to kick ball before it hits floor) 	"Who can do this? See how I watch the ball all the time? Etc...)"
Closing activity: Attention focus and homework	Bb, paper balls	Learners stand at their bb and hold the ball between their knees while watching the leader	<ul style="list-style-type: none"> • Hold the ball between the knees and turn around without it falling • Demonstrate and give homework 	"Who can turn around like this without dropping the ball?" Now you must go and practise this at home - see how high you can throw and catch. Next time I will look to see who've practised it." "Did you enjoy the

COMPONENT	APPARATUS	ORGANISATION	ACTIVITY	What the leader says
Body awareness	Bb, balls	Each learner stands at a beanbag, holds	Roll ball over body parts and	"Who can roll the ball?"
				exercise? Good –bye- bye!"

Dr. Dorita du Toit: Faculty of Education, Potchefstroom Campus, North-West University, Private Bag X6001, Potchefstroom 2530, Republic of South Africa. Tel.: +27 (0)18 299 1723 (w), +27 (0)18 299 6632 (h), Cell: 082 454 8437, Fax.: +27 (0)18 299 4238, Email: smsddt@puk.ac.za

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