



Early Childhood Development and the Crosstrainer Programme in Rural Mahikeng

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ABSTRACT

Introduction: In South Africa, early childhood development (ECD) in rural areas is challenged by the lack of a centre-based programme and because the ECD practitioners are inadequately trained. The Crosstrainer Programme (CTP) may be a centre-based early childhood development programme that could address this challenge. Consequently, the aim of this study is not to prove, but to determine the level of efficacy of the CTP on the development of three to four year old children in the rural Mahikeng areas.

Method: An experimental trial was conducted. The ECDC (Early Childhood Development Criteria) were used to test the children (49 from 17 ECD centres).

Results: Both Section A: Cognitive SRRA (School Readiness Risk Areas) and Section B: Fine Motor Coordination were improved by the CTP. However, Section C: Gross Motor Coordination showed no improvement by the CTP.

Conclusions: The CTP proved valuable in the improvement of the Cognitive SRRA and even more so on the fine motor development of the population group. It is recommended that activities directed at gross motor development should be increased and amplified in the programme. Further studies on the CTP regarding the development of the children and the occupational enablement of the ECD practitioners are recommended.

Key words: Early childhood development; ECD; Crosstrainer Programme; CTP; occupational therapy; early learning programme; rural ECD centres; ECD practitioners

INTRODUCTION

Apart from the home environment, care and education programmes are critical towards children's development and success¹. However, numerous children up to the age of five years old living in developing countries, including South African rural areas, face exposure to multiple risks affecting their early childhood development. These risks include poverty, malnutrition, poor health conditions, and deficient stimulation in their home environment^{2,3}. These disadvantaged children often do poorly at school causing them to enter low-income jobs which eventually limit their opportunities to live long, healthy, creative and dignified lives⁴. Ultimately, this may cause a snowball effect transferring poverty from one generation to the next².

Although the Education White Paper 5⁵, South African Schools Act⁶ and the National Integrated Early Childhood Development (ECD) Policy⁷ acknowledge the importance of quality early childhood development, children in the South African rural areas have limited access and opportunities to reach such goals^{5,7}. In fact, according to the Human Sciences Research Council⁸, in the National ECD Programme, there is currently no centre-based ECD programme provided by the state as that for health and education. However, since the National ECD Policy was approved by Cabinet in December 2015, ECD has been made a top priority and significant efforts are being made to implement a comprehensive package of essential ECD services to all South African children^{3,7}. In the meantime, these programmes are provided by the private and non-profit sector in South Africa⁸ and such collaboration is crucial while the necessary systems are being put into place^{3,7}.

The term early childhood development (ECD), according to the White Paper 5⁵, is defined as an umbrella term that applies to the processes by which young children, from birth to nine years of age, are encouraged to grow and flourish. Ideally, these processes ought to include policies and programmes with active involvement from parents and caregivers. It further mandates to protect the right of children to develop to their full potential within their cognitive, physical, emotional and social abilities⁵.

Furthermore, South African ECD practitioners are not adequately trained and this fact has been regarded as one of the primary concerns in the South African ECD setup^{9,10}. The term ECD practitioner refers to a person working with children in an ECD centre who may have received formal or informal training to provide ECD services to children from birth to school-going age¹¹. This term, according to the White Paper 5, encompasses various roles, responsibilities and levels of qualification and hence this is an inclusive term for caregivers, teaching assistants and pre-school teachers⁵.

South African ECD centres vary from sites in informal settlements, where women with varied levels of qualifications look after the children within their close communities, to suburban day care centres or even pre-primary school classes equipped for education. This attests to a diversity in size, structure, and the number of children enrolled per ECD centre. Alongside the variation in centres, levels of quality education and resources vary^{4,5}.

Therefore, transforming the South African ECD sector would include both training ECD practitioners⁹ and providing a centre-



based ECD programme⁸. This transformation may be assisted and complemented by the non-profit and private sectors.

Consequently, the current situation in the South African ECD sector enthused the Crossroads Educational Foundation to develop and implement the Crosstrainer Programme (CTP) in the rural South African ECD centres. The Crossroads Educational Foundation is an Article 21 non-profit organisation¹² (NPO) based in Potchefstroom, South Africa, and is dedicated to establishing and implementing educational development programmes in Africa. This NPO is funded by various local companies. In affiliation with other organisations, Crossroads Educational Foundation serves 171 centres in RSA, nine in Zambia, one in Malawi and nine in Lesotho. In total, 55 communities and approximately 12 900 learners and more than 1000 staff members are reached¹³.

The CTP is an early childhood development programme for children from three to six years old predominantly situated in rural ECD centres. The CTP was developed using occupational therapy knowledge and basic concepts to reach a comprehensive, step-by-step guide for ECD practitioners to follow on a daily basis. The programme consists of four books per age group (one per quarter term) which includes 40 lessons per term, therefore a total of 160 lessons for each year. Each lesson can be completed in approximately 30 – 45 minutes¹³. The content of the lessons is appropriate for the context of the ECD centres in their environments. The lessons further contain contextually applicable examples and can be adapted to the resources available to each ECD practitioner. However, it is not bound by any context, culture or religion¹³. The CTP may be one of many programmes that could address the problem of access and equity in the South African ECD sector.

In practice, the Crossroads Educational Foundation has observed that this programme has a positive impact on the development of the children, educators and the community. However, to date, no research on the CTP has been published.

The North West University (NWU) Department of Education of Mahikeng undertook to invest in supporting and assisting the ECD centres that have been established to date. This involves supporting the ECD centres in their physical needs as well as equipping the ECD practitioners with basic skills required to run an ECD centre. This support further includes funding and providing the opportunity for the ECD practitioners to receive the CTP training and books.

Consequently, the need arose to commence a study to determine the level of efficacy of the CTP on the development of three to four year old children. It was decided to investigate this programme from an occupational therapy point of view as occupational therapists are deemed experts in occupation which is further strengthened by supporting roles, including being a change agent¹⁴.

Occupational therapy may be defined as a health profession providing a client-centred service towards promoting quality of life through occupation and improving participation in occupations and activities of daily living¹⁵. In early childhood, occupational therapy includes assisting children with or without impairments to prepare for and perform significant learning and developmental activities within their environment¹⁶. Occupational therapy focuses on the following occupations for any client, including young children: activities of daily living (ADLs), instrumental activities of daily living (IADLs); education; leisure; play; social participation; work, and rest and sleep¹⁶. Therefore, investigating the efficacy of an early childhood development programme may very well be afforded to the occupational therapy scope and expertise.

METHOD

Aim of the study

This study aimed to determine the efficacy of the CTP on the early childhood development of three to four year old children attending the ECD centres in the Rural Mahikeng areas.

Research design

An Experimental study design¹⁷ was followed. An experimental trial was employed to determine the efficacy of the CTP on the early childhood development of the population group as compared to a control group.

Study population and sampling

The ECD centres

The NWU Department of Education of Mahikeng approached 20 ECD centres in the surrounding rural areas to participate in the study. These were ECD centres identified with ECD practitioners who had limited or no ECD training and/or the need for a centre-based ECD programme. The project manager and field representative opted to equally divide the 20 ECD centres into an experimental and control group according to the following specifications: the building type, average number of ECD practitioners, level of education of the ECD practitioners, additional ECD level/training or diplomas, basic equipment available at the centres, and the location. The experimental group included ten ECD centres that received the CTP training and books. The appropriate ECD practitioners of the experimental group received training in the CTP from an official CTP trainer for the Crossroads Educational Foundation team. This training took place over three days and was implemented by the experimental group ECD practitioners approximately two months thereafter. The other ten ECD centres were included in the control group. The latter ECD centres were not implementing any other early childhood development programme prior to or during the intervention time and could continue their own programmes at their individual centres. They were further assured that they would receive the opportunity to be trained in the CTP after the intervention time which would be fully funded and not compulsory.

The 20 ECD centres are all situated in villages within an estimate of 5-20km radius from the NWU (North-West University) of Mahikeng. Towards the end of the study only 17 ECD centres (eight experimental group and nine control group centres) from the original 20 were still involved in the study. One centre did not have any children enrolled by February 2016, another centre closed down and the third centre's ECD practitioner was on maternity leave during the implementation period.

The participants

Children between the ages of three years to four years and eleven months were included in the study. This age group was chosen logistically seeing that children are admitted to primary schools from the age of five years old, which may have affected the sampling process. Further inclusion and exclusion criteria to participate in the study are listed below:

Inclusion criteria:

- ❖ Children from both genders
- ❖ English and Setswana speaking children
- ❖ Children with an 80% and higher class attendance.

Exclusion criteria:

- ❖ Children with diagnosed/evident physical and/or cognitive impairment(s)
- ❖ Children who have received previous occupational therapy or physiotherapy intervention
- ❖ Children markedly ill on the day of testing
- ❖ Absentees on the day of testing.

A minimum of 200 children from the 20 ECD centres were approached to participate in the study. This number was decided upon in anticipation of children discontinuing their participation in the study. The number of participants decreased with every phase due to various reasons including absenteeism, illnesses and discontinued access to the ECD centres. With the pre-test phase in February 2016, a total of 71 children completed the tests, 36 of which constituted the experimental group and 35 children the control.

In the end, 49 children completed the post-test and were included in the study, of which 21 were in the experimental group and 28 in the control group. The number of children tested per participating ECD centre ranged from one to seven, depending on the consent from the parents.

Ethics

Approval to conduct the study was obtained from the Health Sciences Research Ethics Committee of the University of the Free State (with approval number: HSREC 07/2016) and the Department of Social Development in Mahikeng. Thereafter, informed consent was obtained from the principals of the ECD centres, the ECD practitioners from the ECD centres and the parents of the participating children. A child-friendly assent form was used to obtain final assent from each child to voluntarily participate in the study. The ECD practitioners from the control group received the CTP training in November 2016, which was after the completion of the study. This training was fully funded by the Crossroads Educational Foundation and not compulsory.

Data collection and procedures

A pre-test was conducted in the two weeks before the start of the implementation to test all the participants from the experimental group (n=36) and the control group (n=35). Thereafter, the post-test was conducted after six months of implementation to test all the participants again from both the experimental group (n=21) and the control group (n=28). The CTP was therefore implemented for just over six months.

Both the pre- and post-tests consisted of the ECDC (Early Childhood Development Criteria) as the measuring instrument. Each individual child's participation was tested against the criteria as set out in the ECDC. This measuring instrument was developed by Herbst¹⁸ giving special attention to relevance and aptness according to culture and due to scarcity of standardised tests appropriate to the South African context. It consists of three sections namely Section A: Cognitive SRRA (School Readiness Risk Areas), Section B: Fine Motor Coordination, and Section C: Gross Motor Coordination.

Section A: Cognitive SRRA involves ten subtests including a draw-a-man test and other assessments involving basic concepts such as colour, form, number, sequencing, and spatial perception. Section B: Fine Motor Coordination involves numerous assessments including threading, colouring, cutting, pincer grasp, and other fine motor coordination assessments. Section C: Gross Motor Coordination involves numerous assessments such as jumping, balancing, catching, throwing, and other gross motor coordination assessments.

The pre- and post-tests were administered by examiners who received basic training in utilising the ECDC. These examiners were qualified occupational therapists, including the principal investigator and the co-investigator, and educators who volunteered to conduct the tests. Furthermore, all the tests during the pre- and post-test rounds were moderated by either the principal investigator or the co-investigator. All the tests occurred within the normal school-going hours and as far as possible with limited external distraction. The tests occurred with the correct table and chairs suitable for young children. A translator with a copy of the test instructions in Setswana was present with every test to bridge the language barrier.

Only the participants (n=49) who completed both the pre- and post-tests were included in the study.

Data analysis

The participants' raw scores were uploaded onto the ECDC computer software and converted to z-scores (which gives the result in relation to the norm in South Africa). The raw scores and the z-scores were given to the UFS Department of Biostatistics for data analysis. These z-scores were used to calculate the difference between the pre- and post-test for each section for both the experimental and control groups. The Kruskal-Wallis test was used to compare these differences between the experimental and control groups. T-tests were used to determine the differences between the pre-test scores of the experimental and the control group, as well as the differences between the post-test scores for each group. The improvements between the pre- and post-test scores were also calculated separately for the experimental and control groups by using paired t-tests.

Trustworthiness

Internal validity was achieved by using a developmental test standardised on the South African population. Reliability was obtained by ensuring that all the examiners completed basic training in the execution of the ECDC and that all the tests were moderated by either the principal investigator or the co-investigator. Performance bias was bracketed by conducting two field visits to all the involved ECD centres to follow up on whether the CTP was still being implemented in the experimental group as well as whether the centres of the control group had not included any external early childhood developmental programmes. Selection bias was reduced by involving all the ECD centres that were identified by the NWU Department of Education of Mahikeng as described earlier. Detection bias was abridged by appointing two other examiners in addition to the principal investigator and the co-investigator, to test the participants. Subjectivity was further lessened by excluding the principal investigator from the post-testing round.

RESULTS

The participants who completed the study (n=49) were spread over 17 ECD centres in the Rural Mahikeng areas, of which 21 were in the experimental group and 28 in the control group. The results firstly compared the pre- and post-test results to indicate whether any statistically significant improvement emerged from the results. Thereafter, the results were categorised according to the three sections of the ECDC.

In *Table I* below, the differences between the pre- and post-tests for each section (A to C) are displayed. A positive value indicates an improvement. The p-value indicates the difference between the median values for each group per section and whether the difference can be considered significant, statistically. A p-value of less than 0.05 was considered statistically significant.

Table I indicates that Section B: Fine Motor Coordination, did show a statistically significant difference between the median improvement of the experimental group (n=21) compared to that of the control group (n=28). Section A: Cognitive SRRA and Section C: Gross Motor Coordination, did not show a statistically significant difference between the median values of each group.

The compared z-scores were then categorised by UFS Department of Biostatistics to show the percentage of participants who improved, showed no change or decreased in their test results. *Tables II, III and IV* (page 21) indicates the percentage of participants within these three categories for Section A, B and C, respectively.

Table I: Compared differences between pre- and post-test z-scores

Section	Experimental Group			Control Group			p-value
	Median	Minimum	Maximum	Median	Minimum	Maximum	
A	1	-1	5	0	-2	4	0.2089
B	1	-1	3	0	-4	3	0.0213
C	0	-4	6	0	-3	3	0.6265

Table II below shows the percentage of participants who improved, showed no change or decreased in their results in Section A: Cognitive SRRA (School Readiness Risk Areas). Distinction is made between the experimental and control group for the purpose of comparison.

Table II: Section A: Cognitive SRRA results

Group	Improved	No change	Decreased
Experimental	61.9%	28.6%	9.5%
Control	39.3%	46.4%	14.3%

In Table II, 61.9% of the participants from the experimental group (n=21) improved their results in comparison with the 39.3% from the control group (n=28) within Section A. Additionally, the results of 28.6% of the participants from the experimental group and 46.4% from the control group showed no change. Only 9.5% of participants from the experimental group and 14.3% from the control group showed a decrease in their results.

Table III below presents the percentage of participants who improved, showed no change or decreased in their results of Section B: Fine Motor Coordination. A greater improvement can be observed in the experimental group for this section.

Table III: Section B: Fine Motor Coordination results

Group	Improved	No change	Decreased
Experimental	71.4%	19.1%	9.5%
Control	39.3%	28.6%	32.1%

Within Section B: Fine Motor Coordination, Table III indicates that 71.4% of the participants from the experimental group (n=21) improved in comparison with the 39.3% from the control group (n=28). 19.1% in the experimental group and 28.6% in the control group showed no change. More participants in the control group (32.1%) decreased in their results in comparison with the 9.5% from the experimental group.

Table IV below presents the percentage of participants who improved, showed no change or decreased in their results of Section C: Gross Motor Coordination. On the contrary to the first two sections in Tables II and III, it is noteworthy that this section showed the largest percentage of participants who decreased in their results in both groups.

Table IV: Section C: Gross Motor Coordination results

Group	Improved	No change	Decreased
Experimental	47.6%	23.8%	28.6%
Control	35.7%	39.3%	25%

From Table IV it is evident that 47.6% of the participants from the experimental group (n=21) and 35.7% from the control group (n=28) showed improvement in their results. No change in the results of 23.8% of the participants from the experimental group and 39.3% from the control group were found. The results of 28.6% of the participants from the experimental group and 25% from the control group decreased since the pre-test round to the post-testing round.

In Tables II to IV it can be noted that a greater percentage of participants in the experimental group showed improvement. Therefore, from a clinical perspective one can conclude that the CTP succeeded, although only Section B showed a statistically significant improvement.

DISCUSSION

Section A: Cognitive SRRA (School Readiness Risk Areas) showed a significant difference in the percentage of participants that

improved in their results. More participants improved in the experimental group (n=21) than in the control group (n=28). In the control group, the highest percentage of participants showed no improvement after six months of attendance at their ECD centres. Therefore, although there was no statistically significant difference between the median values indicating the improvement of the two groups, there is a clinically relevant difference based on the improvement percentages.

In Section B: Fine Motor Coordination, there can be no doubt that the experimental group showed better improvement than the control group. This is proven not only by the significant difference in the percentage of participants that improved in their results, but also by the statistically significant difference between median values indicating their improvement. The CTP proved to bring valuable intervention for fine motor coordination in the duration of six months.

Section C: Gross Motor Coordination showed no significant difference between the improvement of the results of the experimental and control groups. The question can be raised whether six months of intervention is long enough to improve the gross motor coordination in this age group. Furthermore, it is noteworthy that neither the control nor the experimental groups' participants improved in this section. Therefore, there is a possibility that gross motor coordination activities generally might not enjoy priority or that not enough importance is ascribed to such activities. Additionally, this could be associated by the limitations at the ECD centres in terms of the space needed for movement, possible outdoor areas or even safety of the outside area. Naturally, a combination of the aforementioned factors could easily stagnate gross motor development in children. In short, is it related to a mind-set difference, the unavailability of resources or an environmental insecurity? It is unfortunate that the causation is unclear; this could be a future study worthwhile of investigation.

However, it is evident that the CTP has a positive effect on both Section A and B, although more evident in Section B. Therefore, both the Cognitive SRRA (School Readiness Risk Areas) and Fine Motor Coordination proved to have been improved by the CTP. On the contrary, Section C showed no improvement and therefore the CTP showed no positive effect on the gross motor coordination of the participants. By increasing the gross motor aspects in each lesson, the CTP may very well prove to be effective in improving the early childhood development of three to four year olds in rural ECD centres.

Basic occupational therapy principles (early developmental principles used by occupational therapists when approaching children) within an early childhood development programme will have a positive effect on the development and school readiness of children within our South African ECD sector, especially taking into consideration the fact that some or even most of the children in the rural ECD centres may have developmental delays to start with^{1,2,4}. These developmental delays may be caused by their immediate environments. The CTP may, upon further improvements, be a useful early childhood development programme to implement in ECD centres in rural areas and could help improve the South African ECD sector as a whole⁶.

Limitations of this study

The following aspects can be described as the limitations of this study:

- ❖ The drastic decrease in number of participants, even though this was taken into consideration during the planning of the study.
- ❖ The extent to which the ECD practitioners implemented the CTP is unclear as only two field visits were done. Therefore, it is unclear whether the CTP was implemented daily at the ECD centres of the experimental groups and can only be based on the minimum of once a week as was stated by the ECD practitioners.

- ❖ The duration of the intervention may have limited the distinction between the improvement in the results of the control and experimental groups. Longer duration between the pre-test and the post-test may have given more distinct variation between the two groups.
- ❖ The measuring instrument may also be a limitation to the study as the ECDC does not give finer measurements. Therefore, after only six months after the first test round the results do not indicate detailed differences.

Recommendations

Further studies regarding the CTP are recommended. The following studies could be conducted:

- ❖ A similar study can be conducted on a wider population group to determine the overall improvement in more South African communities.
- ❖ A similar study over a longer duration could be a valuable study in conjunction with the results of this study. Increased monitoring and field visits may improve the trustworthiness of such a study.
- ❖ A study may be conducted to determine whether the CTP enables the ECD practitioners' occupation of work. Such an investigation could allow an increased understanding of the value of a centre-based programme, such as the CTP, but regarding the ECD practitioners' occupation of work.
- ❖ A study focussing solely on the Gross Motor Development of the children could be of value, not only determining the efficacy of the CTP on the gross motor development of the children, but also investigating the general attitude towards such activities in the ECD sector.

It is further recommended that the following improvements may be implemented in the CTP, based on the results:

- ❖ Advancing the basic developmental principles based on occupational therapy may cause more significant improvement in the Cognitive SRRA aspects of the CTP.
- ❖ The Gross Motor Coordination aspects in the CTP should receive a great level of advancement and should be a focus of improvement.
- ❖ It is suggested that at least one gross motor coordination component should be introduced in every lesson plan. These components could be aligned with the basic developmental stages and basic occupational therapy knowledge could be a valuable guide in the improvement in this regard.

CONCLUSION

Although the importance of quality early childhood development is acknowledged in South Africa, there is still limited access to reach such outcome with minimal resources available. Currently, in the South African ECD sector, specifically in the rural areas, the problem is one of access and equity. This is due to the lack of a centre-based programme nationally provided and the inadequately trained ECD practitioners in the rural areas. Occupational therapists, as experts in occupation and change agents, should investigate possible resources to invest in the communities and advocate for the people living there.

Consequently, the CTP was investigated to determine the efficacy thereof on the early childhood development of three to four year olds in the rural Mahikeng areas. The results from the ECDC (Early Childhood Development Criteria) was used to compare the experimental group (n=21) and the control group (n=28). The results of the experimental group compared to the control group indicated a greater improvement in both Section A: Cognitive SRRA (School Readiness Risk Areas) and Section B: Fine Motor Coordination sections. Section C: Gross Motor Coordination showed no distinction between the results of the experimental and control groups

Therefore, this investigation proved the CTP to be a valuable

centre-based programme to implement in the rural, South African ECD sector. It is evident that the programme improves the cognitive SRRA and moreover the fine motor development of three to four year olds, specifically in the rural Mahikeng areas. It is, however, necessary to augment activities directed at gross motor development. It is recommended that future studies and improvements be continued on the CTP.

ACKNOWLEDGEMENTS

The authors wish to thank all the ECD practitioners, principles, parents, and participants of this study. We would also like to express our gratitude to Ms Emily Thloloe-Megalane for her invaluable contribution as the contact in the field. We also have great appreciation for Crossroads Educational Foundation and Mr Eddie Schoch for their significant involvement in the South African ECD community.

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