Essay

The Effects of Sensorimotor Stimulation on the Physical Development of Institutionalized HIV/AIDS Infants

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Submitted in partial fulfillment of the requirements for the degree
M.OccTher

In the

FACULTY OF HEALTH SCIENCES

At the

UNIVERSITY OF PRETORIA

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Submitted on
31/10/2008
South Africa is a country desperately struggling to combat the high number of persons suffering from the Human Immune Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS). These have further implications for the infants who become infected via mother-to-child transmission and are often orphaned due to parental death.

This study investigates the negative effects that both HIV/AIDS and institutionalization have on the physical development of infants, and a possible method of improving this delay through participation in a stimulation program known as the BabyGym Stimulation Program.

This study was a quantitative, prospective, cross sectional and quasi-experimental study. This study was a single blind study as the researcher was unaware of which participants were randomly assigned to an experimental group and a control group. The Peabody Developmental Motor Scales – second edition (PDMS-2), was used to assess all participants prior to the commencement of the BabyGym Stimulation Program and once more after participation in the program. Only the infants comprising of the experimental group participated in the BabyGym Stimulation Program.

Pre and posttest results were then analyzed between the respective groups. Graphs were used to present results as the number of participants was inadequate to show statistical significance. Experimental group infants showed a trend of improved physical development when compared to the control group infants.

Chapter 5: Conclusion and Recommendations

5.1 Introduction
This chapter looks at the original aim and objectives stated in Chapter 3, paragraph 3.2 and 3.3 of this study, and examines which were met and which were not achieved. The speculated reasons for either are discussed. Important aspects of Chapter 2: Literature review, are referred to, in order to support certain outcomes of this study.

The challenges experienced in this study are discussed, and recommendations for future studies of this nature are made. Furthermore recommendations are made, with this study’s results in mind, for institutionalized HIV/AIDS infants. The implications of this study are mentioned and its contribution to Cotlands discussed.
Finally it concludes the crux of the study with the outcomes achieved and the implications of these.

5.2 Aim and objectives of the study

5.2.1 Aim of the study

The aim of this study was stated as follows:

This study aimed to determine if institutionalized HIV/AIDS infants, who had participated in the BabyGym Stimulation Program, showed an improvement in the quality of their physical development, when compared to institutionalized HIV/AIDS infants who were not included in the program.

The physical development of the infants was assessed through use of the PDMS-2. The total motor quotient of the PDMS-2, in this study, indicated the overall physical developmental progress of an infant. This is derived from the infant’s performance in all the subtests of the PDMS-2, and subsequently the infant’s fine motor quotient and gross motor quotient. The total motor quotient is therefore equivalent to physical development in this study. An improvement in an infant’s total motor quotient score from the pretest to the posttest would indicate an improved quality of physical development, whereas a decrease in an infant’s total motor quotient score would indicate that that infant’s quality of physical development is deteriorating.

Chart 17 (paragraph 4.4.9) showed that a greater number of infants who participated in the BabyGym Stimulation Program showed improvements in their total motor quotients scores at the posttest, when compared to the infants who did not participate in the program. The aim of this study was therefore met and institutionalized HIV/AIDS infants who had participated in the BabyGym Stimulation Program did show an improvement in the quality of their physical development, when compared to the institutionalized HIV/AIDS infants who were not included in the program.

5.2.2. Objectives of the Study

Each objective of the study was represented by one subtest of the PDMS-2. The corresponding chart (paragraph 4.4.) showing the infants’ performance in each subtest was therefore used to determine whether an objective was met or not. If a greater number of infants who partook in the BabyGym Stimulation Program showed improvement in their standard scores on a subtest as compared to the infants who did not partake in the BabyGym Stimulation Program, then it would indicate that an objective was met. If however a greater number of infants who did not partake in the BabyGym
Stimulation Program showed an improvement in their standard scores on a subtest, than the infants who did partake in the BabyGym Stimulation Program, it would indicate that an objective was not met.

The objectives of the study were listed as follows:

5.2.2.1 To determine if the grasping ability of institutionalized HIV/AIDS infants, showed an improvement in quality after involvement in the BabyGym Stimulation Program.

*This objective was met in this study:* Chart 13 (paragraph 4.4.5) showed that a greater number of institutionalized HIV/AIDS infants who had participated in the BabyGym Stimulation Program, showed an improvement in the quality of their grasping when compared to the number of HIV/AIDS infants who had not participated in the program.

5.2.2.2 To determine if the reflex presentation of institutionalized HIV/AIDS infants, showed an improvement in quality after involvement in the BabyGym Stimulation Program.

*This objective was marginally met in this study:* Chart 9 (paragraph 4.4.1) showed that a slightly greater number of institutionalized HIV/AIDS infants who had participated in the BabyGym Stimulation Program, showed an improvement in the quality of their reflex behaviour when compared to the number of HIV/AIDS infants who had not participated in the program.

5.2.2.3 To determine if the stationary control of institutionalized HIV/AIDS infants, showed an improvement in quality after involvement in the BabyGym Stimulation Program.

*This objective was met in this study:* Chart 10 (paragraph 4.4.2) showed that a greater number of institutionalized HIV/AIDS infants who had participated in the BabyGym Stimulation Program, showed an improvement in the quality of their stationary control when compared to the number of HIV/AIDS infants who had not participated in the program.

5.2.2.4 To determine if the locomotion performance of institutionalized HIV/AIDS infants, showed an improvement in quality after involvement in the BabyGym Stimulation Program.

*This objective was not met in this study:* Chart 11 (paragraph 4.4.3) did not show that a greater number of institutionalized HIV/AIDS infants who had participated in the BabyGym Stimulation Program, showed an improvement
in the quality of their locomotion when compared to the number of HIV/AIDS infants who had not participated in the program.

5.2.2.5 To determine if the object manipulation skills of institutionalized HIV/AIDS infants, showed an improvement in quality after involvement in the BabyGym Stimulation Program.

*This objective was not met in this study:* Chart 12 (paragraph 4.4.4) did not show that a greater number of institutionalized HIV/AIDS infants who had participated in the BabyGym Stimulation Program, showed an improvement in the quality of their object manipulation when compared to the number of HIV/AIDS infants who had not participated in the program.

5.2.2.6 To determine if the visual motor integration of institutionalized HIV/AIDS infants, showed an improvement in quality after involvement in the BabyGym Stimulation Program.

*This objective was met in this study:* Chart 14 (paragraph 4.4.6) showed that a greater number of institutionalized HIV/AIDS infants who had participated in the BabyGym Stimulation Program, showed an improvement in the quality of their visual motor integration when compared to the number of HIV/AIDS infants who had not participated in the program.

5.3 Discussion on speculated reasons for those objectives met and those objectives not met in this study

This study therefore met the objectives of the subtests for grasping, reflex behaviour, stationary and visual motor integration. The objectives for locomotion and object manipulation were not met. Reasons for the objectives which were met can be explained by the inherent nature of the BabyGym Stimulation Program. The BabyGym Stimulation Program presents the infants with a variety of colourful, textured objects of various sizes and shapes throughout the duration of the five week program. The infants are encouraged to reach out to these and track them while they are moving, grasp them and play with them, thereby facilitating eye-hand coordination and grasping.

The ‘energizing’ massage which is presented to the infants during the BabyGym Stimulation Program in the second week, makes use of the Neurodevelopmental Theory principles of fast stretch and trunk rotation to facilitate muscle tone, and hence improves postural control in a stationary position. This would explain the improvement in quality of the
stationary performance of the infants who participated in the BabyGym Stimulation Program. Prone extension (coherent with a Sensory Integration frame of reference) is also encouraged during ‘rug- time’ and when lying prone on a ball, thereby stimulating the labyrinth reflex through activation of the otolith organ in the inner ear, resulting in an increase in postural tone. Core muscle strengthening exercises are introduced during the third week, and this furthermore aids to this achieved objective.

One of the driving theories of the BabyGym Stimulation Program is that of the Triune Brain Theory as discussed in paragraph 2.5.1. This theory emphasizes the importance of the survival brain and consequently reflex integration. It states that the survival brain is the foundation of all learning and thinking later on in life, and thus if reflex integration is disturbed, productive brain functioning will be implicated at a later stage. The BabyGym Stimulation Program thus ensures activities in which it elicits, enhances and integrates age appropriate reflexes. This would therefore explain the reason for the reflex subtest objective being met in this study.

Speculated reasons for objectives not being met in this study, are coherent with the health status of the infants at the time of the posttest. Four out of the five infants who partook in the BabyGym Stimulation Program, presented with Diarrhoea at the posttest. As mentioned in Chapter 2: Literature review, the health detriments which these HIV/AIDS infants are faced with, fatigue their little bodies and thus restricts their movement. It would then not come as a surprise, that the locomotion subtest objective of this study was not met. An infant could possibly maintain postural control appropriately in a seated position, but the effort needed to crawl, may be exhausting if poor health is present. In a similar manner, an infant may grasp a rattle correctly, but shaking it could be excessively tiring if the infant is ill. This would suggest a possible reason then for the fact that the grasping subtest objective was met in this study, but not the object manipulation subtest objective.

5.4 Hypotheses
Hypothesis testing could not be carried out in this study as there were an insufficient number of participants in order to make it statistically significance.

5.5 Challenges encountered during the study
One of the challenges experienced during this study was finding a BabyGym Instructor who was willing to give up time and effort to participate in training the Stimulation Coordinator of Cotlands and a volunteer over a five week period.
without being remunerated. This problem was however quickly solved when Dr. Melodie de Jager approached Karen van Zyl, who had been a previous Stimulation Coordinator at Cotlands, and had since done her BabyGym Instructors training. Karen was more than willing to lend a hand, knowing that it would benefit the infants at Cotlands.

Secondly, the scheduling of a time table which suited the researcher, the BabyGym Instructor, Cotlands, the Stimulation Coordinator, the volunteer and the infants, was a rather daunting task. A collective meeting was held and through brainstorming, rearranging, altering and compromising a schedule was finally drawn up which was suitable for everyone.

Ensuring 10 participating infants in the study was furthermore a challenge as at the time of the pretest, only seven infants in Cotlands fell under the age of 14 months. The inclusion age was therefore increased by two months to include three 15 month old infants into the study.

The final challenge which held implications for the outcome of this study was the Diarrhoea outbreak during the week of the post testing. This however is the reality of not only the Human Immunodeficiency Virus, but also of living in close proximity to many other infants as one would expect in a Children’s Home. HIV/AIDS infants are susceptible to various viral infections due to lowered immune systems, and if these are contagious, the spread of the virus is encouraged by the close proximity. Thus this challenge merely reflected the reality of the developmental challenge facing institutionalized HIV/AIDS infants which is described in Chapter 2: Literature review, paragraph 2.2.
### 5.6 Limitations and strengths of the study

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<tr>
<th>Limitations</th>
<th>Strengths</th>
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<tr>
<td>The number of infants participating in the study was not significant enough to show statistical results</td>
<td>Environmental variables such as routine, diet and stimulation were controlled by taking all participants from one institution, thereby reducing the multitude of factors influencing development.</td>
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<td>Only one institution was utilized from which to gain participants, thereby reducing the ability to generalize results to the general population of institutionalized HIV/AIDS infants</td>
<td>Stimulation was consistently provided to the infants by the same care providers thereby further reducing different handling techniques and ways of applying stimulation to the infants. This provided consistent routine and handling of the infants.</td>
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<td>An outbreak of Diarrhoea influenced the results of the study in the week of post testing</td>
<td>This outbreak of Diarrhoea during the posttest week provided a realistic presentation of the associated illnesses caused by HIV/AIDS and their impact on development through this study. The researcher was therefore able to see the impact of Diarrhoea on development of the infants through the results of this study, and not only through the literature reviewed for Chapter 2.</td>
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<td>True randomization did not occur as all the HIV/AIDS infants who were available in Cotlands at the time of the study and met the inclusion criteria were taken as participants</td>
<td>The researcher was blind as to which infants formed part of the control and the experimental groups until they were revealed to her once all testing had been completed, ensuring a single blind study.</td>
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<td>This study benefited not only the infants who partook in it, but also the entire Cotlands institution, as they were provided with the necessary equipment and training to continue executing the BabyGym Stimulation Program on all infants in their care.</td>
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<td>The BabyGym Instructor demonstrated particular stimulation exercises once a week to the Stimulation Coordinator and volunteer, and those exercises were carried out three times on each experimental group infant during that week, thereby reducing confusion of different stimulation exercises and ensuring that each infant received the correct stimulation every week.</td>
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5.7 Recommendations

5.7.1 Recommendation regarding future research in this field

Firstly it is recommended that a greater number of infants are recruited to participate in a study in order to ensure that it is statistically significant. It is secondly recommended that not only one institution caring for HIV/AIDS infants is used to recruit participants for the study from, but rather that various institutions across the country are used to enable the research to be generalized to the wider population. A study involving infants from various Children’s Homes should however be prepared for the numerous variables which then could interfere with development, a study of this nature should therefore ensure large numbers of participants and stringent control of not only the stimulation exercises but also the daily care the participants would be receiving. Thirdly it is recommended that sensory registration, orientation and modulation be researched as a further objective, in addition to the physical development of the infants, to evaluate the efficacy of the BabyGym Stimulation Program in enhancing sensory processing.

Future recommendations could include providing the BabyGym Stimulation Program training to adoptive parents so that the stimulation including the massage can be continued at their home and in so doing provide continuity.

It is recommended that the long term effects on cognition and emotional development, of infants who have received the BabyGym Stimulation Program be researched.

5.7.2 Recommendations for future stimulation programs in institutions providing care for HIV/AIDS infants

The BabyGym Stimulation Program has been shown to have beneficial results for the physical development of institutionalized HIV/AIDS infants, and therefore developmental stimulation in general is recommended as a crucial part of any program in institutions caring for these infants. The implementation and execution of the BabyGym Stimulation Program within Cotlands itself, on all the infants in their care, is highly recommended as this study yielded a positive trend to improved physical development. Is it however also recommended that only the trained individuals, and not the caregivers who did not receive the necessary training, provide the stimulation to the infants. This is advised due to the nature of the stimulation activities which the infants are involved in. Many of the activities activate the vestibular system.
through various movements such as rocking over a ball, bouncing in a hammock etc. If the person providing the stimulation is not aware of the potential risks of this movement or various positions such as inversion, he/she may not identify warning signs in the infant, especially if it is an infant with gravitational insecurity or any other sensory processing disorder, and it could be harmful to the infant. Training is therefore advised.

The BabyGym Stimulation Program proved to be an all encompassing method of applying stimulation in both gross and fine motor areas, to infants. Its efficacy is stimulating sensory responsiveness should be further investigated.

The accessibility of the BabyGym Stimulation Program, and programs similar to this one, should be investigated to ensure that infants requiring developmental stimulation are able to attain it easily and cost effectively.

5.8 Implications of the study

5.8.1 Implications of the study on the infants residing in Cotlands, and Cotlands itself

The study held beneficial outcomes for the infants who participated in the BabyGym Stimulation Program by demonstrating improved reflex behaviour, stationary postural control, grasping and visual motor integration.

Through the study Cotlands was furthermore provided with all the necessary training and equipment, through donation by the BabyGym Organization, to execute the BabyGym Stimulation Program on all infants in their care. The Stimulation Coordinator of Cotlands and the volunteer were trained in the execution of the BabyGym Stimulation Program, so that they could provide the stimulation to all other infants and incorporate the program into their daily schedule.

The volunteer’s involvement in the study further benefited her in her career as follows: she was undergoing her gap year at Cotlands in South Africa from England. She had previously decided to study tourism on her return to England, but when starting work at Cotlands found early intervention very rewarding and hence applied for this in England, she was however not admitted. On completion of the BabyGym Stimulation Training received during the study, she applied once more and because of this and her involvement in the study, was accepted, so on her return to England later this year, she will studying Early Intervention.

This study is not merely an isolated case, but Karen van Zyl (the BabyGym Instructor who offered up her time to train the Stimulation Coordinator and volunteer at Cotlands) would like to investigate this trend of improvement shown in this...
study further, and is planning to do her doctoral research (she currently has her masters degree in Social Work) in the efficacy of the BabyGym Stimulation Program on the development of infants. This study therefore added to the literature base from which she will gain research.

5.8.2 Implication for developmental stimulation of HIV/AIDS infants
This study reflected a trend of improvement in physical development of HIV/AIDS infants on initiation of developmental stimulation. This supports the work of Occupational Therapists with these infants and shows that even though their lowered immune system has a negative impact on their development, that stimulation can counter this to a certain extent, or maintain developmental levels preventing regression for as long as possible. Appropriate developmental stimulation should therefore be necessary in all institutions providing care for HIV/AIDS infants, as well in homes where mothers, guardians or other family members take care of these infants.

5.9 Concluding Statement
An innocent infant born with the burden of having to bear HIV/AIDS is the sad reality in the world in which we live today. This crippling disease has in itself so many complications in store for the little body which it inhabits. If through developmental stimulation we can in anyway improve the function of these infants and help actualize the reality of improved quality of life, then every which way in which this stimulation can be provided should be investigated. The BabyGym Stimulation Program proved itself as one of these possibilities.

As is a tale, so is life: not how long it is,
But how good it is, is what matters.

-Seneca