A COMPARISON OF TREATMENT PROTOCOLS FOR INFANTS WITH MOTOR DELAY

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Abstract

Purpose: Early intervention (EI) strategies are reported to have positive results on decreasing the extent of motor delay in children. However, most studies regarding treatment of infants with motor delay as a result of psychosocial/environmental factors have taken place in developed countries where resource constraints are not as severe as in the South African context. The aim was thus to determine which intervention protocol (standard vs. intense group orientated therapy) was the most feasible and efficacious for infants with motor delay, primarily due to psychosocial/environmental factors.
Methodology: A cross sectional, descriptive, correlational research approach was used to identify infants with motor delay using the Bayley Infant Neurodevelopmental Screener III (BINS) at three Well Baby clinics. After a baseline assessment, infants who met the criteria to participate entered an experimental study consisting of a single blinded randomized control trial. The final sample included 24 infants aged 3 to 12 months. Participants were randomly divided into two groups and a repeated measures design was followed to conduct this study. The Bayley Scales of Infant Development II (BSID II) was used to evaluate motor progress over a three month intervention period. The standard group received treatment once a month for three months compared to a weekly treatment session attended by dyads in the intense group. Care-giver compliance along with their level of satisfaction was investigated using self-structured questionnaires.
Results: Twenty four participants were recruited with a mean age of 5.69 months (SD= 2.36; range 3-10.4). Both monthly and weekly treatment groups showed significant motor developmental progress over the intervention period. The overall difference between the groups was not significant (p=.78) and by the final assessment, during the intervention period, both groups displayed similar psychomotor developmental indices (monthly: mean= 87.92, SD= 10.87, range 73-109; weekly: mean= 94.18, SD= 7.63, range 85-109). However there was a medium to large effect size (*d*= 0.65) in favour of the weekly treatment group and they also showed better initial developmental progress after 1 month compared to the gradual trend of progress illustrated by the monthly group. After treatment sessions were withheld for six weeks, an assessment of motor performance showed the monthly group retained their skills better than the weekly group. This difference had a medium effect size of *d*= 0.58 in favour of the monthly group. Care-givers generally showed a high level of satisfaction with no significant differences between groups (p= .64). Similarly, no statistically significant difference was found between the groups in terms of compliance to the home programme.
Conclusion: Both the intense and standard group orientated treatment protocols had significantly positive results after treatment. The intense group showed rapid initial progress compared to the monthly group. However, the monthly group better retained their skills after treatment was discontinued. Therefore, in a South African, low socio-economic context, the monthly protocol might be more practical and cost effective.

Table of Contents

List of Tables

List of Figures

List of Appendices

Glossary

Motor delay: When an infant experiences a lag in the acquisition of gross and fine motor milestones.

Care-giver: For the purpose of this study, the primary care-giver was considered as the person who takes care of the infant for a significant period of time on a daily basis. Care-givers may have been legal guardians or biological mothers or fathers.

Dyad: The care-giver and infant pair who attended the clinic and the treatment sessions together.

The Home: The research setting where the assessments and treatment sessions took place.

Areas 1, 2 and 3: The Well Baby clinics where screening occurred were based in these areas. Areas have been coded to ensure anonymity.

Level of Education: The number of years of education successfully completed by the care-giver. This includes primary, secondary and tertiary education.

False positive: When a result is wrongfully positive for motor delay when in fact the infant has normal motor performance.

Specificity: The ability of a tool to correctly identify true positives, i.e. infants who are motor delayed.

List of Abbreviations

AIMS	- Alberta Infant Motor Scale
ASD	- Autism Spectrum Disorder
ASQ	- Ages and Stages Questionnaire
BINS	- Bayley Infant Neurodevelopmental Screener
BSID	- Bayley Scales of Infant Development
CP	- Cerebral Palsy
DS	- Down's syndrome
ECI	- Early Childhood Intervention
ELBW	- Extremely Low Birth Weight
FAS	- Foetal Alcohol Syndrome
GMFM	- Gross Motor Function Measure
HIV	- Human Immunodeficiency Virus
MDI	- Mental Developmental Index
MPOC	- Measure of Processes of Care
MR	- Magnetic Resonance
NDT	- Neurodevelopmental Therapy
NTT	- Neuromotor Task Training
PDI	- Psychomotor Developmental Index

PDMS	- Peabody Developmental Motor Scales
RCT	- Randomized Control Trial
RTHC	- Road to Health Chart
VAS	- Visual Analogue Scale
WHO	-World Health Organisation

1. Introduction

Early intervention (EI) strategies are reported to have positive results on decreasing the extent of motor delay (Frank et al., 2002; Gianni et al., 2006; Potterton et al., 2009). However, most studies regarding treatment of infants with motor delay as a result of psychosocial/environmental factors have taken place in developed countries where resource constraints are not as severe as in the South African context (Mayo, 1991; Mintz-Itkin et al., 2009; Harrison, 2010; World Bank, 2008; World Bank, 2006).

Motor delay falls under the umbrella term 'developmental delay' and is described by Cappiello and Gahagan (2009: 1501) as the "late acquisition of developmental milestones." An infant displays 'motor delay' when he or she experiences a lag in the acquisition of gross and fine motor milestones. A study in 2009 on the development of children in resource poor areas in Cape Town, reported that the average motor developmental quotient was 10% lower than the normed Bayley Scores (Ferguson and Jelsma, 2009), an indication that the infants were lagging behind their peers in well resourced countries.

1.1. Background

1.1.1. Motor Delay - Aetiology

VanSant (2005) states that motor delay in infants can be attributed to either external and/or internal factors. External risk factors for the occurrence of motor delay include psycho-social and environmental factors such as poverty, factors related to the home environment, low maternal education, decreased stimulation at home and maternal depression (Delgado et al., 2007; Halpern et al., 2008; Handal et al., 2007; Petterson and Albers, 2001; Weinreb et al., 2002). Field (2000) reported that maternal depression is associated with “inadequate stimulation” and poor interaction with their infants because of their withdrawn behavior which may affect the development of the infant. Similarly, infants living in poor communities where the household income is severely limited are prone to illness and lack of stimulation as parents cannot afford to provide adequate nutrition and care (Handal et al., 2007). The expectations of parents can also affect the motor development of infants. Low levels of expectation can lead to poor motor development because parents do not create a stimulating environment suitable to challenge their infant’s motor abilities (Abbott and Bartlett, 1999).

Motor delay has previously been associated with internal factors such as HIV (Ferguson and Jelsma, 2009; Baillieu and Potterton, 2008) and foetal alcohol syndrome (FAS) (Kvigne et al., 2004).The management of symptoms related to HIV and FAS is of significant value to the South African population because of the high prevalence of these conditions experienced in this country (Viljoen et al., 2005;). Therefore South African infants are at risk of being exposed to these internal factors which could possibly lead to the development of motor delay.

In the under-resourced suburbs of Cape Town, South Africa, poverty and unemployment rates are high. This places the children born into these communities at risk of delay. Many mothers in these communities have low levels of education as well, further predisposing to delay (Miller and Sonti, 2006).

1.1.2. Impact of Motor Delay in Infancy

Motor delay in infancy has both short and long term consequences for childhood development. Sullivan and McGrath (2003) found that four year old children born at term had significantly higher motor scores than children of the same age who were born preterm. When the same group of children was assessed at the age of 8 years, there was a correlation found between their motor scores and academic achievements. The children who had better motor performance scores at age four had better age eight academic scores. Results also showed that the children, who were born preterm, made use of the school services more often compared to the group who were born at full term.

Research done by Blondis et al. (1993) provided evidence which indicates that the early intervention of infants with motor delay helps them close the gap between them and typically developing infants. The motor delayed group did seem to outgrow their delay in some domains of motor development over the three year period of the study. However, the fact that they only outgrew some domains is significant justification to continue developmental stimulation in these groups.

1.1.3. Identifying Motor Delay

Various tools have been developed to screen infants for developmental delay. Popular screening tools include the Bayley Infant Neurodevelopmental Screener (BINS; Aylward, 1995), the Alberta Infant Motor Scale (AIMS; Piper and Darrah, 1994), the Ages and Stages Questionnaire (Squires et al., 1999) and the Denver Developmental Screener II (Frankenburg and Dobbs, 1990). These tools are used as an initial test to determine whether an infant is developmentally delayed.

Assessment of an infant's level of motor development can also be conducted using standardised motor assessment tools. Popular motor assessment tools are the Peabody Developmental Motor Scales II (PDMS-2; Folio and Fewell, 2000), the Bayley Scales of Infant Development II (BSID-II; Bayley, 1993) and the Gross Motor Function Measure (GMFM; Palisano et al., 1997).

The South African Department of Health uses the Road to Health Chart (RTHC) to identify infants and children with developmental abnormalities or health related problems. This chart is a home-based record monitoring a child's health, growth and development and is often the most accurate way of retrieving information from parents (Road to Health Chart, 2003). However, the WHO Multicentre Growth Reference Study Group (2006) has found that the association between physical growth and motor development has limited significance, and therefore the use of the RTHC to identify motor delay is not considered appropriate.

In the Western Cape infants attend primary health care clinics at least three times within their first 18 months for their scheduled immunizations and to monitor their growth. If a developmental delay is detected during one of these visits, an infant should be referred to a specialised facility for further investigation or rehabilitation if needed (Child Developmental Screening and Growth Monitoring, 2006). At these specialised facilities the health professionals generally use a problem-based assessment method, such as the Infant Neuromotor Assessment, to diagnose or monitor motor related conditions (S. Rahim, personal communication, 27 January, 2010). These tools were not developed to identify infants with motor delay as a result of external factors but rather to monitor infant motor performance of biologically 'at risk' population (Magasiner et al., 1997). Therefore problem-based tools may not be sensitive enough to identify or monitor progress relevant to infants with motor delay because of external factors.

1.1.4. Intervention

Infants with motor delay are generally treated by physiotherapists. The types of therapy offered by therapists vary in terms of the therapy approach used, the environment in which the therapy is carried out, group versus individual treatment approaches, and the intensity of the treatment given to the infants.

1.1.4.1. Approaches

Various intervention approaches for infants with motor delay are applied by physiotherapists according to the therapists' preference or the infant's unique need. Neurodevelopmental Therapy (NDT) formulated by Bobath and Bobath in 1964 is a popular and effective therapeutic approach for treating motor delay (Tsorlakis et al., 2004; Mintz-Itkin et al., 2009). It aims to improve motor development and reduce musculoskeletal complications (Ottenbacher et al., 1986). There have been conflicting results with regards to the effectiveness of NDT, but research by Tsorlakis et al. (2004) found that there was a significant improvement of motor function in children with cerebral palsy after applying an NDT approach, regardless of the intensity of treatment applied to the participants.

Previous studies have also experimented with combining treatment approaches such as NDT and Sensory Integration Therapy (Ayres, 1972) (more often used by occupational therapists) and found significant improvement in the gross motor function of infants who experience motor delay (Jenkins and Sells, 1984). Gagliardi et al. (2008) emphasize the importance of a multi-disciplinary team approach when treating children with motor delays (and more specifically, cerebral palsy).

1.1.4.2. Environmental Context of Intervention

There are different opinions about the most suitable environment in which therapy or exercises should take place. Researchers have found therapy to be more successful when a home-based programme is integrated into the treatment plan for older children (Katz-Leure et al., 2009). Mahoney and Perales (2006) highlighted the fact that parents have the greatest opportunity to influence a child's motor development, as they spend more time with their children. Intervention programmes targeting mother-child interaction have produced significant results showing an improved developmental outcome (physical and mental), directive behaviours and handling skills of parents of infants with motor delay (Chiarello and Palisano, 1998; Gianni et al., 2006). These studies were conducted in the United States of America and Italy respectively and it is unlikely that the same social structures are present in South Africa. Currently treatment is conducted more often at facilities equipped for this purpose, also producing a significantly improved outcome of children with developmental delay (Densem et al., 1989; Jenkins and Sells, 1984; Shumway-Cook et al., 2003; Woollacott et al., 2005). Both the facility and the community-based treatment setting has produced positive outcomes with the regards to the motor performance of infants with motor delay, but they have not been compared in a South African environment to determine which treatment environment is the most favourable for South African infants (Trahan and Malouin, 2002; Gagliardi, 2008; Mayo,1991).

In terms of group versus individual treatment approaches, McNevin et al. (2000) conducted a review of literature on the implications of “Attentional Focus, Self-Control, and Dyad Training on Motor Learning”. They point out the obvious cost reduction associated with therapy conducted in larger groups and also the fact that group therapy gives participants the opportunity to experience learning by means of observation.

1.1.4.3. Intensity and Frequency

Research has produced mixed results for the most effective design for treatment intensity and treatment frequency. Block treatment is a design which entails intense treatment for a short period of time, followed by a period where the treatment is omitted, before it commences with another period of intense treatment. A study conducted by Trahan and Malouin (2002) produced results which showed preference to block treatment compared to a standard once or twice a week treatment regime; however, more recent research has shown that the motor outcome between the participants receiving block treatment and those receiving standard treatment was identical (Christiansen and Lange, 2008).

There have also been conflicting results with regards to treatment frequency in the past. Studies have shown that treatment provided more frequently (5 times a week) to children with motor delay and cerebral palsy produced significant improvements in motor outcome (Tsorlakis et al., 2004; Gagliardi et al., 2008). However, researchers have also found no significant difference between children receiving treatment on a regular basis compared to those who receive treatment on a less regular basis (Jenkins and Sells, 1984; Ustad et al., 2009).

There has been a lack of consensus regarding the best treatment programme that promotes the retention of skills. In a study by Trahan and Malouin (2002), eight week rest periods without any therapy were incorporated between intervention periods in their programme. Motor assessments after these rest periods suggested that that there was no significant increase or decrease in motor ability after the rest period. However, this study had a very small sample size (n=5). Savion-Lemieux and Penhune (2004) (n=58) also examined retention of motor skills in participants with normal development, assigned to either intense or variable delay practice schedules at intervals of 2,4,6 and 8 weeks. This study concluded that the practice intensity had no effect on the learning and retention of motor skills of participants. However, the period of delay between practice sessions had an effect on learning and retention of motor skills. The groups, who had a practice delay of less than eight weeks, retained skills to a greater extent than the group assigned to an eight week practice delay.

1.2. Aims and Objectives

It seems likely that there are a large number of infants in the under-resourced areas of Cape Town who may exhibit motor delay. Although the standard of care offered to those who do receive physiotherapy is on a monthly basis within a central hospital, this may not be the most effective form of intervention.

1.2.1. Aims

The main aims of this study were firstly to document the prevalence and the extent of motor delay in infants aged 3 to12 months living in a small under-resourced population of Cape Town attending the clinics based in under-resourced areas and included in the research. Secondly the study aimed to compare the impact of an intensive (weekly) group-based protocol of intervention with a monthly intervention which would be equivalent to the present standard of care, on motor performance in infants who exhibit delay.

1.2.2. Objectives

The study was divided into two phases, each with specific objectives:

Phase 1: Measuring the prevalence of motor delay

The main aim of phase one was to identify infants with motor delay and to determine the extent of motor delay amongst infants, aged 3-12 months, living in a small population of poorly resourced communities in the Cape Metropole. This phase also served as a method of recruiting suitable participants for phase two of the study. The specific objectives of phase one were:

1. To identify and determine the nature of motor delay amongst infants in poorly resourced communities in Cape Town using the Bayley Infant Neurodevelopmental Screener III (BINS III) and the Bayley Scales of Infant Development-II (BSID-II).
2. To compare the characteristics of infants who presented with motor delay with those who did not. These characteristics included:
    a. Area of residence
    b. Gender
    c. Income of family
    d. Employment status of care-giver
    e. Level of education of care-giver
    f. Medical history of the child (birth weight, gestational age)

Phase 2: The efficacy of a pilot intervention for motor delay

The main aim of the second phase of the study was to determine the efficacy of an intervention for infants with motor delay, by comparing two treatment models. These models are described in the next section. The specific objectives were:

1. To determine whether a group orientated programme of intense physiotherapy (i.e. weekly sessions) resulted in a greater improvement of scores on the BSID-II than a monthly intervention. This is the primary outcome measure. The treatment was instituted over a three month period.

2. To determine if any improvement detected in the BSID-II scores was maintained over a six week period after the cessation of intervention, and whether there was a differential improvement between the two groups.

3. To evaluate and compare the care-givers' level of satisfaction with the model of intervention as measured by self-constructed questionnaire.

4. To evaluate the care-givers' compliance with regard to both attendance and adherence to home advice given, using a self constructed questionnaire.

1.3. Research Setting

The recruitment and screening of infants took place at three community health centers (CHC) located within the communities surrounding the intervention setting. CHC's are facilities where the public can access health care services. These communities are referred to as Areas 1, 2 and 3.

The communities from which the sample was drawn can be described as under-resourced and impoverished according to data from the National Census (2001) as 33.19% of males and 23.29% of females in were employed. Twenty two percent of the community reside in informal shacks and 48% of the community earn less than R20 000 per year (Miller and Sonti, 2006).

At each CHC, care-giver-infant pairs were recruited from attendees of the “Well Baby” clinics. Well Baby clinics provide immunization, growth monitoring services and nutritional support to their attendees. Dyads attend these clinics at least 3 times in the first 18 months of an infant’s life. A visit to the CHC starts off with the infant being weighed, after which the care-giver and infant wait in a queue to receive age-appropriate immunizations. The attending sister who administers the immunizations briefly screens the infant for developmental discrepancies and questions the mother on the general health of the infant. The infant then gets referred to health professionals in specialised fields (dietician, doctor, etc.) who manage them for possible complications if needed.

The intervention component of this study was based at a Residential Children’s Home for infants and children with special needs. There are rehabilitation staff at the Home but they were not involved in the study. The Home is based 3.7km from Area 1, 1.5km from Area 2 and 2.2km from Area 3.

1.4. Justification for the Study

Many studies related to infant motor performance focus on infants or children with specific health conditions, such as HIV or cerebral palsy. The impact of socio-economic or environmental causes of motor delay is not widely reported in the literature. Apart from a study by Ferguson & Jelsma (2009), a review of the available published literature, suggests that very little is known about the prevalence of motor delay among infants residing in poor communities in Cape Town. It has been reported that impoverished circumstances contribute to motor delay in infants and it was thus expected that children in need of interventions would be found in these communities.

In South Africa a standard monthly treatment regime has been adopted in several public facilities in both rural and urban areas due to transport problems faced by patients and limited staff and resources available to attend to infants with motor delays (Sampson, 2009; Njajula, 2010, personal communication). These monthly treatments are administered by therapists to individual children and in groups (although not often). The evidence is inconclusive as to whether a higher or lower frequency or a higher or lower intensity treatment model is most effective when treating infants with motor delay. South Africa has produced little research investigating a suitable treatment model for its population; especially those infants who are more frequently exposed to external factors that contribute the development of motor delay (King et al., 1992; Halpern et al., 2008; Simpson et al., 1998). Furthermore, infants with a history of internal risk factors (low birth weight and prematurity) live in these areas and the possibility exists that these infants forego the opportunity to benefit from early intervention.

Therefore we are faced with a problem. Motor delay among infants is a cause for concern. It is also unclear whether intervention can ameliorate the impact of delay. It is unknown whether intense treatment is more effective/efficacious than standard intervention in terms of outcome.

1.5. Significance of the Study

As the long term impact of motor delay may include poor performance at school (Sullivan and McGrath, 2003) and in physical activities, an appropriate intervention programme needs to be developed to meet the needs of infants with delay and their guardians. In order to plan an appropriate programme, information is needed on the number of infants who require services and also on the most effective form of management. The results are important to physiotherapists who could use the information to adjust their treatment regimes to obtain the most productive outcome for those infants suffering from motor delay who reside in low-economic areas.

As the context of intervention is important, the study determined the effectiveness and not efficacy of the intervention (Spraycar, 1995; Fletcher et al., 1982 as cited by Pittler and White, 1999). In other words, the results were intended to inform physiotherapists as to what treatment protocol works best within the real world context of the health system and the socio-economic situation of the care-givers (effectiveness) instead of an ideal or controlled setting (efficacy). In addition, the less commonly utilised model of intervention used group treatments instead of individual treatments may enable a therapist to treat more infants on a regular basis if resources are constrained.

2. Literature Review

2.1. Introduction

Motor delay refers specifically to delays in the acquisition of gross and fine motor milestones such as crawling or development of a pincer grip for example. Infants who experience delayed motor development are often not identified timeously and may be overlooked when decisions are made regarding referral for therapeutic services. This is even more pronounced in developing countries where health care resources and staff are often limited (Harrison, 2010; World Bank, 2008; World Health Organization, 2006).

This review has been structured in four sections initiated by a discussion regarding the epidemiology of infant motor delay which continues on to evaluating the impact of infant motor delay. This is followed by an exploration into identification and assessment of motor delay and the options for treatment approaches available for infants with delayed motor performance. Finally, methodological issues related to research in pediatric intervention studies are explored including the concern regarding the compliance of the participants are discussed.

Various sources were used to review literature on the relevant topic. Journal articles were retrieved from electronic search engines, namely PUBmed, EBSCO and Google Scholar. Key words in these electronic searches included: motor delay, motor milestones, infants, screening tools and measurement instruments. These electronic databases also served as a source from which references within articles and textbooks were located. The University of Cape Town Medical School Library also provided printed textbooks from which literature was sourced.

2.2. The Epidemiology of Infant Motor Delay

The epidemiology of infant motor delay gives a background on the meaning, prevalence, the aetiology and the methods of identifying or diagnosing infant motor delay. Where possible, these factors are illustrated in the context of developing countries to better comprehend the impact of motor delay in South Africa.

2.2.1. Defining Motor Delay

Motor delay is defined as a lag in motor development of infants compared to a norm referenced sample (Bayley, 1993). Norm referenced assessment measures are often used to make a diagnosis of delay, whereby an infant's motor skills are compared to a norm referenced sample to determine whether their skills are on par with their peers. Characteristics of motor delay include delayed achievement of gross and/or fine motor milestones (Majnemer and Barr, 2005; WHO Multicentre Growth Reference Study Group, 2006).

2.2.2. Prevalence of Motor Delay

Literature regarding the prevalence of motor delay amongst infants without defined medical conditions is limited, whereas numerous studies on the prevalence of motor delay have been conducted amongst infants with illnesses. For this reason, the prevalence of infant motor delay will be discussed in terms of prevalence within general populations of typically developing infants without known medical risk factors for delay and within high risk populations, with known risk factors for delay.

2.2.2.1. General populations

There is a paucity of literature measuring the prevalence of motor delay amongst infants in general populations. Population studies investigating the prevalence of developmental delay in infants have examined the link between delayed motor development and socio-economic factors (Giagazoglou et al., 2007; Halpern et al., 2008; McPhillips and Jordan-Black, 2007).

Infants living in poor circumstances have been reported to have a higher prevalence of motor delay (Halpern et al., 2008). A birth cohort study conducted by Halpern et al. (2008) exploring the prevalence of developmental delay among a sample of children living in Brazil, found that children with poorer backgrounds had a 40% higher risk of developmental delay compared to families with a higher income status.

A cohort study conducted the United Kingdom, evaluating a sample of typically developing infants, reported that 9% of the infants presented with gross motor delays (Sacker et al., 2006). Less than 1% of the infants had difficulty with gross and fine motor skills simultaneously. However, the likelihood of an infant suffering from motor delay increased by 50% if the infant was not breastfed (Sacker et al., 2006).

Sullivan and McGrath (2003) compared the performance of infants, from the United States of America, who were born at term with infants who were born prematurely. They also found that 9% of infants born at term presented with mild gross and fine motor delays.

In the local context, a cross-sectional study investigating the prevalence of motor delay amongst typically developing and HIV infected children found that 5.7% of these children, who were assumed to have been HIV negative, presented with significant motor delay (Ferguson and Jelsma, 2009).

In the absence of systematic review collating the prevalence of motor delay, these studies suggest that the prevalence of motor delay amongst infants without defined medical conditions ranges between 5.7-9%.

2.2.2.2. *With Defined Medical Conditions*

Motor delay has been associated with medical conditions such as HIV (Ferguson and Jelsma, 2009), Foetal Alcohol Syndrome (Kvigne et al., 2004), Down's syndrome (Palisano et al., 2001) and Autism Spectrum Disorder (Provost et al., 2007).

A study conducted amongst HIV infected infants living in Cape Town reported that 66.6% of HIV infected infants experienced significant motor delay and 23.5% displayed a mildly delayed motor performance (Ferguson and Jelsma, 2009). A similar study conducted in Johannesburg, South Africa found the prevalence of significant motor delay amongst HIV infected infants to be even higher at 77, 5% (Baillieu and Potterton, 2008).

Due to the high prevalence of foetal alcohol syndrome (FAS) in the Western Cape, this medical condition is a frequently investigated. In 2005 the frequency of FAS within the Western Cape, South Africa was 65.2-74.2 per 1000 school-going children, this being viewed as the highest in the world (Viljoen et al., 2005). Kvigne et al. (2004) found the prevalence of motor delay amongst Northern Plains Indian American children (with mean ages of 10 years) suffering from FAS to have been 46.5%.

The prevalence of motor delay is very high amongst children with Down's syndrome (DS) and different growth curves have been formulated to apply for children with DS (Palisano et al., 2001).The probability of milestone achievements are as follows: 78% sitting at 12 months, crawling by 18 months is 34% and the probability for a child with DS to walk by 24 months is 40% (Palisano et al., 2001).

Provost et al. (2007) investigated the extent of motor delay experienced by children with Autism Spectrum Disorder (ASD). Their findings were that 68% of the ASD sample presented with motor skill delays of more than 25%, which would qualify them for early intervention in the USA.

The focus of this review is concerned with motor delay amongst infants without defined medical conditions. However, the statistics regarding motor delay amongst infants with defined medical conditions can possibly assist therapist and doctors in determining the need for early intervention services so that they can be equipped to supply such services.

2.2.3. Aetiological factors

Numerous factors have been implicated as causes of infant motor delay. For the purpose of this review, factors that arise due to established risks excluding defined medical conditions, those that arise due to environmental or social mechanisms will be discussed.

2.2.3.1. Established Risks

Birth Weight and Gestational Age

Studies have investigated the extent of infant motor delay as a result of prematurity and low birth weight (Kilbride et al., 2004; Halpern et al., 2008; Delgado et al., 2007; Heathcock et al., 2004; Lando et al., 2005). It is also often regarded as exclusion criteria when researchers have investigated other causes of motor delay because it may act as a confounding variable (Ferguson and Jelsma, 2009; Sacker et al., 2006; Hess et al., 2004). Similarly, screening and assessment tools acknowledge these delays and adjust their age indicators accordingly to compensate for prematurity (Bayley, 1993; Bayley, 2006).

A strong relationship has been found between gestational age and birth weight. It is likely that infants born premature may have low birth weight and their brain development is compromised due to the complications of prematurity (Kilbride et al., 2004; Hill, 2007). Studies have examined the effect of low birth weight on the attainment of motor milestones (Kilbride et al., 2004; Halpern et al., 2008; Delgado et al., 2007; Heathcock et al., 2004; Lando et al., 2005). A study conducted in Brazil found that the birth weight of infants was inversely proportioned with suspected developmental performance ($p<0,001$) (Halpern et al., 2008). Kilbride et al. (2004) reported similar results when they compared extremely low birth weight (ELBW) children (who were mostly premature) without serious neurologic injury to their term siblings. The term siblings achieved significantly higher motor scores (p = .004; Kilbride et al., 2004).

Huppi et al. (1998) quantified the difference in brain development between premature and term newborns using magnetic resonance imaging. The images of 78 newborns with appropriate weight for their gestational age and who had gestational periods ranging between 28 and 40 weeks were analysed. The total brain volume and the gray matter volumes showed a linear increase from 29 to 41 weeks post conception. However, imaging showed that there was a rapid increase in myelinated white matter after 36 weeks of gestation. This suggests a phase of "rapid development and thereby a time of vulnerability of white matter to injurious insults" (Huppi et al., 1998: 233). Studies have found that infants who are born at <37 weeks of gestation or with a birth weight of <2000g run a significantly higher risk of experiencing motor delay than infants born at full term (> 37 weeks) (Delgado et al., 2007; Halpern et al., 2008; Sacker et al., 2006). Even infants and children who had a birth weight of 2500g have shown poor motor performances when compared to their peers of who were born > 2500g (Delgado et al., 2007; Hediger et al., 2002).

The development of premature and low birth weight infants should be closely monitored after birth as they are at risk of motor and general developmental delay (Delgado et al., 2007; Halpern et al., 2008; Sacker et al., 2006; Hediger et al., 2002; Kilbride et al., 2004). If such a delay is identified these infants may benefit from early intervention programmes (Gianni et al., 2006; Procianoy et al., 2010).

Nutrition

Poor nutrition can present in various forms. Obesity, being undernourished and iron and mineral deficiencies have all been seen to negatively affect the development of infants.

Research conducted by Sacker et al. (2006) produced results supporting exclusive breast feeding for as long as possible. Infants who didn't receive any breast milk were 50%

more likely to suffer from gross motor co-ordination delays than those infants who received breast milk exclusively for longer than 4 months (Sacker et al., 2006).

Poor motor development has also been noted in infants who are malnourished or have iron deficiencies (Kariger et al., 2005; Douglas and Bryon, 1996). Douglas and Bryon (1996) relied on the interview information of parents in the United Kingdom to establish if their child experienced any motor delays because of eating difficulties. It is noteworthy that 22% of the children in the sample were born prematurely which may have compromised the parents' view on whether the child was delayed or not (Kilbride et al., 2004; Delgado et al., 2007; Halpern et al., 2008). Eating difficulties included: inappropriate texture of food for age, inadequate quantity eaten, disinterest in food, vomiting, selective eating, slow eating, stores food in mouth, does not chew or spits food out. After the parental interviews and observation of the children a third of the children suffered from delay in major milestones such as sitting and walking (Douglas and Bryon, 1996).

In Zanzibar the nutritional status of 687 infants between the ages of 5 and 18 months was assessed (Kariger et al., 2005). With the use of an adjusted version of a pictorial chart combined with Bayley Scales of Infant Development guidelines, a significant association was noted between motor performance and growth stunting as well as wasting. Infants were 66% more likely to be delayed with walking if they were anaemic and/or had an iron deficiency.

Malnutrition within the first year of life has been seen to result in decreased brain weight, protein, RNA and DNA compared to healthy normal infants (Winick and Rosso, 1969). This retards the division of cells and causes poor myelination within the brain (Winick and Rosso, 1969; Georgieff, 2007). Iron also plays a very important role in the myelination of white matter and the function of the hippocampus in the developing brain which contributes to normal motor development (Lozoff et al, 2006; Beard, 2008; Shafir et al., 2008). Dopamine and norepinephrine metabolism is also altered which cause dysfunction of motor control (Lozoff et al., 2006; Beard, 2008).

On the other end of the nutrition spectrum a few studies have also investigated the motor developmental status of infants who are overweight within the first 2 years of their lives (Shibli et al., 2008; Slining et al., 2010). Slining et al. (2010) did however point out the difficulty in making inferences as to whether or not being overweight causes motor delay or vice versa. In their study, Slining et al. (2010) found that babies who were overweight (≥90th percentile) according to the weight-for-length scores using the Centers for Disease Control/National Center for Health Statistics 2000 growth reference (Ogden et al., 2002) were 1.8 times more likely to suffer from motor delay measured by the Bayley Scales of Infant Development II. They were even more likely (2.3 times) to experience motor delay if they had high subcutaneous fat compared to babies within the normal limits. Shibli et al. (2008) used the same tools to identify infants who were overweight, although infants only fell into this classification when they were ≥ the 85^{th} percentile. Of the 79 overweight infants identified at the Child Health Care Facilities, 8.9% presented with motor delay compared to 0.7% in the control group (*n* = 144).

A study conducted in 2 different areas in Cape Town found that there was a significant difference in nutrient intake between a black and a coloured community (Oelofse et al., 2002). Infants from the black community consumed significantly less essential nutrients than the coloured infants, especially zinc, iron and vitamin D. Even though the weight-for-age scores were significantly higher in the black infants, they had a poorer motor performance ($p<.001$) than the coloured infants. The researchers concluded that the lower zinc and iron levels were responsible for the lower motor performance (Oelofse et al., 2002).

From the reviewed literature it is clear that a balanced diet and weight will benefit the motor development of an infant (Kariger et al., 2005; Douglas and Bryon, 1996; Shibli et al., 2008; Slining et al., 2010; Oelofse et al., 2002). It is reassuring to know that the monitoring of infant weight and growth is one of the main concerns in Well Baby clinics in South Africa with reference to the Road to Health Chart (Sr. Naidoo, personal communication, March, 2011; Road to Health Chart, 2003).

2.2.3.2. Unexplained Motor Delay

The presence motor delay has been associated with various factors; however researchers have also identified idiopathic cases of motor delay (Widjaja et al., 2008). Widjaja et al. (2008) investigated 90 magnetic resonance (MR) images of infants, children and teenagers (2 months to 18 years of age) with primary diagnosis of developmental delay. Children with a history of progressive neurodevelopmental disorders, birth asphyxia, meningitis and encephalitis, known congenital central nervous system infections, metabolic disorders, chromosomal anomalies and severe epileptic syndromes were excluded from the sample. From a total of 90 participants, 16% had normal MR images suggesting that the cause of delay was unrelated to central nervous system pathology.

Although a small percentage, the researchers acknowledged that the absence of a control group posed as a limitation and that possible false positives were pointed out on the MR images. These false positives would refer to brain abnormalities which may be present in infants and children who do not have developmental delay (Widjaja et al., 2008).

2.2.3.3. External Factors

Social and environmental circumstances are said to be indirect causes of motor delay (King et al., 1992). The factors can be related to the parents, such as parental education level, or to the environment the infant is exposed to (Simpson et al., 2003; Delgado et al., 2007; Giagazoglou et al., 2007; Halpern et al., 2008; Miller, 1998). It leads to conditions that neglect the required stimulation of infants or are unfavourable for the exploration and development of infants (Halpern et al., 2008).

Poverty

Poverty has often been considered as a risk factor for infant motor delay (Halpern et al., 2008; Simpson et al., 2003; Miller, 1998). Walker et al. (2007) concluded that poverty "increases young children's exposure to biological and psychosocial risks that affect development through brain structure and function" (Walker et al., 2007: 145). This is not only the case in developing countries (Halpern et al., 2008), but also in developed countries (Simpson et al., 2003; Miller, 1998).

Research has shown that there is an association between family income and infants who experience motor delay (Halpern et al., 2008; Miller, 1998). Halpern et al. found that in 2004 poorer children had a 40% higher frequency of developmental delay than children from the highest income group when using the Denver II screening instrument to assess development. The authors concluded that children living in poorer circumstances may be insufficiently stimulated as their parents had to work longer hours. In addition, children with poorer backgrounds were also less likely to receive adequate medical care. Children are also more susceptible to perinatal complications and unfavourable household environments. Miller (1998) retrieved results that are in agreement with Halpern et al. (2008) when she investigated the association between poverty and the motor performance of children from the United States of America between the ages of 27 and 48 months. Miller (1998) found that children were 60-70% more likely to suffer from motor delay if the family was poor. Conversely, researchers have also found that there was no relationship between motor delay and socio-economic status when comparing the motor outcome of low birth weight children to their normal birth weight siblings (Kilbride, Thorstad and Daily, 2004).

Parental Education

Low parental education levels have been attributed as cause of infant motor delay (Simpson et al., 2003; Delgado et al., 2007; Giagazoglou et al., 2007). According to Delgado et al. (2007) there is an indirect relationship between the level of parental education and the risk associated with a child having a developmental delay. If a parent's level of education was <12 years then risk of the child having developmental delay increased 1.58 times. The rationale behind this is parents with lower levels of education may lack the capacity to provide developmental stimulation. Similarly Giagazoglou et al. (2007) studied the effect that parental education had on the motor performance of pre-school children in Greece. The children of the parents who had higher levels of education (post-secondary) performed consistently better on the applied motor scales compared to children whose parents only had formal education (9-12 years).

Miller and Sonti (2006) have established that some areas on the outskirts of Cape Town, South Africa, have low levels of education; hence predisposing infants in these areas to the risk of motor delay.

Home Environment

Urban and rural environments vary in terms of population density and space availability. Giagazoglou et al. (2007) regarded a rural environment to have to have a population of 5000 people or less compared to an urban environment with 50 000 people. In Cape Town, South Africa, there is a vast difference in population density between the areas of high socio-economic status and the areas of low socio-economic status. The high density found on the outskirts of the city creates a whole different environment and lifestyle to the environment close to the centre of the city.

Giagazoglou et al. (2007) considered the relationship between the environment (urban/rural) and motor delay of children of preschool age in Greece. The researchers found children who resided in urban areas had significantly higher hand-eye co-ordination scores compared to children who lived in rural areas. However, children living in rural areas presented with better gross motor skills than children living in urban areas according to the Griffiths Test No.2 (Griffiths, 1984). The researcher suggested that the difference in motor development occurred because the rural environment had more open spaces and structures to play on compared to the urban environment where children were restricted to playing indoors. Furthermore, children in urban areas, who play indoors more often, occupy themselves with toys that effectively stimulate fine motor development more (Giagazoglou et al., 2007).

Cultural Influence

Every culture has its own perception regarding normal development based on each culture's unique norms and expectations. There is also a link between the expectations of parents and their behaviour (Kolobe, 2004).

Kolobe (2004) found that infants had an increased risk of having motor delay if the mother was Mexican-American compared to non-Mexican-American mothers. However, the correlation between infant motor development and childrearing and developmental expectations was not strong. Earlier research also explored the effect of parental expectations and different care giving practices on the early development of infants (Super, 1976). Contrary to Kolobe (2004), Super (1976) believed that higher expectations promoted development compared to low expectation levels. Factors that influenced the expectation levels and the care-giver practices seemed to originate from cultural differences and religious backgrounds.

Different cultures also have different nutritional habits (Oelofse et al., 2002). The variation in nutritional intake can result in deficiency of certain nutrients in some cultures/races. This has been seen to affect motor development of infants (Oelofse et al., 2002).

The aetiological factors associated with motor delay can sometimes be acute, such as nutrition. Yet, others can present in a more chronic fashion as in the case of the infant's cultural influence (Walker et al., 2007). The clinical implication of being aware of all the factors allow therapists to establish measures to prevent motor delay where possible because it is known that "prevention is better than cure".

2.3. Identifying and Monitoring Motor Delay

"Early identification of problems allows intervention to ameliorate or attenuate problems" (Skellern et al., 2001: 215). Jenkins and Sells (1984) recognised the importance of effective screening and monitoring of infants who experience motor delay. They highlight how much time and effort can be saved if the correct screening and measurement tools are used to avoid over- and under diagnosing of motor development problems (Jenkins and Sells, 1984).

2.3.1. Screening Tools

Screening tools are referred to as tests that identify infants with motor delay, are quick and easy to administer and are less time consuming compared to full evaluations performed (Beligere et al., 2008). Screening tools are not used to make a diagnosis, because further testing and assessments are generally required after abnormalities are detected during the screening. However, Beligere et al. (2008) stated that screening tools have the ability to strengthen a diagnosis. Although screening tools are recommended, a survey conducted in America showed that 71% of certified pediatricians make use of non standardised screening methods (Sand et al., 2010).

2.3.1.1. The Bayley Infant Neurodevelopmental Screener III

A more recently developed tool is the Bayley Infant Neurodevelopmental Screener III (BINS III; Bayley, 2006) which is a norm referenced tool and can be administered to infants from 1 month to 42 months of age. The BINS III takes 10 to 15 minutes to administer and parents/guardians are not required to complete a questionnaire. It is recommended that a trained professional administer the test. The starting point depends on the adjusted age of the infant (if the infant was premature) and each item is scored as either optimal or non-optimal. Termination of the test occurs when the infant scores non-optimally on four consecutive items. Optimal items are then summed to produce a cut score which would fall within the normal, ‘emerging risk’ or ‘at risk’ categories. The BINS III investigates a range of developmental characteristics in subtests, but it allows for isolation of one of the characteristics if required by the health professional (namely gross and fine motor; Bayley, 2006).

During the BINS III test scale development it was found that the average reliability ranged between 0.82 and 0.95 which is regarded as being good to excellent (Bayley, 2006). However, limited research regarding the validity and reliability of the BINS III is available because it only came into use in 2006. Most of the literature available concerns the original BINS (Aylward, 1995) which was updated to develop the BINS III. Hess et al. (2004) tested the use of the BINS on an environmental risk group from Baltimore. The researchers found that when the BINS motor performance results at 6 months of age were compared to the Bayley Scales of Infant Development II (BSID II; Bayley, 1993) results at 24 months the sensitivity was low (23%). This improved to 27% when the BINS results at 13 months were again compared to the BSID II results at 24 months. Using the same comparisons over time, the specificity of the BINS proved to be higher, being 69% and 83% at 6 and 13 months respectively, when compared to the BSID II results at 24 months. Similarly, the predictive validity of the BINS was better when applied at 13 months (52%) than at 6 months (36%) in comparison with the BSID II results (Hess et al., 2004). Aylward and Verhulst (2000) also researched the predictive capability of the BINS in a high risk for developmental delay group in Southern Illinois. There was a moderate degree of consistency for the risk grouping percentages. The results showed that 57% - 85% of the participants remained in either the high risk or low risk categories when tested a second time. These infants were assessed again one to two years later using the McCarthy Scales of Children’s Ability (McCarthy, 1972) and 68% - 73% remained in either the high risk or low risk categories for motor performance. The internal reliability of the BINS is regarded as high for infants between the ages of 3-24 months and ranges between .73 and .85 (Aylward, 1995). With such consistent predictive values, good reliability values and its easy-to-use characteristics, the BINS should be regularly considered as the screening tool of choice.

Various factors need to be considered when deciding on an appropriate screening tool such as time constraints, costs involved and the characteristics of the target population (First and Palfrey, 1994). Therefore other screening tools have also been investigated as can be seen in Appendix 3.5. Limited literature regarding the use of screening tools in South Africa further complicates this decision as most screening tools are standardised in developed countries with different demographics compared to South Africa (Frankenburg, 1990; Bricker and Squires, 1999; Bayley, 2006). The Denver Developmental Screening Test is the only international screening tool that has previously been used in South Africa (Oelofse et al., 2002). However, it was used as an assessment tool to assess the developmental status of infants. No report was given by the researchers indicating whether the Denver was appropriate for the use within the specific population. A short screening tool, compiled by City Health (Cape Town), with no more than six fine and gross motor characteristics, is currently utilized in some of the baby clinics in and around Cape Town (Appendix 6.1.). However, this screening tool does not consider prematurity by adjusting the ages accordingly. No reference has been found regarding the standardization of this tool.

Clinics also make use of the Road to Health Chart (RTHC) as a guide to identify infants who show signs of developmental delay. Infants attend these clinics at least three times within the first 18 months of their lives for scheduled weighing and immunizations and the RTHC is often the only way to retrieve information from the parents regarding an infant's development (Road to Health Chart, 2003). It has however been proven that there are very few associations between the growth of an infant in terms of their weight, and the motor development of that infant (WHO Multicentre Growth Reference Study Group, 2006). This therefore questions the validity of using the RTHC as a screening tool for the identification of motor delay.

Screening tools work hand in hand with assessment tools. Screening tools merely identify areas of possible concern which should then be followed up by a conclusive assessment to verify or diagnose these problem areas.

2.3.2. Assessment Tools

Assessment tools can be divided into norm referenced or criterion referenced tools. For the development of a norm referenced assessment tool, the founder used a supposedly normal sample of infants or children to standardise the tool. This means that when an infant or child is assessed using a norm referenced tool, the infant or child's motor performance is compared to his/her peers in a representative group (Swanson and Watson, 1982). A norm-referenced tool would be used to identify infants or children who suffer from motor problems in a general population such as a school system, or it can be used to establish a specific age level of development for an individual child.

A criterion referenced tool would be more appropriate for the purpose of monitoring the progress of an infant or child receiving intervention for their motor problem that fits the tool's criteria (Montgomery and Connoly, 1987). Criterion-referenced tests evaluate the performance of an individual relative to a particular set of skills or diagnosis (Swanson and Watson, 1982). Criterion referenced tools can also be used to assist the planning and construction for a treatment program. However they are generally not used to identify infants or children who suffer from motor delay within a general population because they are time consuming (Montgomery and Connoly, 1987).

Even though other assessment tools were investigated (Appendix 3.6), the BSID II appeared most appropriate for the purpose of this study.

2.3.2.1. The Bayley Scales of Infant Development II

The Bayley Scales of Infant Development II (BSID II; Bayley, 1993) was developed after revising the Bayley Scales of Infant Development (BSID; Bayley, 1969). It is a norm-referenced discriminative measurement tool used to assess the development of infants between birth and 42 months. The BSID II consists of three components, namely: motor, mental and behavioural rating scales. A normative sample of 1700 children from different parts of America was used to redetermine the values (Bayley, 1993). The BSID II consists of a set of age appropriate items arranged according to level of difficulty. If a child is unable to complete an expected number of items the assessor returns to the easier preceding set until the infant completes the required number of items. The infant then receives a raw score according to the number of completed items. This raw score gets converted into either a Psychomotor Developmental Index (PDI) or a Mental development index (MDI) - a developmental quotient which falls into 1 of the four developmental status categories namely: significantly delayed, mild delay, within normal limits and accelerated development (Bayley, 1993). The raw scores of the BSID II does, however, have a raw score base limit which restricts researchers who have participants performing below the minimum requirement. In 1996, Robinson and Mervis extrapolated the raw scores of the BSID II allowing one to quantify scores falling below this minimum requirement. However, these figures are mostly based on estimations and not on empirical data.

Researchers have investigated the concurrent validity of the BSID II with the PDMS-2 within high risk populations (Provost et al., 2004; Connolly et al., 2006). The correlation co-efficients ranged between $r = .85$ and $r = .97$ when compared to the PDMS-2 when tested on children in New Mexico (Provost et al., 2004). However, Connolly et al., (2006) found that the only significant correlation between the BSID II and the PDMS-2 was present in the locomotor subtest for 12 month old infants. On investigation of the inter- and intra-rater reliability of the BSID II it was apparent that literature was limited, although the motor scale did produce a substantial inter-rater reliability score (0.995) in a pilot study to secure reliability of the BSID II as the assessment tool (Harris et al., 2005).

The BSID II was recently used in low economic, resource poor communities in Cape Town to assess “The prevalence of motor delay amongst HIV infected children living in Cape Town” (Ferguson and Jelsma, 2009:1) with ages ranging between 6.2 to 31.7 months and another similar study conducted in a low-economic area in Johannesburg (Baillieu and Potterton, 2008). Recommendations favouring the BSID II as a tool to evaluate the effect of an intervention have been made by researchers who reviewed 15 different infant neuromotor function assessment tools (Heineman and Hadders-Algra, 2008).

In South Africa, once an infant is identified in a primary health care facility, the infant experiencing motor delay, is then referred to the nearest health professional who addresses motor delay problems, for example a physiotherapist. The infant may also be referred straight to a secondary or tertiary institution if the attending sister believes it is necessary. However it is not uncommon for these institutions to have a waiting list causing the infant to only be attended to up to 6 months after initial referral. In these secondary and tertiary institutions the health professionals make use of an Infant Neuromotor Assessment (INA; Magasiner et al., 1997) to screen and evaluate the motor developmental status of the infants at risk of motor delay (L. Seherfen, personal communication, 11 January, 2011; G. Gribble, personal communication, 30 January, 2012; M. Enright, personal communication, 30 January, 2012). The INA was developed in Cape Town for the purpose of screening infants who return to a premature follow-up clinic (Magasiner et al., 1997).

With the knowledge that the BSID II has been used on a low socio-economic, at risk population in South Africa and other African countries before it creates a sense of security to use it again as an assessment tool on a similar population (Ferguson and Jelsma, 2009; Van Rie et al., 2008). The use of the BSID II in conjunction with a screening tool from the same 'family', namely the BINS III, also creates a consistent evaluation trend for research purposes.

2.4. Impact of Motor Delay

An association between the acquisition of motor milestones and cognitive development can perhaps lead to monitoring of motor function and act as a precursor to a possible need for cognitive stimulation (Shapiro et al., 1990). If clinicians knew that effective intervention for infants with motor delay not only provided instant results but also proved to benefit a child in the future then that should be enough reason to implement the necessary treatment plan. "We are guilty of many errors and many faults but our worst crime is abandoning the children, neglecting the fountain of life. Many of the things we need can wait. The child cannot. Right now is the time his bones are being formed, his blood is being made, and his senses are being developed. To him we cannot answer 'Tomorrow.' His name is 'Today'" (Minstral, 2012).

2.4.1. Short Term

Motor delay has the potential to affect an infant early in his/her life when developmental plasticity is most prominent and the brain is most vulnerable (Huppi et al., 1998). The attainment of motor milestones spills over and assists the development and achievement of milestones in other domains (Clearfield, 2010; Bushnell and Boudreau, 1993).

Infant gross motor delay limits an infant's opportunity to explore the environment which restricts other domains of development such as cognitive development, verbal development and fine motor development (Clearfield, 2010). Infants who walk independently have shown significantly more distance covered ($p < .01$) and verbal interaction as well as interaction with toys ($p = .05$) compared to an age matched sample using a walker (Clearfield, 2010). The increased levels of exploration also challenges and develops visual depth perception (Bushnell and Boudreau, 1993).

Not only does motor delay have a short term impact on global development, but it continues and effectively results in long term problems (Sullivan and McGrath, 2003; Viholainen et al., 2006).

2.4.2. Long Term

Motor delay has been seen to have a long term effect on a child's performance (Viholainen et al., 2006; Sullivan and McGrath, 2003; Piek et al., 2008). Early childhood identification and treatment of motor disorders, while the brain is developing the most, may alleviate the use of future resources and costs associated with later interventions (Huppi et al., 1998; Sullivan and McGrath, 2003; Blauw-Hospers et al., 2007).

2.4.2.1. Academic achievement

Shapiro et al. (1990), investigated whether milestone acquisition within the first two years of life influenced reading ability at the age of seven and a half years. Even though a relationship was found between early speech and later reading ability, the same significant relationship did not exist for motor milestone acquisition and reading ability (Shapiro et al., 1990). However, Viholainen et al. (2006) compared the reading skills and vocabulary range with their early motor milestone achievement of children aged 7. The children who had slow motor development had a significantly smaller vocabulary and slower reading speed compared to infants who had normal to fast motor development (Viholainen et al., 2006). Similarly Piek et al. (2008) ,who conducted their study in Australia, found that early gross motor trajectory, according to numerous Ages and Stages Questionnaire results, was a good predictor of school aged cognitive performance.

In addition, Sullivan and McGrath (2003) found that when comparing the motor performance and academic achievements of children who were born prematurely with children who were born at term, a positive correlation was found between the poor motor performance at age four and academic achievement at age 8. This correlation also applied to 9% of the healthy term infants who suffered from mild motor delay. The preterm infants also made use of additional school services (occupational therapy, physiotherapy and speech and language therapy) more often than children who were born at term.

Furthermore, information drawn from a population birth cohort in Northern Finland found that infants who were unable to stand unsupported at 9 months of age showed a statistically significant (p<0.05) probability of remaining at a basic level of education compared to faster developers who were likely to excel (Taanila et al., 1966). The slower developers were also 12 times less likely to advance from a secondary to a tertiary level of education. Those participants who showed normal to advanced developmental milestones were also more likely to be “in an age-appropriate class at the age of 14 years” (Taanila et al. 2005).

Research has discovered that infant motor delay has a short term and long term impact for children in various domains of development (Taanila et al., 1966; Sullivan and McGrath, 2003; Viholainen et al., 2006; Piek et al., 2008; Clearfield, 2010; Bushnell and Boudreau, 1993). Research regarding the effect of treatment for infants with motor delay on these short term and long term outcomes is limited. This issue will need to be addressed to further justify early physiotherapy for infants with motor delay.

2.5. Intervention for Infants Motor Delay

The availability of treatment and deciding who should receive it is often restricted by factors such as budget constraints, the demand placed on the parent, co-operation and compliance to the treatment and the severity of the child's condition (Jenkins and Sells, 1986).

In light of these constraints, intervention strategies, types, approaches and intensities may be adapted to include more infants. In this chapter, interventions for infants with motor delay are discussed. An overview of different intervention types currently in use, in particular by physical and occupational therapists, is given. Intervention approaches are also discussed in terms of the location of services, structure of service delivery and intensities of interventions.

2.5.1. Early Childhood Intervention (ECI)

Early intervention for motor delay in infancy is supported by researchers who have shown its benefit (Frank et al., 2002). Early Childhood Intervention (ECI) is a multidisciplinary approach for infants and children from birth to 5 years of age. It aims to promote health, improve family functioning, assist parental adaptations, address and correct current or potential disabilities, prevent deterioration of function and reduce developmental delays. The multidisciplinary approach to ECI includes therapeutic, educational and developmental services for infants along with a support structure for their families (Shonkoff and Meisels, 2000).

Early Childhood Intervention allows the opportunity for intervention to influence the central nervous system when it is still considered to be plastic and vulnerable (Blauw-Hospers et al., 2007). However, researchers have identified that ECI may not be able to predict and address the potential problems that an infant may develop at a later stage and may result in unnecessary treatment to infants who fall within an "at-risk" population who do not develop the assumed developmental disorder (Blauw-Hospers and Hadders-Algra, 2005).

Early Childhood Intervention has been found to be effective for infants who present with motor delay for various reasons (Frank et al., 2002; Gianni et al., 2006; Potterton et al., 2009). A study conducted on prenatal cocaine exposed infants reported that infants who received early intervention (which included home health services, parent-child groups, occupational therapy, speech therapy and physiotherapy) had significantly higher adjusted developmental scores, as measured by the BSID, than infants in the other cocaine-exposed groups who did not receive ECI (Frank et al., 2002). Similarly, Gianni et al. (2006) explored the effect of an early developmental mother-child intervention programme for infants with very low birth weight. The control group who received no intervention post discharge performed significantly worse in the personal-social, hand and eye co-ordination and practical reasoning subscales on the Griffiths Mental Development Subscales than the group who only received ECI services at 36 months of age.

Although some research studies support the use of ECI services, a systematic review of 34 research papers that investigated the effects of early intervention on motor development. Blauw-Hospers and Hadders-Algra (2005) found that in only 38% of the studies, infants benefited from ECI before the age of 18 months (Blauw-Hospers and Hadders-Algra, 2005). The review did not support the use of NDT for infants with motor delay and surmised that if some treatment types are applied at the wrong time they are likely to be ineffective.

2.5.2. Delivering Early Childhood Intervention Services

Early Childhood Intervention services may be delivered in a range of settings, including clinics, hospitals, and at home. Each location has its own benefits and disadvantages. A home-based programme might be more costly and time consuming for therapists but it allows them to incorporate the true home environment into the treatment programme. Treatment sessions at home also restricts the use of therapy equipment, however, it forces the therapists to make use of the home appliances and furniture which is more affordable and less intimidating for the parent to use. An institution-based programme implies that family members bring the infant requiring therapy to an institution which offers therapy, or that the infant receives therapy in a special home/school where he/she resides.

There is continuous debate about the best approach for treating infants with motor delay (Blauw-Hospers and Hadders-Algra, 2005). Mahoney and Perales (2001) highlighted that parents have the greatest opportunity to influence the development of their infant. It has been proven on numerous occasions that parent involvement with motor intervention is successful and empowers the parent (Gianni, 2006; Moxley-Haegert and Serbin, 1983). Ustad et al. (2009) agree that parental involvement has the potential to strengthen a motor intervention.

In a review of 31 research articles focusing on the early intervention for disabled infants, Shonkoff and Hauser-Cram (1987) found that most interventions were offered in the home as well as centers and fewer interventions offered home-based or centre based components exclusively. According to more recent literature, investigating the various treatment approaches for infants with motor delay, there seems to be a popular trend amongst therapists regarding the locus of their therapy sessions. In many of the treatment programmes parents or guardians are required to visit a medical facility in order for their infant to receive therapy (Trahan and Malouin, 2002; Gagliardi, 2008).

In a study investigating the effect of different intensities of neurodevelopmental therapy on the same 5 infants with cerebral palsy, Trahan and Malouin (2002) make use of the same location (institution-based) for the therapy sessions. Another researcher made use of either weekly or monthly hospital visits (Mayo, 1991). Mayo (1991) implemented a tailored basic home programme for infants with motor delay and also incorporated both home- and institution-based components. This entailed advice on positioning of the infant during dressing, feeding, playing and sleeping (Mayo, 1991). No comparison was used to establish the effect of the home programme on motor developmental outcome of the participants in these studies (Mayo, 1991; Trahan and Malouin, 2002). However, the outcome of the treatment plan was successful in improving the participants' motor performance.

Limited research is available investigating the effect of therapy location on the motor outcome exclusively. This factor may play an important role in low socio economic areas where transport is a problem and may in turn impact on the compliance and attendance of the dyads to therapy sessions. As Shapiro et al. (1990) has found a relationship between low attendance levels and parental compliance with low socio-economic circumstances.

2.5.3. Home Programmes

Involvement of parents in a treatment programme empowers parents and is known to be successful (Gianni, 2006; Moxley-Haegert and Serbin, 1983). A home programme gives parents the opportunity to be involved and promotes independence which is the eventual aim of a successful treatment/rehabilitation plan. Literature regarding the effects of home advice compared to exclusive institution-based therapy on the outcome of an infant's development is investigated below.

A recent study conducted in central Taiwan looked at the effect of a home programme in addition to an institution-based therapy for infants between the ages of 6 – 24 months who presented with global developmental or motor delay (Tang et al., 2011). Although the institution based therapy alone resulted in a developmental improvement by 2.11 months, the group that received additional home programme improved significantly more in most of the developmental domains of the Comprehensive Developmental Inventory for Infants and Toddlers (Wang et al., 1998) measure. There was a marked improvement in the gross motor ($p = 0.03$) and fine motor ($p = 0.00$) domains of the group receiving additional home programme compared with the participants who received institution-based therapy only (Tang et al., 2011). Similarly, Potterton et al. (2009) found that children with HIV receiving a basic home stimulation programme, had a significantly greater improvement in motor ($p = 0.02$) and cognitive ($p = 0.01$) development scores using the BSID II, compared with the control group who received no home programme.

In conclusion, a home programme can be a successful therapeutic approach. A home programme is also an easy method of involving parents in an infant's therapy and development which has been proven to be an important component of therapy (Gianni et al., 2006).

2.5.4. Individual vs. Group Therapy

Individual therapy refers to a treatment session where a therapist attends to a single patient or dyad pair. When a group of about 2 to 6 dyads join for therapy, it is referred to as a group session. Both individual and group therapy have their own benefits and limitations. Individual therapy allows the therapist to be more thorough and more goal-directed with the intended treatment outcome. The environment is also more private for the patient and the guardian. In contrast, group therapy allows parents/guardians to relate with one another regarding their experiences of raising a child with motor problems. The group design saves the therapists time and may be more cost effective than individual therapy (Dugas et al., 2003).

In 2006, Gianni et al. compared the developmental outcome of very low birth weight infants who received a mother-child intervention programme with infants who received no intervention. The intervention group consisted of 4-6 dyad pairs who received psychological support along with the promotion of perceptual skills and focus on quality of movement, the exploration of the environment and objects, vocalization and eye contact. This group had a significantly greater improvement within the personal-social, hand and eye co-ordination and the practical reasoning subscales when re-assessed at 36 months of age.

Even though group therapy has its benefits, researchers have found that participants tend to drop out more frequently compared to individual treatments (Dugas et al., 2003). Research regarding the treatment of infants with motor delay as a group is otherwise very limited and the individual approach seems to be the preferred approach used by physiotherapists treating motor delay even in South Africa (Jenkins and Sells, 1984; Tang et al., 2011; Hielkema et al., 2011; G. Gribble and M. Enright, personal communication, 30 January, 2012).

2.5.5. Treatment Schedules

Previous studies have investigated the effect of different intensities of treatment on the motor outcome of infants and children with motor disorders (Ustad et al., 2009; Christiansen and Lange, 2008; Trahan and Malouin, 2002; Tsorlakis et al., 2004; Gagliardi et al., 2008; Mintz-Itkin et al., 2009). Even though results were controversial; some researchers feel that parents should be included when constructing a schedule because this promotes compliance (Ustad et al., 2009).

In most of these studies, intense treatment for infants and children with motor disorders, ranged anything from twice a day to four times a week (Ustad et al., 2009; Christiansen and Lange, 2008; Trahan and Malouin, 2002; Tsorlakis et al., 2004; Gagliardi et al., 2008). Such a regime is often unrealistic in a developing country such as South Africa where the normal intensity is usually one therapy session a month (Sr. Naidoo, personal communication, March, 2011). However, most of these studies focused on cerebral palsy children and made use of the Gross Motor Function Measure as an outcome measure (Ustad et al., 2009; Christiansen and Lange, 2008; Bower et al., 2001, Trahan and Malouin, 2002; Tsorlakis et al., 2004; Gagliardi et al., 2008). Mayo (1991) and Jenkins and Sells (1984) are of the few researchers who investigated the effect of different intensities of treatment on children and infants who suffer from motor delay only.

In two single case studies the researchers made use of the same participants to evaluate their response to periods of different intensities of treatment. Trahan and Malouin (2002) recruited five children (mean age 22.6 months) who were diagnosed with severe CP. These children received between 8 to 20 weeks of regular (twice a week) physiotherapy followed by two sets of four treatment sessions a week for four weeks and 8 weeks rest, with no physiotherapy, in between the intense periods. The treatment consisted of individual sessions where techniques were used to guide a child's movement. This is described as being a neurodevelopmental approach (Mayston ,1992). Three out of 5 participants showed significant increases in their GMFM scores (3 – 15%) after the intense periods which was maintained during the rest period. Ustad et al. (2009) performed a similar study, also evaluating the outcome of 5 infants (6 – 12 months of age) after periods with various intensities. Instead of four times a week, participants received daily treatment for four weeks during the intense treatment, after which they then continued with their normal treatment regime (once or twice a week) for 8 weeks. Even though all five participants improved their GMFM scores, there was no conclusive difference between the intensive physiotherapy and the regular therapy. These two studies were very limited, as they had a small sample size and heterogeneous participants which would have most likely affected the outcome.

Researchers have also used randomized control trials (RCT) to study the outcome of different treatment regimes on infants and children with motor deficits. Most of the more recent studies were implemented on infants suffering from CP (Christiansen and Lange, 2008; Bower et al., 2001; Tsorlakis et al., 2004; Gagliardi et al., 2008). Christiansen and Lange (2008) applied four weeks of intense treatment followed by a six week period without physiotherapy to one group. This regime was applied three times. There was no significant difference ($p = 0.81$) in this group's GMFM scores compared to the group who received one or two physiotherapy sessions a week for 30 weeks even though there was a general improvement in both groups. Similarly, Bower et al. (2001) found no significant difference in the change of the final GMFM scores of children diagnosed with CP when an extra hour of physiotherapy was added to their usual Monday to Friday daily treatment regime. Over a 6 month period of therapy, 56 participants were randomly allocated either: i.) a group receiving routine physiotherapy with certain aims in mind, ii.) a group receiving intense physiotherapy with certain aims in mind, iii.) a group receiving goal directed routine physiotherapy, and iv.) a group receiving goal directed intense physiotherapy, after initial stratification. Even though the intense form of therapy produced more favourable results during the enhanced stages of the study, this advantage was not maintained once the therapy was reverted to its usual intensity.

The evidence from two more randomized control trials supports a more intense form of therapy. Tsorlakis et al. (2004) found a significantly greater improvement (p= .018) in the group receiving four NDT sessions a week. Although the control group (NDT once a week) had a significant improvement in motor function from the baseline assessment to the final assessment, it was not as great as the intervention group. However, the researchers failed to recruit the required 52 participants needed for the study to have 80% power for its statistics. Similarly, a recent pilot study produced results supporting an intermittent, intensive, integrated treatment for children (n=40) with CP under the age of 6 years (Gagliardi et al., 2008). Both the continuous treatment (twice a week) and the intermittent intensive treatment (2 months of the year receiving treatment twice daily) for one year proved to attenuate the children's motor abilities according to the GMFM. Nevertheless, the intermittent, intensive treatment was significantly more effective.

Researchers have also appeared indifferent to what intensity of treatment was given to infants with motor difficulties (Mintz-Itkin et al, 2008). Mintz-Itkin et al. (2008) tested a weekly and a monthly treatment protocol on 29 infants with benign hypermobility with hypotonia. After comparing the outcome of the weekly group (n=14) with the monthly group (n=15) no significant difference was found between the two groups on the AIMS. The intense group only showed a significant advantage of achieving independent walking by 15 months of age.

Older randomized control trials have included motor delay without defined medical conditions (Mayo, 1991; Jenkins and Sells, 1984). In 1991, Mayo investigated the effectiveness of two intensities of physical therapy for infants with motor delay or cerebral palsy under the age of 2 years. The treatment included either a weekly (intense) or a monthly (basic) hospital visit where a physical therapist instructed parents on how to carry out a home programme for their infant. On average both groups showed an improved performance. However, the group receiving intense treatment performed better than the group receiving basic treatment. Although the duration of the therapy was the same for both groups (6 months) and each participant received an individually tailored home programme, the intensive group was provided the opportunity to meet specific goals of the infants as they were more familiar with their needs. The home programme also had no measure of monitoring compliance which may have been a factor in the basic group who received little input.

2.5.6. Retention of Skills

Continuous standard and intense physiotherapy has been found to be stressful and cumbersome for parents (Bower et al., 2001; Ustad et al., 2009). A successful treatment plan aims to relieve patients from continuous physiotherapy visits once they have achieved independence. This occurs when the therapist is satisfied that the patient will retain or improve their skills and not deteriorate.

Better retention and accuracy of learnt motor skills have been experienced when the frequency of guidance and feedback to the participant is decreased (Wulf and Schmidt, 1989; Winstein and Schmidt, 1990). However, these theories are applicable to adults and not developing infants. The results from these two studies contradict the trend seen in the research of Bower et al. (2001) whose participants showed deterioration of motor performance with a decrease in treatment intensity. However, when Trahan and Malouin (2002) tested the ability of children with CP to retain skills during 8-week periods of rest (no treatment), they experienced a similar outcome to that of Wulf and Schmidt (1989). They found that most children maintained their motor performance level and even though the overall mean motor scores decreased slightly, the decrease was not significant.

Studies that have tested treatment frequencies on children with CP have not reached agreement on whether high/low intensity or even withholding treatment elicits good retention of skills (Trahan and Malouin, 2002; Bower et al., 2001). Even though some research supports lower frequencies of feedback (intervention) in order to retain skills, the results are not conclusive, as this theory has not been tested on infants with exclusive motor delay (Winstein and Schmidt, 1990; Wulf and Schmidt, 1989).

2.5.7. Situation in South Africa/ Public service

The standard treatment protocol for infants with motor disorders in public service can range anything from once a week to once every six weeks. This occurs because of the lack of resources and problems with transport, especially in the country's rural areas (G. Gribble and M. Enright, personal communication, 30 January, 2012; P. Njajula and T. Pells, personal communication, 2010; L. Sampson, personal communication, 2009).

There are projects that attempt to reach the rural and isolated areas in South Africa. One of these projects is the "*Malamulele Onward Project"* which is a non-profit organisation founded in 2005. This project, which takes place in rural areas of South Africa, consists of a team of occupational therapists, physiotherapists and speech therapists who identify children with CP that will benefit from therapy. These children then undergo a five day intense intervention period consisting of therapy, provision of equipment and care-giver training. Two months after the intervention period, the children are reassessed and additional therapy given to children who require it. The intense five day intervention is then repeated the following year after which annual visits are arranged to ensure sustainability of the intervention and the retention of their skills. Even though this strategy seems to reach children in rural areas where services are limited, the project is focused on providing services to children with CP. These strategies do not address infants and children who suffer from motor delay without medical diagnosis because of the great demand in areas such as CP (Malamulele Onward, 2011).

Physiotherapists should utilize evidence based practice, which states that protocols that are scientifically proven to be effective, should be applied. However, the above mentioned protocols are resource intensive and were established in developed countries where access to resources is not limited. What is needed is a model that produces positive results in a more cost effective way similar to the Malamulele Onward Project.

2.6. Parent Satisfaction

The satisfaction of parents whose infants undergo medical treatment is important as it serves to motivate parents and contribute to compliance to medical treatment (Becker et al., 1972; Lewis et al., 1986; Albrecht and Hoogstraten, 1998). However, because satisfaction "is rooted in an individual's perception of a particular experience, satisfaction is a highly individualized and volatile construct" (McNaughton, 1994: 32). Various tools have been formulated to establish the levels of parental satisfaction towards medical intervention (Ngui and Flores, 2006; Ygge and Arnetz, 2001; Ammentorp et al., 2007). These tools assist therapists when they decide on a treatment plan for infants who have motor difficulties so that they can get maximum co-operation from the parents and optimal outcome for the infant (McNaughton, 1994; Stallard, 1996).

2.6.1. Tools to Measure Satisfaction

Standardised satisfaction questionnaires, as response from parents who have infants receiving treatment, are limited. This is because programme developers often want to investigate the views specific to the need or programme they are supplying (McNaughton, 1994). In a review of previous early childhood intervention studies, between 1986 and 1992, which included a measure of parent satisfaction as a dependent variable, all 14 studies that fit the criteria had individually developed parent satisfaction tools (McNaughton, 1994). Methods used to survey parent satisfaction are oral interviews, written questionnaires and electronic questionnaires (McNaughton, 1994; Ngui and Flores, 2006; Ygge and Arnetz, 2001).

An example of a satisfaction questionnaire is the Measure of Processes of Care (MPOC) (King et al., 1995). The questionnaire was developed in Canada but has been validated in

Dutch and translated to use in Sweden. The questionnaire is used to evaluate a treatment process undergone by a child. The parent is required to complete 56 items on a seven point scale. Although written questionnaires are often a cheap option, there are also risks involved in retrieving information (McConachie and Logan, 2003). If the researcher intends to post the questionnaires, it may result in a poor response rate (Shaughnessy et al., 2005). Questionnaires also require the skill of reading which include the obstacle of language barriers and in areas with a low level of education this may pose as a problem.

In a previous study the researchers used data from the National Survey of Children with Special Health Care Needs in America, collected via telephone interviewing to determine parent satisfaction (Ngui and Flores, 2006). The survey only contained a single satisfaction item which was not sensitive to identify specific medical care needs that contribute to patient satisfaction. Some parents who had more recent encounters with medical providers were assumed to give more accurate responses in terms of their satisfaction levels. The researchers felt that this recall and reporting bias may have affected the accuracy of the parents' satisfaction report because of the self-report method (Ngui and Flores, 2006).

An example of a parent satisfaction questionnaire (written) is a variation of the Quality of Care Parent Questionnaire (Arnetz and Arnetz, 1996) widely used in Sweden. The questionnaire contains demographic questions (age, sex etc.) as well as questions requiring Likert-type scale and visual analogue scale ratings. Ygge and Arnetz (2001) tested the reliability and validity of this questionnaire and found it to be good. They found that the questionnaire was of great benefit because of its quantitative method of measuring quality of care. One of the main limitations of a written questionnaire is that an illiterate population requires assistance in answering the questions which may alter the internal validity of the tool.

In a recent study Ammentorp et al. (2007) tested the applicability of an electronic questionnaire for parents whose children were referred to a paediatric department in a hospital in Denmark. This involved the completion of a questionnaire, on a touch screen computer in the ward, on discharge. If parents expressed dissatisfaction the researchers had follow-up telephonic interviews if contact details were provided by the parents. The electronic method had low response rates which were attributed to factors such as illiteracy, anxiety about using a computer and the fact that non-Danish speaking people did not receive instructions in their own language. However, this form of questioning seemed to consume less time and allowed researchers to respond to parents much faster (Ammentorp et al, 2007).

It is apparent from the analysis of the above studies that different methods of surveying have their own benefits and limitations. It is therefore with no surprise that researchers often formulate their own tools unique to the situation to determine parental satisfaction.

2.6.2. Factors that affect the level of parental satisfaction

McNaughton (1994) mentioned that a person's level of satisfaction is derived from a unique experience. The way people perceive these experiences are often related to factors related to the medical care they received or even their socio-economic background (Moumtzoglou et al., 2000; Ngui and Flores, 2006).

In a retrospective study data regarding factors which influence parental satisfaction was collected from parents whose children were participating in a Head Start programme in the State of California (Tataw et al., 2010). Parents who voiced their anxiety about their child's health and who trusted their child's provider reported to be at least 6 times more likely to be satisfied with the caring services their child received. Significantly higher levels of satisfaction were also expressed if there was easy access to care, easy travel arrangements to get to care, easy to make an appointment and also having insurance. Parents' satisfaction had a similar trend when Ngui and Flores (2006) assessed associated factors. Insurance was also associated with higher levels of satisfaction along with the severity of their disease or condition.

People who are from Hispanic or black racial background, are poor or have less than a high school degree, have been seen to express significantly lower levels of satisfaction than white families who are not poor and have more than a high school degree (Ngui and Flores, 2006; Tataw et al., 2010). Conversely, Moumtzoglou et al. (2000) found no significant association between parental satisfaction and the type of medical problem of the child or the parent's education and their profession which was surveyed in the outpatient and inpatient department in a paediatric division in a hospital in Greece.

The benefit of knowing that certain factors can negatively affect the satisfaction of parents with medical care is that medical professionals can adjust medical intervention accordingly (McNaughton, 1994; Stallard, 1996). Adjustments can aim to lighten the burden that the associated factors may have on satisfaction to eventually improve medical services and treatment outcome.

2.6.3. Generally More Satisfied with What Treatment?

When testing the outcomes of different treatment protocols for infants with motor delay, it is worth assessing the satisfaction of the parents, especially if the treatment requires compliance to a home programme or multiple visits to a service provider. If the parents involved are more satisfied with a certain treatment protocol, it is known to promote compliance and attendance which would lead to the outcome desired by the infant's multidisciplinary team (Becker et al., 1972; Lewis et al., 1986; Albrecht and Hoogstraten, 1998).

After evaluating the parents' opinions of the hospital care they received in a paediatric unit in Greece, Moumtzoglow et al. (2000) found that 16.2% of parents felt that the medical provider did not spend enough time with their child. This statistic applied to the outpatient and the inpatient setting and refers to the actual time spent with a child instead of the frequency of doctor's attention to the child. In the intervention intensity trials analysed under section 3.6, only Bower et al. (2001) made use of a standardised measure to find out parents' perception of the care-giving their children received. According to the Measure of Processes of Care, parents were generally more satisfied with the intense treatment regime which consisted of their normal regime and an additional hour of treatment daily. The difference, however, was not significant. The parents from the intense treatment group also complained that they regarded the intense regime to be 'tiring and stressful' (Bower et al., 2001). In another study a similar attitude was experienced by parents whose children had undergone periods of regular treatment followed by intense daily treatment (Ustad et al., 2009). Even though parents had high attendance rates during the intense periods of treatment, they felt that arranging daily routines during this time was challenging and they appreciated pauses (Ustad et al., 2009).

In the event of developing a treatment protocol for infants with motor delay, the therapist will need to consider the responsibilities of the parents, to not overload them with a regime which will expect too much of them. Intense regimes have been perceived to be stressful and parents cope better with a less intense regime (Bower et al., 2001; Ustad et al., 2009). A measure of parental satisfaction can assist the therapists in formulating a balanced regime which not only achieves the best outcome in terms of infant performance but also promotes compliance (Lewis et al., 1986; Albrecht and Hoogstraten, 1998; McNaughton, 1994; Stallard, 1996).

2.7. Methodological Issues

There are many factors that may affect the outcome in clinical trials. These include factors relating to the study design, factors relating to instrumentation and factors relating to compliance of participants. Other factors that may influence outcome include the Hawthorne effect, sample biases, measurement biases and intervention biases (Law et al., 1998). Choosing the right research design can ameliorate these confounding variables.

2.7.1. Research Design

According to Law et al. (1998) the use of a Randomized Control Trial (RCT) is appropriate once the topic has been investigated and the researchers are aware of the variables that may impact the outcome of the study and take measures to manage them. Researchers have made use of the various study designs to investigate numerous outcomes surrounding the topic of infant motor delay.

One of the components of determining the feasibility of an intervention study is by establishing whether or not there is a need for the intervention within the targeted area/population. This can be done by conducting cross-sectional studies through methods of questionnaires, surveys or screening (Law et al., 1998). Such epidemiological studies can face challenges especially if there are multiple factors contributing toward the existence of the condition being investigated (Schoenbach, 1999). As mentioned before, Ferguson and Jelsma (2009) conducted a cross-sectional study where they made use of a professionally applied assessment tool to identify motor delay among children living with HIV who attended an infectious diseases clinic at a children's hospital in Cape Town. A cross sectional study design is also useful in providing researchers with information regarding factors that may influence the outcome of an experimental study design.

Trahan and Malouin (2002) and Ustad et al. (2009) applied a single subject, multiple-baseline design which is valuable when investigating the attainment of skills. However, this design is appropriate for smaller sample sizes and in cases where the participants are heterogeneous such as the 5 CP children in this study. It is also at times questionable whether any change in behaviour was brought about by the intervention or by changes in the child's condition (Law et al., 1998).

Numerous other studies have made use of a randomized control trial design to investigate the effects of different intensities or treatment regimes on the motor outcome if infants or children (Mayo, 1991; Christiansen and Lange, 2008; Tsorlakis et al., 2004). A randomized control trial is regarded as a thorough research design and provides a comparison group with similar participants compared to the above mentioned single subject design. Jenkins and Sells (1984) made use of a control group from which treatment was omitted. It is however often regarded as unethical practice to withhold treatment from participants which sometimes limits the use of a RTC (Law et al. 1998). Bower et al. (2001) used a 2 x 2 factorial design because they wanted to investigate the effect of two independent variables on the motor function and performance. This design forms part of the experimental design group and also makes use of randomization similar to the RCT; although, the 2 x 2 factorial design sometimes requires a larger sample size to soundly illustrate its outcome which, like the RCT, is often costly (Law et al. 1998).

When conducting intervention studies, the blinding of the participants, the therapist and/or the assessor is essential to prevent biases in the study. In the above mentioned intervention studies researchers made sure their assessor/team of assessors were blinded from the group allocation of the participants they were assessing (Jenkins and Sells, 1984; Tsorlakis et al., 2004; Bower et al., 2001; Christiansen and Lange, 2008). In the case of single subject research design, the assessors were neither aware of the participants' history, current intensity of treatment nor their treatment goals during assessment to avoid measurement bias (Ustad et al., 2009; Trahan and Malouin, 2002).

The implementation of an intervention study produces more concise information when applied in the form of a RCT compared to a single subject design. It is also more popular when investigating the outcome of various intensities and frequencies of therapy for infants and children with motor deficits.

In randomized controlled drug trials, it is commonplace to use placebo or sham treatments as a control. However, it is considered unethical to withhold therapy from a control group when it is known that therapy will benefit infants with motor problems. Therefore, therapy trials often make use of a comparison group, as opposed to a control group. A comparison group is usually a homogeneous group receiving the regular intervention who can act as the control group. This strategy avoids the use of a single subject design where there is question about whether change in behaviour is due to natural causes or the intervention. However, in both types of intervention study designs it is imperative that the assessor/assessors are blinded from the group allocation of participants to avoid measurement bias.

2.7.2. Compliance and Attendance of Dyads

Jenkins and Sells (1986) pose the question as to whom priority should be assigned in order to qualify for therapy. Should therapy be given to those with greatest motor deficit or rather to those who would benefit most from it?

There are a few factors to consider when delivering holistic paediatric therapy services. Higher rates of attrition and compliance have previously been associated with low socio-economic circumstances (Shapiro et al., 1990). Therefore it is important to deliver services in an environment that is easily accessible and to offer a regime that is understood and easily applied by the family members of the infants who need therapy. Such an environment would enhance attendance, compliance and parental involvement from which an infant with motor delay will benefit (Gianni et al., 2006; Mahoney and Perals, 2006). It is noteworthy that even though parents complain about the demands faced during intense periods of treatment, the compliance rates seem to be better compared to periods of standard treatment intensity (Trahan and Malouin, 2002).

In a survey conducted by Olusanya et al. (2007) in developing countries, South Africa had the lowest return-for-follow-up rate (39.7%) for infants partaking a hearing loss screening and management programme. This figure is substantially lower than the conventional criteria of 95% return rate used in developed countries (Olusanya, 2007). The researchers suggested that adequate parental education highlighting the importance of screening would contribute towards increasing parental compliance. Furthermore, factors such as the costs associated with transportation, accessibility and convenience, parental stress as well as the severity of the child's condition, are related to the rate of compliance and co-operation (Olusanya, 2007; Shapiro et al., 1990; Trahan and Malouin, 2002).

Moxley-Haegert and Serbin (1983) investigated the developmental progress of infants with motor delay to determine what independent variables affect the participation, compliance and motivation of these infants' care-givers. A sample of 39 care-giver-child pairs (with the infants all being under the age of 36 months) were allocated to three different treatment groups, namely: i.) the developmental education group, ii.) the group who received child management and general parenting education, and iii.) no intervention group. After 4 weeks, the developmental education group had significantly more treatment sessions recorded, achieved more skills and care-givers recognised more developmental gains, and had better knowledge about their infant's development than the other two groups. Similarly, at the one year follow up, the parents in the same group showed better participation according to the occupational therapist's report ($p < .05$). The infants in the developmental education group had a 9.6% increase in motor skills on the BSID compared to the 7% and 3.09% of the child management and attention group and the no-education group respectively. The developmental education group's improvement was significantly greater than that of the no-education group ($p < .05$). These results show that if parents were educated to recognise developmental progress, they would have improved motivation and compliance (Moxley-Haegert and Serbin, 1983).

Programmes that are carried out in low income areas where people face factors associated with poverty, such as problems with transport, financial distress and occupational pressure, run the risk of suffering from a high default rate to follow up (Olusanya et al. 2007; Shapiro et al., 2009). However, this burden can be lightened by educating parents on child development and the importance of early intervention (Olusanya et al., 2007; Moxley-Haegert and Serbin, 1983).

2.7.3. Confounding Variables

It is difficult for researchers to control the research design in such a way as to avoid all types of biases and confounding variables. Researchers should be aware of the possible effects of biases on their data and acknowledge confounding variables such as the Hawthorne effect.

2.7.3.1. Sample biases

The method of recruitment can result in possible sampling biases. In the event of using a sample of convenience, the researcher is at risk of recruiting a sample that is not representative of the population. There is a possibility of over- and under-representation within a sample of convenience (Shaughnessy et al., 2005).

Furthermore, if a RCT takes place over a long period of time, seasonal sample biases should be considered. Bad weather in certain seasons can affect attendance rates of dyads, especially if they make use of public transport (Law et al., 1998).

2.7.3.2. Measurement biases

Multiple measurements during a study can also result in recall bias inferring that the participant becomes accustomed to the outcome measure and may become aware of the requirements (Law et al., 1998).

Measurement biases can also occur as a result of social desirability. Participants respond to questionnaires and interviews in a way they think they should respond (socially acceptable response) instead of giving the true response (Shaughnessy et al., 2005).

2.7.3.3. Intervention bias

A benefit of a double blinded RCT is that participants, as well as evaluators, do not favour a particular group (control/experimental) in terms of performance and scoring. However in a single blinded study, where the participants are aware of the treatment they are receiving compared to the other group, participants can perform in a manner they assume is the norm for the group for the group they have been allocated to. This bias is unlikely to occur when assessing infant motor performance, as infants are usually unaware of the expected outcome of their intervention group.

2.7.3.4. Hawthorne effect

The Hawthorne effect is another confounding variable which often occurs in intervention studies. It limits the ability of generalizing the results because participants alter their behaviour due to their involvement in the study which may not reflect their true nature intended to be investigated (Wickstrom and Bendix, 2000). It often results in positive outcomes because of people's tendency to impress.

The study design effectively determines what kind of data you obtain to convey the story that your results will eventually illustrate. Choosing the right research design can ameliorate these confounding variables and assist researchers in conveying the truth when trying to tell their story.

2.8. Conclusion Based on the Literature Review

The reviewed literature indicates that in a developing country like South Africa the prevalence of motor delay amongst presumably normal infants is comparable with the statistics available in developed countries (Ferguson and Jelsma, 2009; Sullivan and McGrath, 2003; Sacker et al., 2006). Factors within the South African population increase the risk of infants developing motor delay and are likely to create a substantial work load for therapists. These factors associated with motor delay include HIV (Prevalence of HIV, total [% of population ages 15-49], 2010; Ferguson and Jelsma, 2009), frequent substance abuse by pregnant mothers (Viljoen et al., 2005; Kvigne et al., 2004), low birth weight and gestational age (Kilbride et al., 2004; Halpern et al., 2008; Delgado et al., 2007), poor nutrition (Kariger et al., 2005; Douglas and Bryon, 1996; Slining et al., 2010), poverty (Halpern et al., 2008; Simpson et al., 2003; Miller, 1998), low parental education (Simpson et al., 2003; Delgado et al., 2007; Giagazoglou et al., 2007), unfavourable home environment (Giagazoglou et al., 2007) and cultural influences (Oelofse et al., 2002; Kolobe, 2004). Motor delay is not only experienced in a high risk population. Physicians have come across a few cases of unexplained motor delay for with the aetiology was unknown (Widjaja et al., 2008).

The use of standardised measurement tools to identify, assess and monitor infants with motor delay is encouraged (Jenkins and Sells, 1984; Sand et al., 2010). These tools provide reliable and valid information. However the user needs to make the final decision as to which screening and assessment tool would be most suitable in a specific situation. Many standardised screening and assessment tools are available on the market, but only a few have been used in South Africa (Molteno et al., 1999; Burger et al., 2011; Baillieu and Potterton, 2008; Ferguson and Jelsma, 2009). After careful consideration the combination of the BINS III together with the BSID II is thought to produce a sound identification and evaluation pair suitable for at-risk populations in South Africa.

The identification, monitoring and treatment of infants with motor delay would be in vain if motor delay did not have a short term or a long term impact on the infants' development. Evidence has been found to show that motor delay not only has an immediate effect on development, but continues to affect them later in life (Clearfield, 2010; Bushnell and Boudreau, 1993; Viholainen et al., 2006; Sullivan and McGrath, 2003; Piek et al., 2008; Viholainen et al., 2006). The effect does not remain within the motor domain. It spills over into other developmental domains such as the cognitive and social domains and can even have an impact on a child's academic achievements in his/her early school career (Clearfield, 2010; Bushnell and Boudreau, 1993).

Early Childhood Intervention (ECI) has been encouraged by researchers and debates regarding the best treatment plan package are on-going (Frank et al., 2002; Blauw-Hospers and Hadders-Algra, 2005). This package is put together by firstly deciding on the type of treatment given to the infant based on the preferred theory of development (Gesell and Amatruda, 1947; McGraw, 1945; Thelen et al., 1987; Piper and Darrah, 1994). Individual, institution-based therapy, combined with a home programme, has frequently produced favourable outcomes for the parties involved (Potterton et al., 2009;

Gianni et al., 2006; Jenkins and Sells, 1984; Tang et al., 2011; Hielkema et al., 2011; Trahan and Malouin, 2002; Gagliardi, 2008). However, it is noteworthy that less literature is available investigating group sessions and home-based therapy, and neither has been proven to have unfavourable outcomes. There are mixed results regarding the most effective intensity of treatment (Ustad et al., 2009; Christiansen and Lange, 2008; Trahan and Malouin, 2002; Tsorlakis et al., 2004; Gagliardi et al., 2008; Mintz-Itkin et al., 2009). Intense treatment regimes are frequently supported by research, however the theory exists that lower intensity regimes may elicit better retention of skills by the patients (Mintz-Itkin et al., 2009; Trahan and Malouin, 2002; Tsorlakis et al., 2004; Gagliardi et al., 2008; Wulf and Schmidt, 1989; Winstein and Schmidt, 1990).

Literature has attached importance to the satisfaction of parents with the medical services their infant receives (Lewis et al., 1986; McNaughton, 1994; Stallard, 1996). Satisfaction promotes attendance and compliance which is often a problem in low socio-economic areas (McNaughton, 1994; Stallard, 1996; Albrecht and Hoogstraten, 1998; Shapiro et al., 1990). Tools to measure satisfaction are often novel and formulated by researchers or institutions to suit a unique population from which specific information is required (McNaughton, 1994). Interestingly, parents appear to have better compliance and attendance rates in intense regimes, even though parents seem to generally prefer lower intensity regimes (Bower et al., 2001; Ustad et al., 2009).

Finally, in South Africa the lack of resources and over-loaded staff result in long waiting lists of infants who require intervention for motor delay (Harrison, 2010; World Bank, 2008; World Bank, 2006; G. Gribble and M. Enright, personal communication, 30 January, 2012; P. Njajula and T. Pells, personal communication, 2010; L. Sampson, personal communication, 2009). With the high demand for therapy placed on therapists, prioritising is often the only way of handling the load. This results in neglect of infants who sometimes only present with mild delay which has been proven to affect children at school (Taanila et al., 1966; Piek et al., 2008; Viholainen et al., 2006). There is a need for an effective intervention regime for these infants that will not only gain approval from parents, but also educate and empower them to be attentive and take responsibility at home. Such a treatment regime may decrease the load experienced by health professionals whilst attending to the infants' need.

3. Methodology

There were two phases to the research, the first entailed identifying infants with motor delay and the second implementing and monitoring the impact of the intervention.

3.1. Research Designs

A cross sectional, descriptive, correlational research approach was used to establish the prevalence of delay within the clinics utilized in the study.

Cross sectional designs are often used in epidemiological studies to document the presence and nature of a particular problem within a targeted area at a particular point in time (Currier, 1990). This design was thus used to document and describe the prevalence of motor delay in a sample of infants attending Well Baby clinics in three poorly resourced communities in the Cape Town Metropolitan area over the study period. A correlational design was used to investigate factors contributing toward motor delay in these communities (Payton, 1988).

This was followed by an experimental study with parallel group randomization and single-blinding. A randomized control trial is regarded as the gold standard of research design and is intended to prove causality (Currier, 1990).

A longitudinal, repeated measures design was incorporated to document outcomes and identify possible trends over the study period (Currier, 1990). The use of a longitudinal design is recommended in studies investigating neurodevelopment of infants and numerous studies have used similar designs (Christiaansen and Lange, 2008; Mintz-Itkin et al., 2009). Study participants were assessed at baseline, then at monthly intervals for three months. The final outcome was measured one week after termination of treatment and again after six weeks without intervention.

It is important to note that the lack of a control group limited the study in making inferences regarding the efficacy of the intervention. However having a control group, and in effect denying early intervention, would not be ethically appropriate.

3.2. Participants

Non-probability convenience sampling (Currier, 1990; Payton, 1988) was used to select the research settings. These included three clinics which were within relatively close proximity to the Children's Residential Home at which treatment was to be offered. All of the clinics were in deprived socio-economic areas.

All children presenting to the Well Baby clinics for immunizations were eligible for inclusion. Convenience sampling was chosen due to the ease of accessibility of infants in the desired age category who attend these clinics. It was not possible for the researcher to visit the individual homes of parents who had infants within the target age rage. Neither was it possible to identify a large enough group of well infants and care-givers in one setting.

3.3. Eligibility Criteria

3.3.1. Phase 1: Screening and Assessment of Infant Motor Delay in Infants Reporting to These Clinics

3.3.1.1. Inclusion Criteria

The care-givers of all infants between the ages of 3 months and 12 months, attending Well Baby clinics on days when recruitment took place, were invited to allow their children to be screened. All infant-care-giver pairs (dyads) who met the age criterion and gave consent to participate in screening were included. Infants who were premature and had a history of low birth weight were also included. The reasoning was infants with a history low birth weight and prematurity live in these areas and the possibility exists that these infants forego the opportunity to benefit from early intervention. Furthermore, those who obtained scores of level four and below on the BINS III were then eligible for more in-depth assessment using the BSID II. No more than three weeks elapsed between screening and assessment.

3.3.1.2. Exclusion Criteria

Screening for the exclusion criteria was conducted by retrieving information from the infants' clinic cards and files and also by means of questioning the care-givers.

As infants with neurological or medical conditions that resulted in delay were likely to either be receiving treatment through the health care system or, if not, were to be referred for long term care, the exclusion criteria were as follows.

Infants were excluded if they presented with:

- High fever, vomiting, irritability, and/or coughing at the time of recruitment as assessed by the researcher and nursing staff at the clinic. These factors were deemed likely to result in inaccurate interpretation of performance on the BINS III.
- Down's syndrome, Cerebral Palsy or any other congenital developmental disorder previously diagnosed and recorded in their medical file or confirmed verbally by the care-giver.
- Diagnosed blindness or complete hearing loss as recorded in their medical file or confirmed verbally by the care-giver.
- Diagnosed encephalopathy due to perinatal asphyxia or meningitis, neonatal seizures or any birth trauma.
- HIV
- Multiple episodes (>1) of severe systemic infections (i.e. chest, cardiac, other)
- APGAR score of < 7

The researcher verified whether the infants who met the above mentioned criteria were being managed appropriately within the medical system. Additionally, infants who were receiving any form of rehabilitation elsewhere were excluded from the study.

3.3.2. Phase 2: Intervention

3.3.2.1. Inclusion Criteria

Infants, who had been identified as having motor delay according to the BSID II, i.e. those whose PDI score amounted to 84 or less and whose care-givers consented to inclusion in the intervention study were included.

3.3.2.2. Exclusion Criteria

No exclusion criteria were applied at this stage.

3.4. Sample Size Determination

Sample size calculations were based on the primary outcome of the intervention phase.

The minimum sample size required was calculated using the hypothesis that there would be no difference in the BSID–II scores between the two intervention groups. According to Currier (1990), knowledge of the standard deviation from a previously reported study can be used to estimate the sample size.

Statistica-version 10 (2011) was used to calculate the sample size required using data from a study conducted on children living in similar settings (Jelsma, Davids and Ferguson, 2011). In this study, the mean development score, using the PDMS was 84 (SD=7.7). Since the PDMS has strong concurrent validity with the BSID II (r=0.76)

(Connolly et al., 2006) these values were entered to estimate the expected impact of treatment (it was anticipated that the intensive intervention group would gain 10 points).

Thus it was determined that a sample size of 12 was required per group in order to detect this difference at a p value =.05 with 83% power. Screening of children was continued until this number of participants had been identified. Additional participants were recruited to ameliorate the effect of attrition. Refer to tables in Appendix 3.1.: Sample size calculation figures.

3.5. Randomization

Randomization in research refers to the assignment of each individual to a group based on chance rather than on other factors such as preference or membership of prior groups (Consort, 2012).

Individuals in each age stratum were randomly assigned to either the weekly or the monthly treatment group with a 1:1 allocation ratio (Consort, 2012). The participant numbers of infants were written on sheets of paper which was folded to conceal the identity and placed in a box. A volunteer, who was not part of the study, reached into the box and randomly drew one sheet at a time, placing alternate sheets into two boxes, marked A and B.

3.6. Instrumentation and Measurements

In the following section, the outcome measures used in this study are discussed.

3.6.1. Screening for Motor Delay

The standardised norm-referenced Bayley Infant Neurodevelopmental Screener III was used with no modifications to screen infants for possible motor delay at the Well Baby clinics.

The BINS III has 11 to 13 different items depending on the age of the participant. These items are scored as being either non-optimal or optimal, after which the optimal scores are added to produce a score summary in each domain. The score summaries (final scores) are then categorised as either “normal”, “emerging risk” or “at risk” for either gross or fine motor domains (Bayley, 2006).

To facilitate analysis, the researcher assigned numerical scores to these categories within each domain as indicated in Table 1 below:

Table 1: Values of the respective performance categories for the BINS III

Category	**Value**
Normal	3
Emerging Risk	2
At Risk	1

The gross and fine motor scores were combined and categorised into five levels of performance. The term 'level' referred to the sum of the fine and gross motor category rankings. See Table 2 below.

Table 2: Categorization of BINS III scores according to levels

Level 6	Normal gross motor score (3) + Normal fine motor score (3)
Level 5	Normal gross/fine score (3) + Emerging risk gross/fine (2)
Level 4*	Normal gross/fine score (3) + At risk gross/fine (1) or Emerging risk gross (2) + Emerging risk fine (2)
Level 3*	Emerging risk gross/fine (2) + At risk gross/fine (1)

Level 2*	At risk gross (1) + At risk fine (1)

**Qualify for further assessment.*

The 'levels' were used to distinguish between the infants who qualified for further assessment and those who did not. The 'levels' imply that if an infant had a normal score within both the gross and fine motor domains, the infant would not be eligible for further assessment. Furthermore if an infant achieved a normal score in one of the two domains and an 'emerging risk' score in the other domain, the infant will not qualify for further assessment. However if an infant achieved an 'emerging risk' in both fine and gross motor domains or obtained an 'at risk' score in either the two domains, the infant would qualify for further in depth assessment (i.e. all infants who scored at level 4 or below).

It was beyond the scope of the study to establish whether the BINS III scores were valid for the population under study. However, it has been found to be valid in other populations and as it measures motor development in young infants, environmental influences may not have a large impact on outcome. The validity of the BINS III was not assessed during the validity and reliability testing period as validity had been established in previous studies and during development of the tool (Hess et al., 2004; Aylward and Verhulst, 2000; Bayley, 2006).

3.6.2. Motor Development

Motor development was measured using a standardised measurement tool. The Bayley Scales of Infant Development II (BSID-II) was used with no modifications and is suitable to assess development of infants between the ages of 1 and 42 months (Bayley, 1993). The items of the psychomotor developmental index (PDI) are individually applied to the participants and scored as either credit, no credit, refuse, report (mother reports that the infant is able to complete the task) or omit. The scores derived from the amount of credits received are converted to an index score based on age-specific norms with a mean of 100 and a standard deviation of 15 (Bayley, 1993).

The validity of the BSID II within the South African context has been assessed in two studies examining the motor performance of infants with HIV (Ferguson and Jelsma, 2009, Baillieu and Potterton, 2008). In the study by Ferguson and Jelsma (2009) the BSID II was able to effectively discriminate between infants with HIV and those without. The researcher was aware of the recommendations made by previous researchers who used the BSID II in South Africa (Ferguson and Jelsma, 2009). However it was decided that in using the original BSID II equipment, the validity of the results were not compromised in order to compare to previous studies locally and internationally. Thus, the BSID-II (Appendix 1.3.) was viewed as an appropriate measurement tool and convenient to use after the initial screening had been conducted using the derived screening tool, the BINS III.

3.6.3. The Level of Satisfaction of the Care-Givers

A questionnaire evaluating the intervention programme was developed by the researcher. No appropriate standard questionnaire was identified. The Satisfaction Questionnaire was validated for content validity by a panel of therapists and social workers.

This original English questionnaire was also made available in Afrikaans and Xhosa (Appendix 1.5.), and consisted of questions relating to management of time and work, progress of the infant at home, whether the treatment model suited them and their level of satisfaction with the treatment received. The questions were answered by means of a visual analogue scale ranging from 1 to 10. The visual analogue scale is perceived as a scale which is easy to complete and has been used in different clinical settings to measure the satisfaction of patients who receive medical attention (Antoniotti et al., 2009; Atkinson, 2004; Grant et al., 1999).

3.6.4. Compliance Monitoring Form (Check List)

A questionnaire was developed by the researcher to monitor compliance of care-givers to the prescribed interventions. The checklist questionnaire was validated for face and content validity by a panel of therapists and social workers. It consisted of a series of simple questions. Some were open ended and others were presented on a Likert scale (see Appendix 1.4.). The questionnaire was constructed so that high scores mean good compliance, and low scores mean poor compliance. Once validated, the English questionnaire was forward translated and again translated back into both Xhosa and Afrikaans.

The questionnaires were administered at each visit. Care-givers who were literate completed the questionnaire independently and those who were illiterate were interviewed using the questionnaire, and their responses were recorded.

3.6.5. Training in Instruments

All researchers and the evaluator underwent training to ensure the correct use of the screening and assessment tools. In addition reliability testing was continued until consensus was reached.

Prior to the study, assessments were conducted under video surveillance in the Well Baby clinics on infants whose parents had given consent. This was done to determine inter- and intra-rater reliability. For this purpose, three dyads were recruited at one of the Well Baby clinics for the BINS III testing and two infants were recruited for the BSID II testing.

To determine the intra-rater reliability for the use of the BSID-II, two infants who reside at the Home where the intervention occurred, were assessed twice by the evaluator with a two day resting period between each assessment. These two assessments were also video recorded and assessed by another physiotherapists to test agreement.

3.7. The Intervention

A typical treatment session consisted of three parts. The first related to education of the care-givers regarding the typical development of infants, the second was practical application of the activities that care-givers needed to implement at home. Finally a home programme was given which included the activities and guidelines for behavioural or home adjustments that would benefit the development of their particular infant.

The infants were all encouraged by the therapist to perform a series of motor skills appropriate to their developmental level. In other words, if an infant struggled to perform activities appropriate for their age, then the physical therapist taught the care-giver the activities for the group below the infant's age category.

The intervention focused on care-giver education combined with neurodevelopmental therapy (NDT) and task based approaches. The developmental requirements of the BSID II were used as the basis for the design of the treatment sessions. Emphasis was placed on strengthening and the achievement of motor milestones. Strengthening concepts were used from the Disabled Village Child (Werner, 1999) with its simple and easy to follow techniques along with its easily manufactured equipment. The treatment sessions were conducted in a group format and each group had no more than 5 dyads. A weekly/monthly group would gather at the same time and together receive education, guidance and advice from the therapist who attended to the whole group. Each session was approximately 1 hour in length during which the therapist moved around the group to attend to care-givers who struggled with particular activities.

Parental education plays a cardinal role in the intervention process as well as its role in compliance (Moxley-Haegert and Serbin, 1983). Advice on the most appropriate play and sleeping positions and use of equipment was given to care-givers for them to apply in their home environment (Bartlett and Fanning, 2003; Davis et al., 1998). The education also addressed interaction between the mother and her child which has been proven to have a significant effect on the development of personal-social skills, hand-eye co-ordination and practical reasoning skills of the infant (Gianni et al., 2006). Niemeijer et al. (2006) found that there was a significant improvement of motor performance of children with Developmental Co-ordination Disorder when the sharing of knowledge was utilized as a teaching principle during the treatment sessions. Such a strategy was also followed when addressing the care-givers during the treatment sessions.

A Xhosa translator accompanied the sessions where care-givers did not understand Afrikaans/English. All participants in groups A and B received activities to do at home with their infants. See Appendix 4 for all the treatment sessions.

3.8. Procedure

3.8.1. Ethical Approval

Ethical approval was granted by the University of Cape Town Research Ethics Committee (HREC 266-2010; refer to Appendices 5.1. and 5.2.) to conduct the study. The City Health and the Department of Health of the Provincial Government of the Western Cape granted the researcher permission to conduct screening in the respective Well Baby clinics (refer to Appendix 5.3. and 5.4.).

3.8.2. Training of Research Assistants

The researchers involved in the study included:

i.) **An Evaluator:** a qualified physiotherapist, familiar with the tools, who assessed all the infants at baseline and at each subsequent re-evaluation. This person was blinded as to whether the infants were in group A or group B. The evaluator could speak and understand English.

ii.) **An Intervention Therapist**: the researcher who is a qualified physiotherapist, conducted the group sessions. The researcher could speak and understand English and Afrikaans.

iii.) **A Translator**: assisted the intervention therapist. The translator was able to speak and understand Xhosa and English.

3.8.3. Data Collection

Single-blinded designs are commonly used in physiotherapy studies where participants are actively involved in the intervention. In this study, only the evaluator monitoring the outcome of the two intervention groups was blinded to group allocation. It was neither possible for the participants nor the researcher administering the intervention to be blinded.

3.8.3.1. Baseline Evaluation

All the infants underwent an initial baseline assessment of their motor developmental level by the evaluator.

3.8.3.2. Intervention: Group A

Group A attended the Home for the therapy intervention once a month for 3 months. They had their first day of intervention one week after baseline evaluation. Subsequent evaluations took place on a monthly basis when they came in for their monthly treatment sessions.

3.8.3.3. Intervention: Group B

Group B attended the Home once a week for 3 months for treatment conducted by the same therapist who attended to group A and a similar structure was followed to that of group A. Subsequent evaluations happened on a monthly basis. Shaughnessy et al. (2005) have discussed the risk of practice effects associated with repeated measures study designs. This involves confounding factors such as memory/recall bias and threatens the internal validity of the data collected (Shaughnessy et al., 2005; Law, et al., 1998). To limit this effect the assessments were conducted only once a month which required new starting points in the BSID II as well as new additional items tested because the infant had aged by one month. Even if they returned to the previous set of items (if they were unable to perform enough items in the age appropriate set) then the order of the items would be different to that of the previous month.

All the participants attended the Home one week after their final treatment session for another assessment of their motor function. Dyads waited in a furnished waiting area in the entrance hall while each infant was assessed individually by the evaluator in a separate room approximately 100m away. The room contained an exercise mat, a desk and a chair. Sandwiches and muffins were offered to care-givers at each session, along with tea, coffee, juice and water. Care-givers remained in the room with their infant while the assessment was conducted. R30 transport money was given to each care-giver after either the weekly or the monthly session had been completed.

A final assessment took place 6 weeks after the treatment intervention to find out if the infants maintained their developmental level after the treatment was discontinued.

Treatment was withheld for this time period because it was longer than the periods both the weekly and monthly groups were used to without receiving reinforcement.

3.8.4. Monitoring the Intervention and Ensuring Compliance

All participants in Group A and B were required to complete the compliance questionnaire (Appendix 1.4.). The questionnaire was developed to determine whether care-givers were compliant with instructions given in the intervention programme. This questionnaire comprised of a simple checklist with yes/no responses to activities administered by the researcher with additional qualitative, open ended questions to inquire about possible reasons for poor compliance.

In order to decrease the attrition rate, the researcher kept contact details of all participants. An attempt was made to avoid problems that have been experienced in the past with regards to either not starting the intervention or not completing the intervention phase, by keeping in contact with the participants by means of telephone calls (Hollis and Campbell, 1999).

3.8.5. Data Management

Consent forms, demographic information, BSID II scores, the checklists for monitoring compliance and the satisfaction questionnaire were kept in separate folders for each child. The folders were each coded to maintain complete anonymity. Data collected was kept in a safe environment accessible only to the researcher in order to maintain complete patient confidentiality. Data was entered onto an Excel spread sheet on the day of collection.

3.9. Statistical Analysis

The STATISTICA 10 (2011) software programme was used to analyse the data. The appropriate tests were selected according to the distribution of the values which were first determined by the Shapiro-Wilk test. All results were accepted as statistically significant with probability values of $p \leq 0.05$.

3.9.1. Identification of Infants

Descriptive statistics were used to describe the numerical demographic medical data. The information and results from the BINS III and the BSID-II motor scale were also displayed on a histogram.

T-tests were used to identify if there were any significant differences between those who attended and those who defaulted with respect to care-giver age and birth weight. A

Mann-Whitney U test was used to do the same for the infants' ages, weeks premature, and the care-giver's years of education. Similarly, the Chi-squared test was used to identify significant differences between those who attended baseline assessments and those who did not in terms of gender, income received, type of housing, employment status and area of residence.

3.9.2. Intervention Phase

For the intervention phase, t-tests were used to identify if there were any significant differences between groups with respect to care-giver age and infant birth weight. A Mann-Whitney U test was used to do the same for the infants' ages, weeks premature, and the care-giver's years of education. Similarly, the Chi-squared test was used to identify significant differences between the treatment groups in terms of gender, income received, type of housing, employment status and area of residence.

Between-group comparisons (performed before, at cessation and six weeks after intervention) were conducted if the values were non-normally distributed using the Mann-Whitney U test. For normally distributed data, an unpaired t-test was used to determine if there was a statistical significance between groups, whereas a paired t-test was used to compare results of a participant at baseline compared to after the treatment intervention.

All numerical data sets were assessed for normality. As the measurements after one month were not normally distributed, no ANOVA was done to compare the scores at different ages, although the means were presented graphically. T-tests were done to compare the BSID II PDI score at admission to the study, after the intervention and at follow-up. As it was apparent that the monthly group scored lower at the cessation of treatment and higher at follow-up, the difference between the cessation and follow-up scores was calculated and the t-test used to determine if there was a difference between the two. As the numbers were relatively small, it was anticipated that statistical significance might not be reached and the effect size of intervention was calculated using the cessation scores. To determine if there was a difference in the gain (or loss) in score from cessation to discharge, the effect size was calculated using the difference in scores between these two points as independent variables. Cohen's *d* was used to calculate the effect size.

$$d = \frac{\bar{x}_1 - \bar{x}_2}{s},$$

The effect size (*d*) is calculated by dividing the mean of the experimental group (x_2) subtracted from the mean of the control group (x_1) by the standard deviation of the entire group (s) (Coe, 2012). The 95% confidence intervals are calculated using the following formula:

Equation 2

$$\sigma[d] = \sqrt{\frac{N_E + N_C}{N_E \times N_C} + \frac{d^2}{2(N_E + N_C)}}$$

Where N_E and N_C are the numbers in the experimental and control groups, respectively.

According to Cohen's *d*, an effect size of 0.8 or more is regarded large, an effect size around 0.5 is "medium" and a "small" effect size ranges between 0.2 and 0.3.

3.9.3. Satisfaction and Compliance

The satisfaction questionnaire and the checklist yielded ordinal data. Comparisons between treatment groups were made using the Chi-squared test.

3.9.4. The Use of Extrapolated Scores

After the development and validation of the BSID II, researchers using the assessment tool found that some infants and children achieve scores too low to convert to a PDI classified in the lowest category (Ferguson and Jelsma, 2009). This implies that the infant's raw score was lower than the lowest score anticipated by the developers of the BSID II. In effect, the user is unable to convert that particular score, for the specific age of the infant, to a previously calculated appropriate PDI which would place the infant in a specific developmental category. This resulted in the development of extrapolated scores to enable a researcher to perform statistical analysis with the use of an extrapolated PDI (Robinson and Mervis, 1996). With reference to the original BSID II, these researchers estimated appropriate PDI values that would correspond to very low raw scores. It is noteworthy that these extrapolated scores are estimates and are not derived from the standardised sample.

3.10. Ethical Consideration

The study adhered to the Declaration of Helsinki (WMA Seoul version, 2008).

3.10.1. Autonomy

With regards to this study where the participants were minors, "autonomy is diminished". Therefore underage care-givers/mothers (under the age of 18 years) were excluded from the study unless they attended the clinic with their legal guardian who then gave consent. Parents were required to give consent by signing a consent form to be able to participate in the study. In addition, the autonomy of each participant was still respected by gaining informed consent from the parent/legal guardian of each child (Tangwa, 2009). Informed consent forms were available in English, Afrikaans and Xhosa (Appendix 2). Participants were also allowed to withdraw from the study at any point in time if they felt the need.

3.10.2. Beneficence

It has been proven that physical therapy is beneficial to children with motor performance problems (Gagliardi et al., 2008; Jenkins and Sells, 1984; Tsorlakis et al., 2004; Ustad et al., 2009; Verschuren et.al., 2007), therefore beneficence was respected. The care-givers benefited from this intervention by gaining knowledge on child development. Literature has also shown that the promotion of mother-child interaction can lead to a more stimulating environment at home as a result of participation in a mother and child intervention programme which in turn has a positive outcome for the development of infants (Gianni et al., 2006).

The current standard of care in South Africa depends on the geographic environment and severity of the infant's motor deficit. In rural areas where health care is not easily accessible programmes have been developed to empower community members and care-givers to sustain treatment effects. The Malamulele Onward project has adapted such a regime for children with disabilities with initial intense (daily treatment for a week) followed by annual follow-up visits (Malamulele Onward, 2011). Furthermore, physiotherapists in the public sector see infants with motor delay more frequently (up to once a week in some clinics) for longer periods until they are satisfied with the infant's progress and the ability of the care-giver to maintain the progress at home. Research, to determine the best standard of care for infants with motor delay, will benefit the well-being of infants and children who are currently receiving treatment and will still receive treatment in the future.

Infants who showed signs of motor delay were advised to see a medical practitioner and the necessary referral letters were then given to the care-giver to rule out any other medical complications. After the study was complete, the infants who were still delayed according to the BSID II, were referred to a facility close to their home where they could continue physiotherapy. Arrangements were made with the attending physiotherapists at these facilities to see these infants.

Both groups received exactly the same treatment in terms of the intervention content. However, the weekly group just had more frequent visits to the physiotherapist. There are mixed results available on whether or not an increased intensity of physiotherapy sessions affects the outcome of an infant's motor progress (Mintz-Itkin et al., 2009; Mayo, 1991; Jenkins and Sells, 1984). Therefore, it was initially unclear if one group would benefit more than the other.

3.10.3. Non-Maleficence

The fact that some of the infants might have received treatment which causes discomfort or fatigue, may have been a concern, but the therapist performing the treatment took necessary precautions to ensure these were minimal. The time taken to comply with the treatment model may have interfered with care-givers ability to attend work or meet other obligations.

A major ethical concern was whether the screening instrument would actually pick up children with delayed development. If there were too many false positives mothers would have been worried unnecessarily. Therefore, the researcher chose to use the BINS III, an updated version of the original BINS which has good predicative validity (Aylward and Verhulst, 2000; Leonard et al., 2001). It is in the mothers' best interest to be aware of the problem as it can be treated successfully. The researcher explained that if the problem is not addressed, it may either lead to problems later in life (i.e. when the child goes to school) or the child may outgrow the problem. It was the mothers' choice whether or not to take up the offer of referral for treatment.

To further reassure the mothers whose children had been identified as having a delay, the researcher, in her capacity as a trained therapist, provided the mothers with basic advice to stimulate development generally. The researcher reassured the mothers not to worry as their child would be referred for intervention even if they chose not to be part of the study.

Once care-givers were made aware of the fact that their child may have a motor delay, they may have been curious or concerned about the wellbeing of their other children. The researcher enquired about the other children living in the household and advised the care-giver to bring the child in for an assessment at the well-baby clinic or with the paediatrician servicing that particular CHC.

3.10.4. Confidentiality

As the infants were treated in groups, the other mothers knew that all the babies who attended the therapy sessions were delayed. Mothers/care-givers had to sign a confidentiality agreement within the consent form prior to the therapy sessions.

Access to information was given to the therapists and examiners who attended to infants on a need-to-know basis. Infants were randomly allocated a code number under which their test results and the information from their questionnaires were entered. Participants were never referred to by their name or any form of recognizable identification. In the same way, the anonymity of the care-givers participating in this research was ensured.

3.10.5. Insurance

The researchers were covered by mal-practice insurance and no fault insurance was available through UCT to all participants.

3.10.6. Dissemination of Information

Sharing of information with other health professionals is considered important in order to apply methods scientifically proven to be of greatest benefit to the patients involved. The dissemination of information to physiotherapists will be at conferences and through publications. Information will also be sent via e-mail to authorities who granted permission for access to the facilities involved in the study as they have the resources to convey the information to institutions that will benefit from it. The researcher's contact details will be made available along with the information if therapists have any questions regarding the results and/or recommendations.

4. Results

The results will be presented as follows: Firstly, the results obtained during the screening and recruitment phase are presented. This will be followed by the result obtained at the baseline assessment. Finally, the results of the intervention study are presented. This includes between-group and within-group comparisons and the compliance and the level of satisfaction of participants.

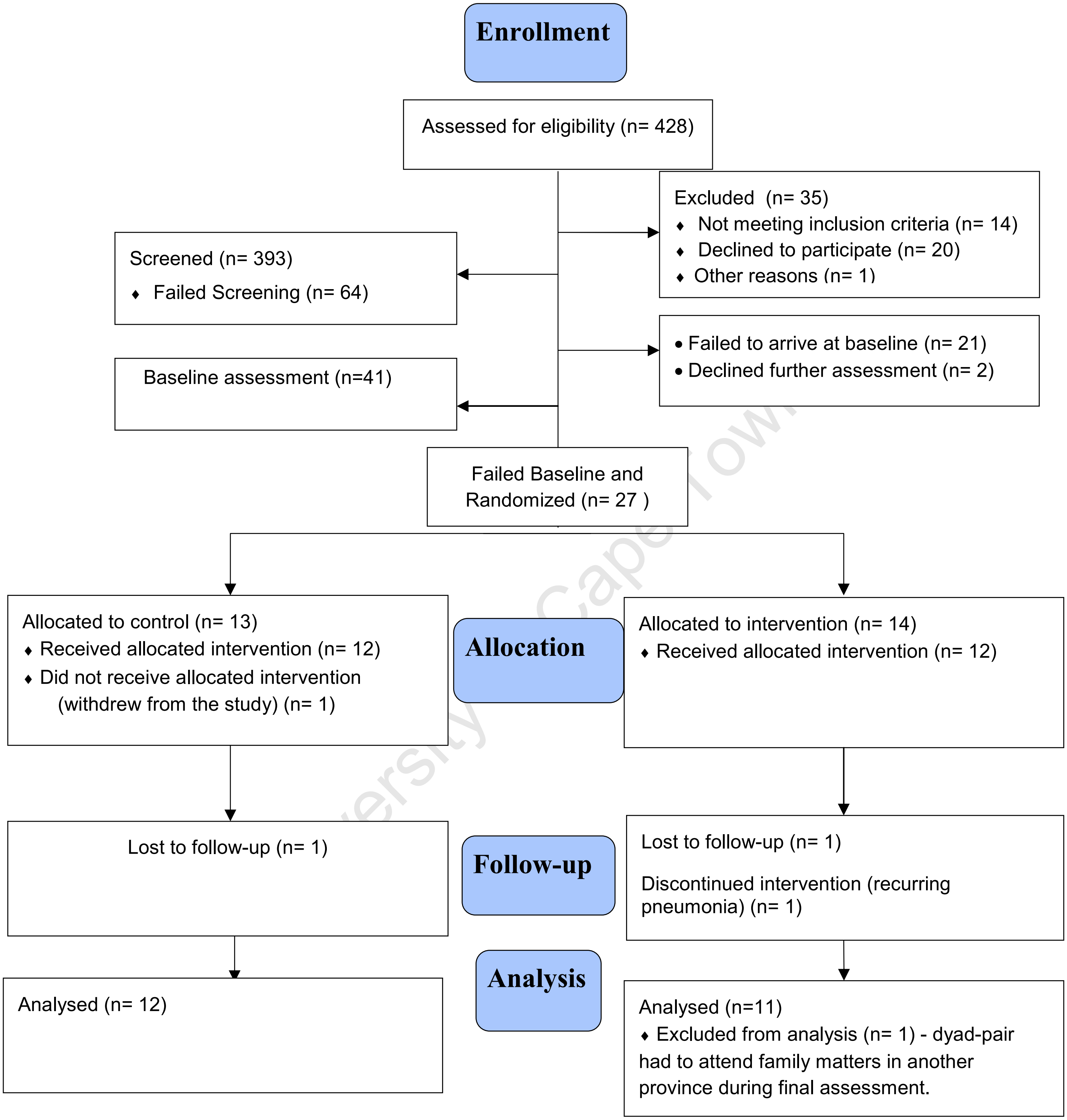

FIGURE 1: **Flowchart of identification, recruitment and follow-up.**

4.1. Screening and Recruitment

From 23 August 2010 to 20 April 2011, 60 days were spent in Well baby clinics where a total of 428 infants were identified as meeting the inclusion criteria for the study. Of these, twenty care-givers did not consent to screening and one child was unable to finish the test due to excessive crying. Thus 407 were screened. Fourteen were subsequently excluded according to the exclusion criteria (see details below in Table 3) leaving an effective sample of 393. See Table 3 below.

Table 3: Infants who fit the exclusion criteria

Exclusion Criteria	**N**
Diagnosed HIV	6
Previous serious chest infections	2
Previous meningitis	2
APGAR <7	1
Trauma at birth	1
Hydrocephalus	1
Postnatal myocardial infection	1

4.1.1. Description of Sample (n=393)

There were equal numbers of males (50.1%) and females (49.9%) in the study. The mean age of the children was 6.1 months (SD=2.5, range 3.00-11.9 months). The age range of the infants is reflected in Figure 2 below. Eighty infants (20.4%) were born before their due date and 53 (13.5%) were premature by 3 weeks or more. The mean birth weight of the infants was 3051.3g (SD = 642.98) and ranged between 900 – 4500g. Fifty five (7%) weighed less than 2000g at birth.

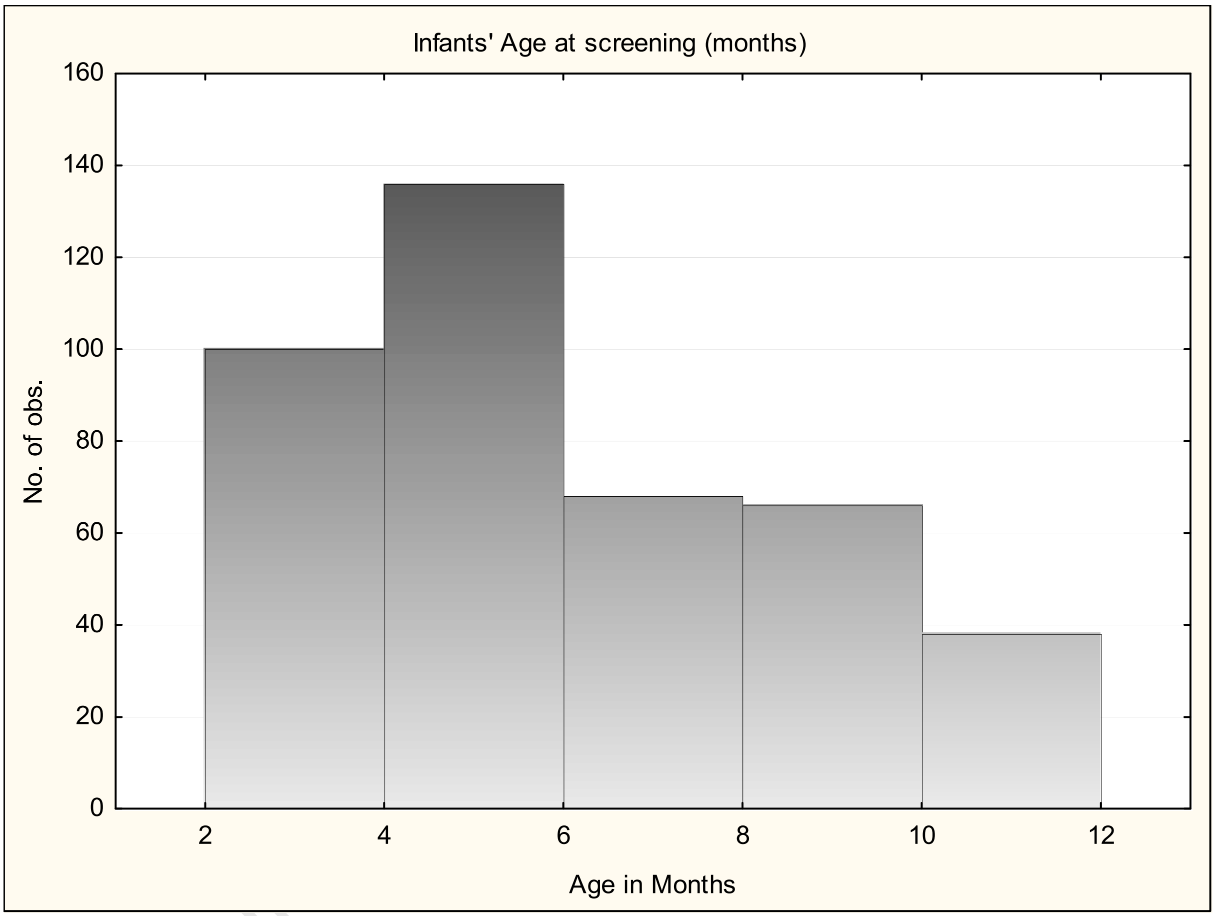

FIGURE 2: **Histogram of the infants' age range (n=393)**

Infants who were previously hospitalized accounted for 13.18% of the sample. The most common cause for hospitalization was, according to information contained on the RTHC, "postnatal complications" (50% of those hospitalised). These postnatal complications included: low birth weight, prematurity and jaundice. Other causes include *single* episodes of conditions depicted in Table 4 below.

Table 4: Causes for hospitalization of infants

Causes	Number	Percentage
Postnatal complications (i.e. low birth weight, prematurity and jaundice)	26	50%
Respiratory conditions	12	23.08%
Infections	3	5.77%
Surgery	3	5.77%
Dehydration	3	5.77%
Reflux	2	3.85%
Weight Loss	1	1.92%
Head Injury	1	1.92%
Gastroenteritis	1	1.92%

The infant with the head injury was not excluded because the severity of the head injury was minor and involved getting stitches after the infant bumped his/her head. The child remained in hospital for only one night for observations. However, the doctors were confident that no follow up was needed as it was only a surface wound. Information gathered from infant's file and by means of parent interview.

The majority of infants (92.11%) were brought to the baby clinics by their natural mothers, the rest were brought in by guardian or other family members. The mean age of these care-givers attending the baby clinics was 28.1 years (SD = 7.9) with a range of 16 to 67 years. The mothers who were underage (n=7), gave assent and their own mothers signed the informed consent forms. More than half (58.02%) of the care-givers had more than one child. Some (13.04%) of their other children were not living in the same home and were cared for by another family member someone other than their parents.

In terms of education, two primary care-givers (0.5%) had no schooling, 10.43% had less than 9 years of schooling, 47.33% achieved 9 to 11 years of schooling, 34.86% had twelve years of schooling and 6.88% had tertiary education.

Twenty eight per cent were employed. There were 18.58% of the sample who received no form of income and 42.49% received government grants (R270 pm). Only 4.07% of the care-givers received a monthly income of R5000 or more. The majority of dyads resided in houses (57.51%) compared to 18.32% who were living in flats/duplex apartments and 24.17% who were living in informal structures.

4.1.2. Screening Results (n=393)

4.1.2.1. Differences in Gross and Fine Motor Delay

Separate results for the gross and fine motor domains during the BINS III screening are illustrated in Figure 3 below. With regards to fine motor skills; 8 (2.04%) were at risk of delay, 144 (36.64%) displayed an emerging risk and 241 (61.32%) had normal scores.

For the gross motor domain; 4 infants (1.02%) were at risk of delay, 72 (18.32%) displayed emerging risk and 317 infants (80.66%) had a normal gross motor performance according to the BINS III test.

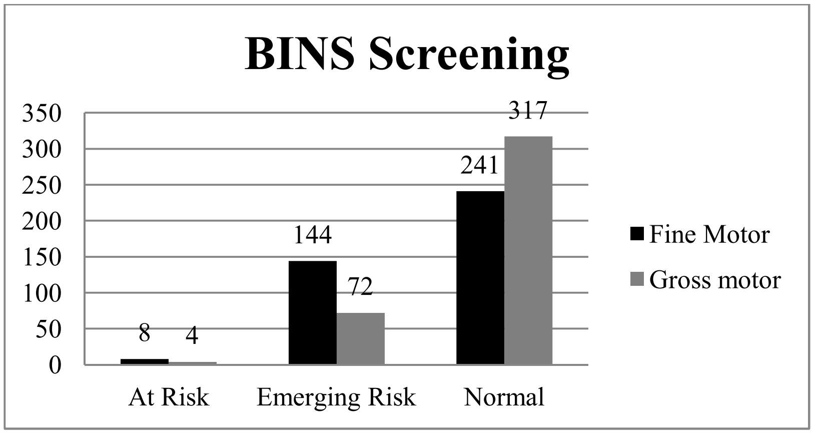

FIGURE 3: **BINS III screening results: Classification of performance in gross and fine motor domains**

Figure 4 below illustrates the results of the screening and the identification strategy utilized to assess infants' eligibility to participate in the intervention phase.

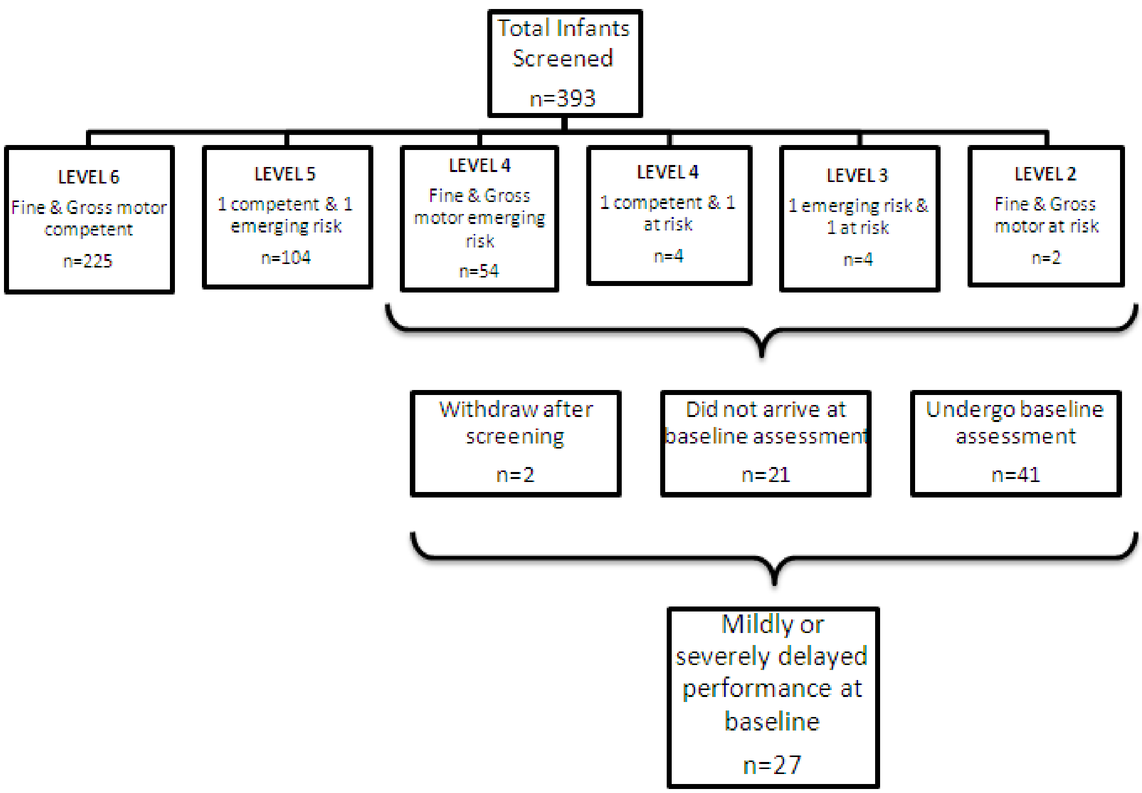

FIGURE 4: **Identification of participants for intervention phase (n=393)**

Of the 393 infants screened using the BINS III 225 (57.3%) infants scored at level 6 on the BINS III, indicating competent fine and gross motor performance. One hundred and four infants (26.5%) scored at level 5 on the BINS III indicating competent motor performance. The rest of the infants (n= 64, 16.3%) scored at level 4 and below proceeded on to further assessment (Phase 2). The prevalence of suspected motor delay on screening was this 64/393 or 16.3%.

4.1.2.2. Comparison between Infants Eligible for Intervention and Those with Normal Performance

The age of the infant and care-giver, birth weight, weeks premature and care-giver's years of education for those who achieved typical scores (levels 5 and 6 of the BINS III) were compared with those who scored in the delayed range (4 or below). The Mann-Whitney U test was used because the population was not normally distributed according to the Shapiro-Wilk W statistic ($p<.001$). The two groups were also compared in terms of gender, care-giver's employment status, income bracket, area of residence and type of residence using the Chi-squared test for these categorical outcomes. The only significant difference between groups was the care-giver's years of education. The care-givers of those infants who were identified as being within typical limits on the BINS III screening had significantly more years of education compared to those who did not. Although a statistical significant difference was found regarding care-giver's years of education between typically developing and the eligible for intervention group, the normally developing group had only 0.67 more years of education which is not considered clinically significant.

Table 5 below represents the test results.

Table 5: Comparing variables of those who qualified for further assessment (n=64) vs. those who did not qualify (n=329)

Variable	Eligible for Intervention	Normal Performance	Test statistics	p
Infant mean (SD) age (months)	5.85 (2.51)	6.10 (2.48)	U = 9899 Z = -0.76	.45
Care-giver mean (SD) age (years)	29.77 (10.4)	27.74 (7.36)	U = 9410.5 Z = .89	.37
Mean (SD) birth weight (grams)	2996.43 (727.73)	3061.97 (625.88)	U = 9328 Z = -1.08	.28
Mean (SD) weeks premature (weeks)	0.78 (2.13)	0.85 (2.02)	U = 10412 Z = -0.14	.89
Mean (SD) years of education (years)	10.14 (2.47) Range: 0-13	10.81 (1.72) Range: 4-15	U = 8856.5 Z = -2.01	.045
Education 10+ (years)	73.44%	82.37%	Chi-squared = 2.77	.10
Employment	employed=14 unemployed=50	Employed=97 Unemployed=232	Chi-squared = 1.53	.22
Gender	male:165 female:164	male:32 female:32	Chi-squared = .0005	.98
Area of residence	Area 1 :45 Area 2 :213 Area 3 :71	Area 1 :13 Area 2 :33 Area 3 :18	Chi-squared = 4.1	.13
Income	<R2000:251 R2000-R5000:62 >R5000:16	<R2000:53 R2000-R5000:10 >R5000:1	Chi-squared = 1.95	.38
Type of residence	flat:59 brick house:190 informal:80	flat:13 brick house:36 informal:15	Chi-squared = .20	.90

Two care-givers withdrew after the screening and refused to continue with further testing because they did not feel their infant was delayed and in need of therapy.

Despite ongoing contact, twenty one (33.87%) of participants did not attend the baseline assessment for unknown reasons, thus leaving an effective sample of 41 infants who arrived at the Home for the baseline assessments.

Differences were investigated between the care-givers of those infants that gave consent (n=41) to continue and those who did not arrive (n=21) or withdrew (n=2). The two groups were compared to see whether employment status, gender, income bracket, area of residence or type of residence were different. No significant differences were found between those who proceeded on to phase 2 (n=41) and those who either withdrew or did not attend (n=23) in terms of the variables listed in Appendix 3.2., except for the difference in care-giver's age. The care-givers who attended baseline assessment were significantly (p=.05) older than those who either withdrew or failed to attend. The differences have been tabulated in Appendix 3.2.: Comparing variables of dyads that arrived baseline assessment (n=41) vs. those who did not arrive or withdrew (n=23).

4.2. Baseline Assessment and Confirmation of Motor Delay (n=41)

The mean PDI for the infants who were assessed at baseline (n=41) was 80.78 (SD = 11.47; range 53-101), see Figure 5 below.

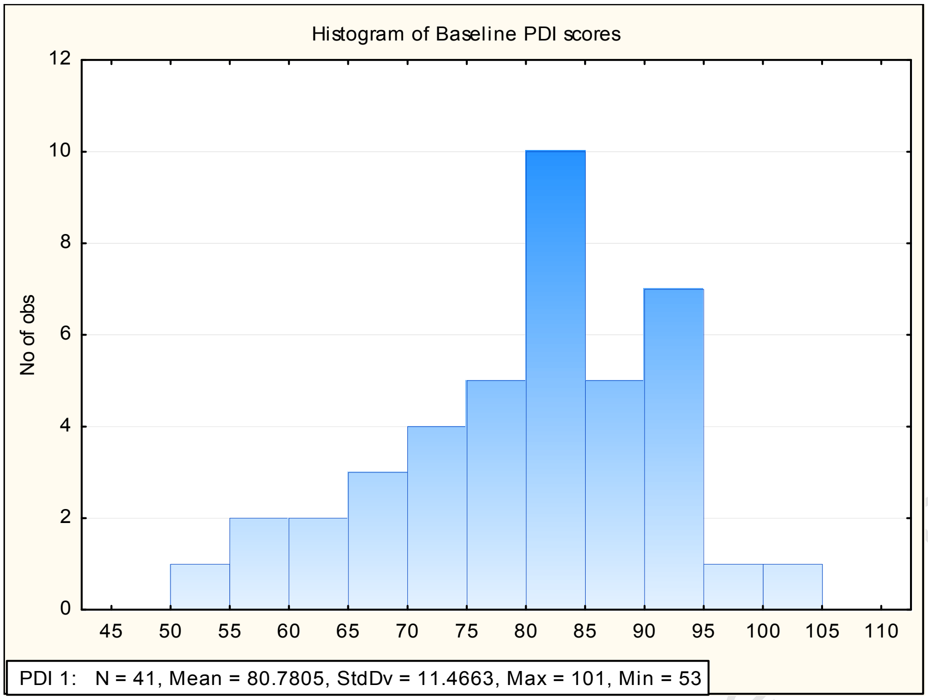

FIGURE 5 **Histogram representing baseline PDI scores (n=41)**

During the baseline assessment 27 of the 41 participants showed either a mildly delayed (n=21) or a significantly delayed (n=6) performance. Fourteen infants were classified as having normal performance despite previous poor performance on the BINS III (see Table 6 below).

Table 6: BSID II categories at baseline (n=41)

Category	**n (%)**	**'Emerging risk' at screening (n=39)**	**'At risk' at screening (n=2)**
Normal	14 (34.15%)	13 (33.33%)	1 (50%)
Mild	21 (51.22%)	20 (51.28%)	1 (50%)
Significantly	6 (14.63%)	6 (15.39%)	0

4.2.1. **Specificity of the BINS III**

Fourteen infants had a normal performance during the baseline assessment; thus were false positives (14/41 = 34.15%). Even though most (13/14) of the false positives had only an 'emerging risk' during screening, 26 (66.67%) of the 'emerging risk' infants had mildly delayed or significantly delayed outcomes during the baseline assessment. Twenty-seven infants therefore met the criteria for delayed motor performance and proceeded on to the intervention phase of the study.

The prevalence of confirmed mild (n=21) or severely delayed performance (n=6) in the recruited sample (n=393) was therefore 6.8%. Of those who on screening were found to be between levels 2 and 4, 65.8% were found to have developmental delay.

4.2.2. Relationship between PDI and Socio-economic and Birth History (n=41)

There were no significant correlations between the initial PDI and the care-giver's age (r=-0.12; p=.27), years of education (r=0.15; p=.34), infant's birth weight (r=0.24; p=.13), and weeks premature (r=0.03; p=.85). Three infants who had a history of low birth weight (<2000g) qualified to participate in the intervention phase. Only two of the three infants with low birth weight were premature by > 4 weeks.

Additional tests, such as the Mann-Whitney U and the ANOVA were conducted to determine the relationship between categorical variables and the initial PDI of the sample. The results are reflected in Table 7 below.

Table 7: Relationship between socio-demographic variables and PDI (n=41)

Variable	Categories	n	Mean PDI (SD)	statistic	P
Gender	Male	22	80.82 (11.27)	U=208	.99
	Female	19	80.74 (12.00)	Z=0.01	
Premature by 4	*Yes*	*4*	*69.0 (9.70)*	*U=24*	*.03*
weeks or more	*No*	*37*	*82.05 (11.01)*	*Z=-2.18*	
Birth weight less	Yes	3	72.67 (7.77)	U=25	.12
than 2000g	No	38	81.42 (11.27)	Z=-1.58	
Care-giver	Yes	10	78.10 (11.84)	U=127	.40
employment	No	31	81.65 (11.41)	Z=-0.84	
Area of	Area 1	5	83.20 (9.96)	ss=323.88	.30
residence	Area 2	25	78.56 (10.98)	df=2	
	Area 3	11	84.72 (12.81)	MS=161.94	
				F=1.25	
Income	<R2000	34	80.21 (11.88)	SS= 88.63	.72
	R2000-R5000	6	82.83 (10.11)	df =2	
	>R5000	1	88.00 (0.00)	MS=44.32	
				F= 0.32	
Type of	Flat	6	83.00 (10.33)	SS-: 679.30	.07
residence	House	24	80.04 (12.01)	df=2	
	Informal	11	81.18 (11.48)	MS= 339.65	
				F =2.82	

4.3. Intervention Study

Over a period of three weeks, three participants (1 from group A and 2 from group B withdrew from the study and were excluded. Two participants voluntarily withdrew and one infant struggled with chronic pneumonia and had to withdraw because they were unable to attend treatment sessions and assessments. Another four (three from group A and one from group B) participants failed to attend the final (fifth) assessment; however, their data were still utilized because they received all the treatment offered.

4.3.1. Differences between Groups-Demographic

The sample was randomly assigned to two intervention groups A (monthly) and B (weekly). No statistically significant difference was found between group A and B and at baseline the two groups were equivalent. See Table 8 below.

Table 8: Differences between group A (n=13) and B (n=14)

Variable	Group A (monthly) n=13	Group B (weekly) n=14	Statistic	p value
Infant mean age (months)	5.86 (SD=2.47)	5.77 (SD=2.45)	U = 89 Z = .07	.94
Care-giver mean age (years)	31.62 (SD=8.24)	30.93 (SD=8.54)	t-value = 0.21	.83
Mean Birth weight (grams)	2764.23 (SD=1054.97)	2979.29 (SD=727.68)	t-value = -0.62	.54
Mean weeks premature	1.69 (SD=3.45)	0.29 (SD=1.07)	U = 75.5 Z = .73	.47
Mean years of education	10.31 (SD=1.8)	10.72(SD=1.14)	U = 85 Z = -0.27	.79
Gender	males:7 females:6	males:9 females:5	Chi-square = .30	.58
Income	<R2000:10 R2000-R5000:3	<R2000:13 R2000-R5000:1	Chi-square = 1.36	.24
Area of residence	Area 1 :2 Area 2 :9 Area 3 :2	Area 1 :1 Area 2 :11 Area 3 :2	Chi-square = .50	.78
Type of	flat:2	flat:1	Chi-square = .48	.79

residence	brick house:7 informal:4	brick house:8 informal:5		
Employment	unemployed:7 employed:6	unemployed:12 employed:2	Chi-square = 3.28	.07

4.3.2. Differences between groups: Motor performance at baseline (n=24)

Thus 23 participants completed the intervention and attended four out of the five assessments.

Both groups were equivalent in terms of motor performance at baseline. For Group A, the PDI at the baseline assessment was 74.33 (SD = 10.14; range 53-83). And For Group B the baseline PDI was 76.0 (SD = 7.14; range 64-84). There was no significant difference between the groups at baseline (t= 0.12, *p*=.91)

4.3.3. Longitudinal Performance of Groups (n=24)

4.3.3.1. During the intervention period

The mean psychomotor developmental indices (PDI) for the two groups over 3 months of intervention are represented in Figure 6 below. The results reflect scores of participants who completed all 4 assessments over this period. In group A n=12, and group B n=11.

FIGURE 6: **Representation of mean (95% Confidence Intervals) PDI scores in the intervention period**

Group A gradually improved at the second assessment to achieve a mean PDI score of 75.17 (SD = 17.06; range 30-88). At the third assessment there was a substantial increase in PDI scores to a mean of 85.58 (SD = 14.87; range 65-117) and continued until the fourth assessment to a mean of 87.92 (SD = 10.87; range 73-109). Group A displayed a significant improvement in PDI scores from baseline to the fourth assessment when the change was tested using a Wilcoxon test (T = 1.00; Z = 2.52; p = .01).

Group B presented with a similar trend in developmental progress compared to Group A. At the second assessment the mean was 88.67 (SD = 9.92; range 79-106), at the third assessment the mean was 91.5 (SD = 8.67; range 73-104). One participant failed to attend the fourth assessment and the mean was 94.18 (SD 7.63; range 85-109). Group B also showed significant improvement from baseline to the fourth assessment ($t = -5.91$; $df = 21$; $p = < .001$).

The difference between the PDI scores at each assessment was investigated. Table 9 below depicts the relevant statistics to illustrate that there were no significant differences between the groups at any of the five evaluations.

Table 9: Difference between mean PDI scores at each assessment

Assessment	Statistic	p-value
PDI 1.	U = 65.5	
	Z = -0.35	.73
PDI 2.	U = 47	
	Z = -1.41	.16
PDI 3.	t-value = -1.19	.25
PDI 4.	t-value = -1.62	.12
PDI 5.	t-value = 0.29	.78

Even though the Mann-Whitney U tests and the t-tests revealed no significant differences between group A and B's motor outcome, Figure 6 illustrates that the weekly group improved more than the monthly group over the intervention period after they initially displayed similar scores at baseline. To determine the extent of this difference an effect size calculation was utilized.

The effect size between the PDI scores of the fourth assessment of group A and B was medium to large (*d*= 0.65, CIs=.22-.1.08) in favour of the weekly group's progress, however the confidence intervals were large. Refer to Table 10 for relevant values.

Table 10: PDI 4 effect size

Mean PDI 4 Group A	**Mean PDI 4 Group B**	**Standard Deviation of whole group**	**Effect Size**
87.92	94.18	9.59	0.65

4.3.3.2. Six week follow-up

After 3 months of treatment sessions, treatment was withdrawn but a follow-up assessment was undertaken to see whether the infants had retained their higher level of functioning.

After 6 weeks of no treatment, nine of the 12 participants in group A arrived at the final assessment. Two care-givers refused further assessment and the third infant had been removed from her mother as a result of parental separation. Group A demonstrated a continuing trend of improvement of their PDI scores with a mean of 94.22 (SD = 16.85; range 68-117).

A participant in group B also failed to attend the fifth assessment due to attendance to family matters in the Eastern Cape. However, in contrast to group A, there was a decrease in PDI scores of group B at the fifth assessment with the mean of 93.2 with greater variances in scores resulting in a standard deviation of 16.56 and a range of 65-117. None of the changes within the groups were significantly different (illustrated in Table 9) after treatment was withdrawn. These changes of the means of group A and B are illustrated in Figure 7 below.

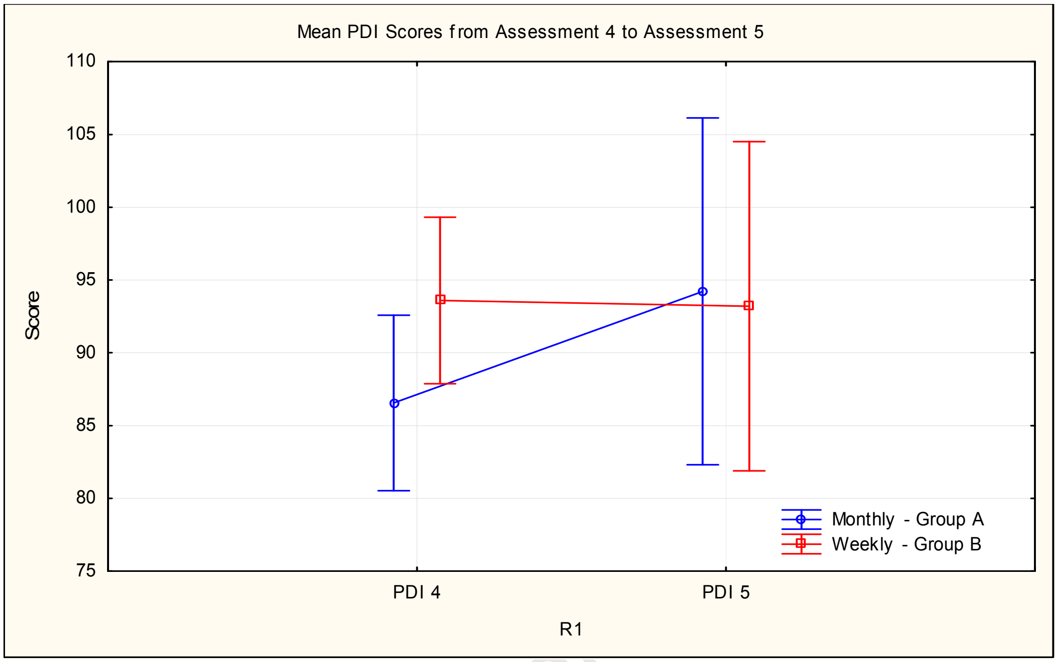

FIGURE 7 : **Changes of PDI scores from assessment 4 to assessment 5**

Between Group Effect

After the six week no-intervention period, group A and B showed a difference in the ability to retain skills. The PDI scores of the infants in group B decreased; whereas the scores of the infants in group A increased. Please refer back to Figure 7 above where this is illustrated.

The poor attendance after the six week period, when there was no treatment, resulted in the smaller sample size as well as the variability in PDI scores which produced large standard deviations (SD=16). To determine if there was a difference between the groups in terms of the change in PDI scores from the fourth to the fifth assessment the effect size was calculated. The effect size amounted to $d = 0.58$, (CIs .12-1.04) indicating a medium effect size of the difference between the groups' performances from the fourth to the fifth assessment. Relevant values are illustrated in Table 11.

Table 11: Effect size of change from PDI 4 to PDI 5

Mean PDI 4 Group A	Mean PDI 4 Group B	Standard Deviation	Effect Size
7.67	-0.4	14.03	0.58

4.3.3.3. Motor Performance Categories of Groups

The difference in motor performance categories for the two groups over the study period are presented in Tables 12 and 13 below:

In group A the participants gradually improved and after each assessment more infants scored 'within normal limits'. By the fourth assessment none of the participants had significant delays. On final assessment, after treatment had been withdrawn for six weeks, one participant had regressed and achieved a 'significantly delayed score'. However, there was also one infant who continued to improve and had progressed to the 'accelerated performance' category.

Table 12: Performance of group A over study period

Motor Performance Category	Assess 1	Assess 2	Assess 3	Assess 4	Assess 5
Accelerated Performance	0	0	0	0	1
Within Normal Limits	0	5	7	8	5
Mildly Delayed	9	4	3	4	2
Significantly delayed	3	2	2	0	1
Extrapolated Score (<50)	0	1	0	0	0
Missing	0	0	0	0	3
TOTAL	12	12	12	12	12

The majority (n = 10) of infants in group B were classified as having a 'mildly delayed performance at baseline and two participants presented with a 'significantly delayed performance'.

At the second assessment there was an improvement in motor performance and six infants fell into the 'mildly delayed performance' category and six infants performed 'within normal limits'. From this point the progress was gradual until all 11 infants achieved scores 'within normal limits'.

In contrast to Group A, there was a decrease in the infants' performance at the final assessment after treatment was withheld for 6 weeks. Even though one participant showed an 'accelerated performance', only five participants achieved scores 'within normal limits'.

Table 13: Performance of group B over study period

Motor Performance Category	Assess 1	Assess 2	Assess 3	Assess 4	Assess 5
Accelerated Performance	0	0	0	0	1
Within Normal Limits	0	6	10	11	5
Mildly Delayed	10	6	2	0	4
Significantly Delayed	2	0	0	0	1
Extrapolated Score (<50)	0	0	0	0	0
Missing	0	0	0	1	1
TOTAL	12	12	12	12	12

4.4. Compliance with Home Programme

During the intervention period the care-givers completed a questionnaire enquiring about their compliance with the home programme. In addition, participants were required to explain factors that may have limited compliance to the home programme. The original questionnaire had two questions, however, participants answered Question 1 incorrectly in that several participants reported that they performed none of the prescribed activities during the month in Question 1, after which they would then answer that the frequency at which they applied the activities was more than once a week. Therefore only the results of Question 2 were analysed

One participant reported not doing any home activities for one month of the intervention period. The participants demonstrated reasonable compliance rate in terms of the frequency of applying the activities at home (see Table 14 and 15 below). There was no particular trend regarding the improvement or failure to comply. Most of the participants (average = 59.35%) applied the activities between 2 to 6 times a week, while the recommended frequency was ±5 times a week. By the final assessment only 16.7% of the participants were performing the activities once a week compared to the initial 25% after the first month of treatment.

Table 14: Compliance- participants applied home programme (yes/no)

Performed Activities at Home	Yes	No
Assess 1 (n=24)	24 (100%)	0 (0%)
Assess 2 (n=24)	24 (100%)	0 (0%)
Assess 3 (n=23)	22 (95.65%)	1 (4.16%)
Assess 4 (n=18)	18 (100%)	0 (0%)

Table 15: Frequency home activities performed

How often were the activities performed	After 1 month n=24	After 2 months n=24	After 3 months n=22	After 4½ months n=18	Average %
1/week	6 (25%)	5 (20.83%)	3 (13.64%)	3 (16.67%)	19.04
2-6 /week	11 (45.83%)	13 (54.17%)	16 (72.73%)	12 (66.67%)	59.35
Everyday	7 (29.17%)	6 (25%)	3 (13.64%)	3 (16.67%)	21.12

Care-givers were asked to list any possible barriers that may have affected compliance every month. These qualitative limitations were categorised and listed in Table 16 below representing problems faced by the group as a whole:

Table 16: Frequency table of barriers faced by parents

	After 1 month	After 2 months	After 3 months	After 4 months	Total
Work Demands and Household Responsibilities	6	8	10	4	**28**
Infant Sick	4	6	4	5	**19**
Other children needed attention	7	3	2	2	**14**
Teething - irritable	0	1	0	0	**1**
Mother Sick	1	0	0	0	**1**

4.4.1. By Group Compliance: Frequency of Activities

The Chi-squared test was used to determine if there was any significant difference between the Group A and Group B in terms of compliance over the four month period. There were no significant differences between group A and B in terms of frequency of home activities performed at each time point as reflected in Table 17 below.

Table 17: Difference between groups for frequency of activities performed

	Chi	p-value
After 1 month	4.04	0.13
After 2 months	0.28	0.87
After 3 months	4.55	0.21
After 4 months	1.34	0.51

4.5. Satisfaction Questionnaire

All 12 care-givers in group A and 11 care-givers in group B completed the form. The satisfaction questionnaire used a visual analogue scale (VAS) ranging from 0-10 to rate the level of satisfaction of the care-givers (Appendix 1.5.). The frequencies of the values are displayed below along with the median and total scores for each question.

Table 18: Frequency of VAS scores for group A (monthly; n=12)

Question	VAS =7	VAS =8	VAS =9	VAS =10
Were you happy with treatment?	0	3	1	8
Will you be able to apply exercises?	0	4	0	8
Did you like the monthly classes?	0	2	1	9
Were your questions answered?	1	4	0	7
Do you feel the treatment worked?	0	3	2	7

Table 19: Frequency table of VAS scores for group B (weekly; n=11)

Question	VAS =0	VAS =3	VAS =6	VAS =7	VAS =8	VAS =9	VAS =10
Were you happy with treatment?	0	0	1	1	1	1	7
Will you be able to apply exercises?	0	1	0	1	0	1	8
Did you like the weekly classes?	1	0	0	0	0	1	9
Were your questions answered?	0	0	1	0	0	2	8
Do you feel the treatment worked?	0	0	0	0	1	1	9

Table 20: Medians and totals of VAS scores for group a and b

Questions	Median Group A	Median Group B	Total Group A (n=12)	Total Group B (n=11)
Question 1	10	10	113/120 (94%)	100/110 (91%)
Question 2	10	10	112/120 (93%)	99/110 (90%)
Question 3	10	10	115/120 (96%)	99/110 (90%)
Question 4	10	10	109/120 (91%)	104/110 (95%)
Question 5	10	10	112/120 (93%)	107/110 (97%)

Care-givers generally showed high levels of satisfaction. The care-givers in group B more often gave lower scores compared to group A. This can also be seen by the total of group A being greater than group B. Care-givers in the weekly group (B) were only more satisfied than the monthly group (A) for question 5 which enquired about the overall affect of the treatment. However, these differences were not significant as can be seen in Table 21 below. Only two scores showed dissatisfaction of which both were from group B. One was not satisfied (VAS=0) with the weekly commitment. Another felt that they were unable (VAS=3) to reproduce the activities at home that they had learnt in the sessions.

The monthly group had slightly higher levels of satisfaction. However, when comparing the scores for each question as well as the total, there were no statistically significant differences between groups A and B.

Table 21: Difference in satisfaction between groups

	Chi-square	p-value
Question 1	3.03	0.55
Question 2	6.97	0.14
Question 3	2.96	0.40
Question 4	8.04	0.09
Question 5	1.54	0.46
Totals	6.06	0.64

4.6. Summary of results

The prevalence in the 393 infants who were screened, of confirmed mild (n=21) or severely delayed performance (n=6) in the recruited sample (n=393), was found to be 6.8%. Of those who on screening were found to be between levels 2 and 4, 65.8% were found to have developmental delay. If this percentage is applied to those who withdrew, n=23, there may have been an additional 15 children with delay. The true prevalence may therefore be between 6.8% and 10.6% ((27+15)/395). Factors found to result in significantly lower PDI scores was prematurity of 4 weeks or more and a lower level of care-giver education.

The intervention programme resulted in a significant increase in both groups of participants from baseline to the fourth assessment after 3 months of intervention. The weekly group did not show a significantly increased score at any time point. However the effect size over the weekly intervention was .65 in favour of the weekly group, a medium to large effect size, although the CIs were large and ranged from a small to large effect.

Surprisingly the monthly group showed an effect size of .58 in terms of score at six weeks post treatment, but the CIs were similarly large.

No striking difference emerged between the care-givers' from group A and B in terms of satisfaction with either form of intervention and both groups expressed high levels of satisfaction with the progammes. An increase in the frequency of activities was noted in the entire group as time went on but this was not tested statistically.

5. Discussion

This study demonstrated that the prevalence of developmental delay in infants attending Well Baby Clinics in three under-resourced areas of Cape Town could be between 7-10%. The two intervention programmes resulted in improved motor ability after three months of treatment. The weekly intervention group showed greater initial improvement, but on cessation of treatment, the monthly group retained their skills better. Both programmes were acceptable to the care-givers and compliance was good.

The internal and external validity of these results will be discussed in this section. The demographic and medical information of the population obtained through the questionnaires will be described and compared to samples in previous studies. Relationships between the demographic information and the motor performance scores will also be highlighted. The significance of the motor performance and compliance rates of the effective sample over the study period will be discussed with reference to previous similar studies to identify similarities or differences. The preference and satisfaction of participants are also looked at to ascertain a protocol which is not only effective but will also suit the lifestyle of parents and guardians who have infants with motor delay.

5.1. The Sample

A sample of convenience could result in the sample differing from the general population in which it is based. The sample in this study consisted of dyads that made use of the public services offered to them in this area. This would exclude those who attend private medical facilities for their child's immunizations and monitoring. It is unlikely that people in low socio-economic areas will attend private medical practitioners due to the costs involved but the possibility does exist. Additionally, care-givers who are negligent and do not take their infant for any immunizations will also not form part of the sample. This may have resulted in the exclusion of those infants who are motor delayed but do not attend the CHC.

The sample included infants who were premature (13.5%) and who had a low birth weight (7%). As in this study, prematurity has previously been associated with a delay in motor development (Delgado et al., 2007). Furthermore, birth weight of less than 2000g is also associated with poor motor development (Halpern et al., 2008; Sacker et al., 2006). It would seem reasonable to target this group of infants for routine screening and intervention.

Infants who were previously hospitalised accounted for 13.18% of the sample. The relationship between the length of hospitalization and its negative effects on later motor outcomes has been reported in other studies (Limperopoulos et al., 2002). Not only is a longer hospital stay associated with further medical complications and the increase in severity of the medical condition, it also limits mother-infant interaction which is beneficial to an infant's motor development (Gianni et al., 2006).

Three infants in the sample had previously been admitted to hospital. One for the conservative management of a mitral valve disorder, another infant underwent surgery to repair an abdominal hernia and one infant suffered from one episode of pneumonia. Three infants reported frequent episodes of illness. Two were reported sick every second month and one infant was sick once a month according to the care-giver. The term 'sick' was defined as regular colds, flu, temperature spikes or diarrhoea lasting more than a day, and were not perceived as being severe. Previous research found that on average, infants normally experienced these illnesses twice a year (Cohen et al., 1995).

5.1.1. Care-Givers

The majority of infants and their care-givers were drawn from poor or disadvantaged backgrounds. This was evidenced by the low employment rate (28.4%) as well as the high number of care-givers who were dependent on government grants. While it is understandable that care-givers would be classified as unemployed because of their responsibilities towards a young infant, the fact that 61.07% are dependent on government grants or earn no form of income is of concern.

The current rate for government grants is R270 per month ($32.49) (Child Support Grant, 2011). This is well below the poverty indices and the implications are that parents may not have sufficient money to provide their infants with “items” that would foster their motor development (Rosier, 2011). These “items” include nutritious meals (Pomerleau et al., 2005), toys that enhance the satisfaction of mastering an object (Rubenstein and Howes, 1976) and access to physiotherapy services (Jenkins and Sells, 1984). The availability of funds also allows parents to send their infant to a crèche or day care centre. Interaction between infants of the same age has been shown to enhance socializing and promote more frequent and a higher developmental level of play (Rubenstein and Howes, 1976).

Studies suggest that motor performance is better in infants at risk of delay that are exposed to high levels of interaction with their mother (Gianni et al., 2006). Thus, being unemployed may also afford mothers the opportunity to increase their interaction with their infants despite having limited funds to access resources that foster motor development. In this study, however, there was no relationship between employment, income and motor delay.

The care-givers of the infants with suspected delay had a significantly lower level of education compared to those whose infants were not delayed (p=.045) according to the screening results. This reflects previous research that gathered data from birth certificates as well as subsequent medical records and parent reports of children born between 1994 and 1998 in Florida (Delgado et al., 2007). They recognised an increasing risk for developmental delay if the maternal education did not surpass 11 years. Researchers have also found that children whose mothers have higher education (i.e. post-secondary education) performed significantly better on the Griffiths Test No II than the infants whose mothers had lower levels of education (9-12 years; Giagazoglou et al., 2007). Therefore, it is likely that the infants from this current study were placed at risk for motor delay as the care-giver’s mean years of education within the sample amounted to 10.5 years. Rose et al. (1989) suggested that better educated parents are able to provide more adequate age appropriate stimulation for their infant.

Within the group that scored poorly on the BINS III, 26% of care-givers had education levels below Grade 10, whereas amongst those who performed well on the BINS III, 17% had education levels below Grade 10. Considering that Grade 10 is a requirement to get a certificate for further education in South Africa (Education in South Africa, 2011), it would be more difficult for people who do not achieve Grade 10 to secure jobs, thus limiting their ability to provide financial security in the home.

In conclusion, it is inconclusive whether the motor delay exhibited by the study participants was due to their socio-economic circumstances (McPhilips and Jordan-Black, 2007). Further studies are recommended to evaluate the impact of socio-economic factors in relation to motor performance using larger, more diverse samples.

5.2. Prevalence of Motor Delay

5.2.1. Screening

Within the screened population in this study, 16.3% of infants presented with suspected motor delay. It is much higher than the general prevalence of functional delay (2.4%) amongst a general population of American infants aged 4-15 months who were screened using a questionnaire based on the Functional Developmental Growth Chart (Simpson et al., 2003). This is likely due to the fact that the sample (n=393) contained infants who were premature, had low birth weight and who came from poor socio-economic conditions (Delgado et al., 2007; Halpern et al., 2008; Sacker et al., 2006; McPhilips and Jordan-Black, 2007). Furthermore, the screening tool used for the American infants (Simpson et al., 2003) was a questionnaire compiled from a standardised growth chart which makes it vulnerable to subjectivity and bias. This may lead to under-identification of functional delay.

A pilot study conducted by undergraduate students from the University of Cape Town, South Africa, in a low socio-economic population, similar to the population in this study, recorded the prevalence of possible fine motor delay to be 39.39% and gross motor delay to be 21.21% (Amankrah et al., 2010). The BINS III was the screening tool of choice in their pilot study. Their findings are thus fairly similar to that found in this study (fine motor = 38.68%, gross motor = 19.35%) where the BINS III was also used to screen for motor delay. The similarities are most likely due to the similar socio-economic characteristics of the two populations. The analogous results add confidence to the reliability of the BINS III in detecting motor delay in these populations. Alvic and Groholt (2011) had contradicting results when they compared their Norwegian data to that of a United States sample when using the Ages and Stages Questionnaire (Squires et al., 1999). In the Norwegian sample, more infants scored below the gross motor cut-off score than the fine motor cut-off score. Alvic and Groholt (2011) reckon that the variances are related to cultural differences and the different attitudes towards the use of their fingers and hands for daily activities. Gladstone et al. (2008) also found that western tools (adjusted Denver II) have different cultural expectations and that some objects in screening and assessment tools were foreign to infants and children living in rural Malawi. With the use of the BINS III, which has not been standarised in South Africa, the different cultural expectations may have therefore resulted in poorer fine motor scores compared to gross motor.

A major concern is the fact that so many infants who have motor developmental difficulties are not identified in the clinics and thus are unable to benefits from early intervention (Frank et al., 2002). This occurs because the screening tool (even though it is brief) is not being administered correctly since focus is instead placed on the completion of the immunizations for all the infants that attend the clinic. Furthermore medical staff members are also burdened by the overwhelming number of babies and infants who need to be attended to. Consequently those infants with milder forms of motor delay are overlooked.

Very few health professionals in general, and particular in South Africa, make use of standardised screening and assessment tools to identify motor delay among infants (G. Gribble and M. Enright, personal communication, 30 January, 2012; Sr. Naidoo, personal communication, March, 2011; Sr. Vaughn, personal communication, November, 2010;

Sand et al., 2010) This is because health professionals consider screening tools to be time consuming for use in busy hospital practices, to be expensive and not standardised for application to South African infants (Sr. Naidoo, 2011; Sr. Vaughn, 2010, personal communication). The Griffiths Scales of Mental Development (Griffiths, 1970) is the only assessment tool that has been standardised in the South African population (Luiz et al., 1999). There is thus limited data available to compare the prevalence of motor delay in South Africa with the findings from this study.

5.2.2. Baseline Assessment

The BSID II assessment took place in a more controlled environment compared to the rushed and noisy clinics. This allowed fewer distractions to the infant and less stress for the care-giver. The assessment was able to identify false positives (34%) from the screening. A false positive is when a result is wrongfully positive for motor delay when in fact the infant has normal motor performance. Most of the false positives (92.86%) had been referred with an 'emerging risk' classification during screening. However, 26 of the 27 participants who qualified to participate in the intervention also had an 'emerging risk' during screening. Therefore, it is recommended to further assess or at least monitor those who display only an emerging risk of motor delay during screening.

Specificity has been defined as the ability of a tool to correctly identify true positives, i.e. infants who are motor delayed (Aylward, 1995). The BINS has previously been found to have a very high specificity when screening an environmental risk group (Hess et al., 2004). The specificity for the motor domain ranged between 73-99% after the screening results were confirmed by the BSID-II. In the current study, there was a high percentage of false positives which resulted in a lower specificity of 65.9%. The lower specificity may have been the result of the screening being conducted by a different therapist and in a different environment compared to the assessment.

Unfortunately the sensitivity cannot be calculated because the infants who had normal results during the screening were not assessed on a second occasion.

A prevalence of 7.3% of infants with confirmed motor delay was detected once those who were deemed 'at risk' were formally assessed. However poor attendance 'at risk' infants to the baseline assessment may have affected the true prevalence of motor delay. The prevalence of motor delay found in this study was also higher than the prevalence of motor delay recorded in a study in Cape Town (5.7%) (Ferguson and Jelsma, 2009). Similarities between the two groups under study included that both recruited participants at Well-Baby clinics and both targeted infants living in poor socio-economic circumstances. The higher prevalence compared to Ferguson and Jelsma (2009) is most likely due to 13.5% of the infants in this study being more than 3 weeks premature and 7% having a low birth weight (<2000g), whereas Ferguson and Jelsma regarded prematurity and low birth weight as part of their exclusion criteria. In addition, a further disparity was that the age range in the Ferguson and Jelsma study was wider (1-33 months).

The BSID II was normed using a sample of healthy American children between 1991 and 1992. They classified 2.3 % as having significantly delayed motor performance and 12.5% were mildly delayed (Bayley, 1993). Thus the prevalence of delay in this study is much higher than the Bayley sample (14.8%) (Bayley, 1993). Taiwanese infants were also found to have significantly lower raw scores on the BSID II compared to the above mentioned American sample (Wu et al., 2008). These Taiwanese infants ranging between 6-12 months of age were also initially regarded to be normal, typically developing infants with normal gestational ages and birth weights (Wu et al., 2008).

The researchers identified three factors that may have contributed to the lower scores of the Taiwanese infants. Bayley recruited infants from kindergartens or churches and used a cross-sectional study design (Bayley, 1993). Wu et al. (2008) utilized a longitudinal follow-up design and recruited infants from medical facilities similar to this current study. Secondly, some of the equipment as well as the use of language in the BSID II were foreign to Taiwanese culture. Finally, the researchers reported that the differences in cultures regarding the upbringing of infants and the value placed on sleeping, eating and playing could also affect the motor scores.

Similarly, the higher prevalence of motor delay within the sample of South African infants compared to the American sample (Bayley, 1993) may be due to the difference in cultural habits. Cultural influences have previously been shown to result in different developmental phenomenons (Super, 1976; Kaplan and Dove, 1987). The people of the Ache population in Paraguay practiced a lifestyle of hunting and gathering. Infants were rarely allowed to explore further than a meter from their mother before being picked up. Furthermore, the use of writing accessories had no use in this population therefore children were not exposed to objects such as pens and paper. These habits and different cultural expectations have contributed to the Ache infants performing poorly on the Denver Scale (Kaplan and Dove, 1987). Similarly, Super (1976) found that the infants of the Kokwet population in Kenya have different developmental patterns with persisting stepping responses compared to American infants. This is caused by the early teaching techniques of a jumping programme by mothers to encourage infants to practice an early stepping response and to take weight through their legs (Super, 1976).

It is noteworthy that the infants identified with motor delay in this study were infants who were regarded to be at risk of motor delay following the screening process. The sample of 41 participants also included infants who had low birth weight and were premature which negatively affects motor development (Delgado et al., 2007; Halpern et al., 2008; Sacker et al., 2006).

The higher prevalence of the motor delay among the infants raises initial concern. However, once the contributing factors such as the 'at risk' population and the different cultural influences are considered, it is understandable why there is a higher prevalence of motor delay compared to the normative sample of American infants used to standardise the tool (Bayley, 1993; Super, 1976).

5.2.3. Factors Influencing Performance on Assessment

Various factors have previously been associated with motor delay (Grossman et al., 2010; Simpson et al., 2003; Delgado et al., 2007; Hediger et al., 2002; Halpern et al., 2008;

Sacker et al., 2006; Giagazoglou et al., 2007). Such factors often give researchers an indication of populations who are more at risk of motor delay than others. After statistical analysis it was seen that some of these factors were also associated with the infants' motor performance. However, other factors did not have such a strong affect, as expected, and this was most probably due to the limited sample size.

5.2.3.1. Gender and Motor Performance

The mortality rates among male and female infants have been investigated and a long standing expression, the 'male disadvantage', is used among researchers to articulate the vulnerability of males who are at risk of health complications, compared to females (Naeye et al., 1971). Only speculations surrounding the reason for the 'male disadvantage' exist, and science has not yet identified the reason behind the occurrence (Stevenson et al., 2000).

In contrast to studies that showed female infants performing better than male infants (Grossman et al., 2010; Simpson et al., 2003; Durmazlar et al., 1998), this study found no differences between genders in terms of motor performance. Grossman et al. (2010) found that there were 13% more males who tested positive for developmental delay compared to the females. However, other research supports findings of this current study in terms of equal performance between genders (McPhillips and Jordan-Black, 2007). Compared to this study, Simpson et al. (2003) had a much larger sample size representative of an American population and made use of a questionnaire that was not standardised to identify functional delay. The questions asked were simple and required only a 'yes'/'no' response. McPhillips and Jordan-Black (2007) used the standardised Movement ABC and had a much smaller sample size compared to Simpson et al. (2003). The use of similar standardised tools may have contributed largely to the similarities in the motor outcomes and their association with gender.

5.2.3.2. Prematurity

There was a significant difference (*p*=.03) in the motor performance at baseline of infants who were premature by more than three weeks compared to those born at term. The results are in accordance with research that found that prematurity of more than three weeks can negatively affect development, and that premature infants are more likely to have motor delay (Delgado et al., 2007; Hediger et al., 2002). Researchers have found that myelinated white matter in the brain increases dramatically after 36 weeks of gestation (Huppi et al., 1998). It is suggested that the white matter in the developing brain experiences a period of vulnerability to insult and injury.

Infants who weighed less than 2000g at birth performed poorly compared to those who were born at weights above 2000g. However the difference was not statistically significant due to a large standard deviation in the normal weight sample and the low number of children in the low birth weight category (n=3). The results, although not statistically significant do concur with other studies that suggest low birth weight can affect motor performance, (Halpern et al., 2008; Sacker et al., 2006). Birth weight even as low as 2500g have been found to negatively affect the motor performance of infants (Delgado et al., 2007; Hediger et al., 2002).

5.2.3.3. Home Environment

There was no statistically significant difference between those who lived in informal settlements, houses or flats/apartments. Research exploring the exclusive effect of housing on an infant's motor development is limited. Oelofse et al. (2002) investigated the nutritional status of 60 infants between the ages of 6-12 months in two communities in Cape Town in relation to their environments and its effect on developmental domains such as motor performance. In the one community 94% of infants resided in brick houses compared to 80% of the infants in the other community who lived in informal housing. The infants from the community with predominantly brick houses performed significantly better in both gross and fine motor domains. The researchers concluded that the high rate of infections may play a large role in the development of infants. However, these infections do not only result from poor living conditions, but also from nutritional deficiencies.

Thus the study from Oelofse was unable to establish that housing itself influences development. A more robust measure may have been to consider infections and nutritional deficiencies instead.

Previous studies have strongly associated low birth weight and prematurity with motor delay (Delgado et al., 2007; Hediger et al., 2002; Halpern et al., 2008; Sacker et al., 2006). Even residential factors and gender have been considered to affect the motor development of infants (Grossman et al., 2010; Simpson et al., 2003; Durmazlar et al., 1998; Oelofse et al., 2002). However, while considering a smaller sample size compared to other studies, prematurity by more than three weeks was the only factor of significance in terms of its effect on motor performance on the BSID II.

5.3. Intervention Study

The findings suggest that even though no difference was detected in the overall outcome of infants receiving treatment on a monthly basis and those receiving treatment on a weekly basis, the response was still favourable for both groups. Differences were evident in that the weekly group displayed an early improvement compared to the more gradual response demonstrated by the monthly group. Improvement was accompanied by a gradual increase in compliance towards the end of the intervention period, and care-givers generally expressed a high level of satisfaction for their respective protocols. No difference was noted between the monthly and weekly treatment groups in terms of compliance and satisfaction.

The final sample of 24 participants who fit the criteria had a mean age of 5.8 months. These infants were tested on a monthly basis at the research setting to monitor their motor developmental progress. There were no significant differences between the two groups of this randomly divided sample with respect to socio-economic, their medical history or their baseline motor scores. From the results it was derived that the weekly treatment group (B) performed better than the monthly treatment group (A), especially after 1 month of treatment. Group A showed significant improvement after 3 months of therapy and also showed better retention of skills compared to group B when the therapy was withheld for 6 weeks after the intervention period. Even though the difference in the motor performance improvement between the two groups was not significant, both groups had shown significant improvement from the baseline assessment until therapy was completed.

The fact that the weekly group showed more progress even though they both received the same content of therapy, could be due to the weekly group having had more frequent reinforcement and reminding of the therapy and how to execute it. Although all participants were encouraged to contact the physiotherapist if they had any questions regarding the treatment, the weekly group had better opportunity to do so face to face at the frequent treatment sessions than the monthly group. Furthermore, when randomly dividing the participants into two groups, there were 12 infants who were born at term and 13 mothers with high school qualifications in the intense group (before participants withdrew from the intervention). This was much higher than the 5 term infants and the 5 mothers with high school qualifications in the monthly (basic) group. The researcher recognised that these factors may have benefited the intense group. Prematurity was also a factor to consider in the current study. This contributing factor may have led to the weekly group performing better than the monthly group as three out of the four premature (<37 weeks gestational period) infants were randomly allocated to monthly group (Delgado et al., 2007).

Mintz-Itkin et al. (2009) had a similar outcome when they compared a weekly treatment protocol with a monthly treatment protocol for infants with joint hypermobility, benign hypotonia and motor delay. The weekly treatment group also showed better initial response to therapy but after 9 months of therapy the majority of infants in both treatment groups had reached the required outcome measure goal. In contrast to the current study, Mintz-Itkin et al. provided individual therapy sessions and participants had been referred to take part in the study after being diagnosed with motor delay.

These results also coincide with the evidence of Jenkins and Sells (1984) who found that children receiving increased frequency of therapy (3 times per week) responded as well as the children who received therapy once a week. They initially aimed to clarify issues surrounding the efficacy of treatment, identifying the children with the greatest need for therapy as well as the best frequency of treatment sessions. Similar to the current study, Jenkins and Sells (1984) also excluded infants with diagnosed CP or muscular dystrophy due to the possibility of regression during the intervention.

Other researchers also had results that were inconclusive as to what intensity is best suited for children with motor difficulties (Ustad et al., 2009; Christiansen and Lange, 2008; Bower et al., 2001). In all these studies the participants had CP and the researchers used the criterion referenced Gross Motor Function Measure as an outcome measure. And as mentioned before, CP children are sensitive to complications which may have led to regression of motor performance of participants in the above mentioned studies (Jenkins and Sells, 1984).

The single-subject design incorporated by Ustad et al. (2009) with only 5 participants is vastly different from the study design used in the current situation. Given the small sample, the difference between the intense therapy periods and the standard therapy periods was not large enough to conclusively support a preferential protocol and generalise it to the CP population. Even in the randomized control trial incorporated by both Christiansen and Lange (2008) and Bower et al. (2001), inconclusive results as to whether an intermittent or more intense form of treatment is more beneficial than the standard continuous treatment protocol. These studies even made use of bigger sample sizes (n=25 and n=56 respectively) and still did not retrieve significant results favouring a specific protocol.

Alternatively, Mayo (1991) produced results strongly supporting (p=.0019) weekly therapy instead of monthly therapy for infants with motor delay. Although Mayo used a similar study design and sample size which was divided into a weekly treatment group and a monthly treatment group, there were also important differences that possibly contributed to difference results compared to the current study. Even though there were infants with motor delay without CP involved in the study, their results were not presented separately from the CP infants. Mayo also incorporated six months of treatment and only assessed these infants at baseline and post-intervention. The longer treatment period may have strengthened the effect of the intense therapy compared to a three month treatment regime; however, with only two assessments, it is more difficult to monitor a trend of motor developmental progress over six months.

There are also other researchers who support increased intensity within a treatment regime (Trahan & Malouin, 2002; Tsorlakis et al., 2004). Trahan and Malouin (2002) investigated intermittent intense periods of therapy using a similar design and the same sample size as used by Ustad et al. (2009). Once again, with such a small sample size it is difficult to generalise the findings to the general population. Tsorlakis et al. (2004) utilized a similar research design to that of the current study where two groups of children received different intensities of treatment. However, Tsorlakis et al. was unable to recruit the required number of participants to achieve a power of 80%. The 38 participants also had a much larger age range (3-14 years) than the current study. Yet again, both the above mentioned studies recruited children who had been diagnosed with CP which complicates the comparison of their outcome to the current study. Research regarding the treatment of infants with exclusive motor delay is found to be limited.

It is important to note that in all the above mentioned intervention studies the participants received treatment in one-on-one sessions with the therapists.

The fact that both groups improved significantly from baseline until after the intervention is reassuring. The infants seemed to respond better during certain stages of the intervention depending on the group they were in, which is similar to previous study results (Mintz-Itkin et al., 2009). The weekly group (B) had an early response whereas the monthly group (A) responded the best after the second month of treatment.

In terms of the ability to retain skills there was a much better response by group A (monthly) than group B (weekly) who actually showed a decrease in motor scores on the BSID II. This is possibly because the weekly group had grown accustomed to frequent reinforcement and the monthly group became used to occasional reinforcement and was able therefore to cope better. Cerebral palsy children have shown poor ability to retain skills during periods where treatment was withheld between intermittent periods of intense therapy (Trahan and Malouin, 2002). Unfortunately, the current study lost power when only 20 participants attended the final assessment. There were no significant differences between the groups with regards to the ability to retain skills; however a medium effect size was encountered favouring the monthly group's ability to retain skills.

The results from this study were inconclusive in supporting either the standard or intense treatment protocols. Both the weekly and the monthly therapy protocols were significantly beneficial to the motor development of infants with motor delay. The difference between the responses of the groups were that the intense group showed better initial response to treatment and the standard, monthly group showed later motor developmental progress. These results can be used to possibly formulate a treatment protocol by combining an intense and standard treatment protocol. Such a protocol could reap the benefits of initial progress with initial intense therapy and maintaining that progress with later standard therapy as proved to do by the monthly group. Even though similar results have been seen before in previous research, there have been studies supporting more intense treatment protocols (Mintz-Itkin et al., 2009; Jenkins and Sells, 1984; Ustad et al., 2009; Christiansen and Lange, 2008; Bower et al., 2001; Mayo, 1991; Trahan & Malouin, 2002; Tsorlakis et al., 2004). However, these protocols were more frequently researched on infants with CP and treatments were provided in individual sessions.

5.4. Attrition and Compliance

Intervention studies often face obstacles such as attrition and poor compliance of the participants (Olusanya et al., 2007).

Despite follow up phone calls and provision of transport funds after screening, it remains unclear why 33.87% of the dyads did not attend the baseline assessment. According to care-givers, public transport was unreliable which made participants reluctant to attend. Other reasons for poor attendance included: care-giver's work commitments and the mother not feeling comfortable for a caretaker to take the infant to the Home where the intervention sessions took place.

Mayo (1991) reported that parents of children with developmental delay were reluctant to give consent to attend an intervention programme because of the weekly commitment they would have to make. Further, he also concluded that parents of children, whose disability was mild, were less likely to attend sessions than those who exhibited more severe delay. This may have also been the case in this study as most of the infants were not overtly delayed.

Following screening, the dyads from Area 2 had a 78.13% attendance rate at assessment compared to the 64.71% and 38.46% of Area 1 and Area 3 dyads respectively. All three clinics are of equal distance from the location of the assessment and all have a similar client profile in terms of socio-economic status. However, the taxi's that travel towards the Home are much more accessible in Area 2 than those in Area 1 and Area 3 which may have influenced the attendance rate.

Care-givers who attended the first assessment were also significantly older than those who failed to attend or withdrew. This may have occurred because older care-givers have been seen to have more experience and knowledge regarding the developmental needs of infants which contributes to parenting confidence (Ruchala and James, 1997). A concern regarding their infant's development could possibly encourage such care-givers more than those who have less experience with infants. These results contradict previous compliance related research (Kaona et al., 2004). Kaona et al. (2004) found no association between the compliance with medical treatment regimes and the patients' age. Olusanya (2009) found that parents, who brought their newborn babies for diagnostic testing after being referred, were between the ages of 20-35 years. Parents younger and older than this age range failed to attend more frequently. However, statistical significance of the data in the study by Olusanya was not tested.

During the intervention period, 14.8% of participants withdrew or failed to attend an assessment. Most of the infants who withdrew or failed to attend an assessment were from the weekly group (n=3) while only one participant from the monthly group withdrew. None of the participants who withdrew, returned on invitation. Parents of participants along with therapists in another study considered the intense form of therapy to be 'tiring and stressful' (Bower et al., 2001). This may have been a possible cause of the higher attrition rate in the weekly treatment group. Conversely, previous research has shown that participants had better compliance during intermittent intense periods of intervention (Trahan and Malouin, 2002). Christiansen and Lange (2009) supports the findings of Trahan and Malouin as their study participants in a group receiving intermittent intense treatment had a better attendance rate.

There was an even higher attrition rate by the fifth and final assessment after the six week period when treatment was withheld. Three participants from the weekly group and one participant from the monthly group failed to attend the assessment. Trahan and Malouin (2002) did not have trouble with participant attendance after both 8 week rest periods amongst their intervention. However, they had a much smaller sample size (n=5), their participants had a severe form of CP and participants had been enrolled in a previous rehabilitation programme which signifies commitment to rehabilitation on the parents' behalf. This poor follow-up rate is not surprising as previous medical research has illustrated this occurrence amongst South African parents of infants with medical needs (Olusanya et al., 2007).

Compliance to the prescribed home programmes was difficult to monitor and a self-completed questionnaire was used to do so. Even though there was no difference between group A and group B in terms of their compliance to the home programme, there was a slight general increase of compliance by 8.33% toward the end of the study period. The best compliance was experienced during the third month of intervention which is understandable since the participants had received repeated treatment sessions over a three month period. Researchers have recognised that if parents are educated about development and can identify progress, it serves to promote motivation and compliance to therapy (Moxley-Haegert and Serbin, 1983). Reasons for non-compliance were mainly: work and household responsibilities, the infant becoming sick, and the attention requirements of siblings. The fact that work responsibilities were interfering with performing the home programme is questionable as 79.37% of care-givers were unemployed. Very little research is available surrounding the compliance of care-givers to a home programme for infants with motor problems. Christiansen and Lange (2008) acknowledged that infants with sickness during the intervention period resulted in the cancellation of appointments. This occurred more frequently during prolonged periods of intensive intervention which contradicts the results of this study.

Converse to previous research, there was no significant difference between the weekly and the monthly group in terms of attendance rates. The withdrawal of participants was most likely due to transport and associated costs. The increase in compliance to home activities is possibly linked to the knowledge the care-givers gained through the education they received as part of the intervention. Education concerning development has previously been associated with improved motivation and compliance (Moxley-Haegert and Serbin, 1983).

5.5. Care-Giver Satisfaction

Poor levels of satisfaction can detract from motivation which resultantly contributes to compliance (Lewis et al., 1986; Albrecht and Hoogstraten, 1998). A self-formulated satisfaction questionnaire was used to find out whether the care-givers were satisfied with the intervention provided to their infants and if the protocol design suited them.

The monthly group attendees displayed higher levels of satisfaction. This agrees with the opinions given by parents who were not satisfied with intense periods of treatment for their children (Bower et al., 2001). They found it taxing on their daily routine and tiring. However, the current study's difference was not statistically significant (p=0.64). This can be ascribed the fact that the questionnaire was a self-structured, unstandardised questionnaire which relied on self report methods that have been regarded as not being sensitive enough to identify medical needs that satisfy parents (Ngui and Flores, 2006).

5.6. Limitations

5.6.1. Sample of Convenience

By using a clinic sample of convenience, the researcher acknowledges that children receiving immunization services elsewhere (e.g. at private clinics or pediatrician offices) and those whose parents elect not immunize their child may have been left out during the recruitment process. Thus the sample is biased toward those who utilise public health facilities.

5.6.2. Undiagnosed HIV

During the screening process most of the care-givers were aware of their infant's HIV status and it was documented as such. Infants who were HIV positive were screened, however they were excluded from participation in the intervention phase. It is unlikely that an infant who is HIV positive, due to infection by either of the parents pre-birth or during birth, would be overlooked by the age of three months as these babies are known to be at risk of infection and are tested immediately after birth and again at six weeks of age to rule out infection. It is however possible for an infant to be infected with HIV post-partum (via breast milk) and be overlooked because of the delayed presentation of symptoms. The possible participation of such infants in the intervention phase is a limitation which may compromise the results of the study.

5.6.3. Sample Size

The difference in scores between the two groups was less than predicted. Using the above parameters, it was calculated that a sample size of 38 per group would be necessary to detect a significant difference between the two groups by the fifth assessment.

5.6.4. Instruments and Measurements

The use of the recently developed BINS III within this study is compromised because the validity has not been established within a South African context. Validity of the original BINS, on which the BINS III was based, has been established in developed countries (Hess et al., 2004; Aylward and Verhulst, 2000; Bayley, 2006). Therefore, population variances, in terms of motor developmental norm, may pose as a limitation when using a screening tool in a country different to the population used to validate the tool.

Additionally, the written questionnaires (check list for compliance and satisfaction questionnaire) limited consistent data collection, even though the questionnaires were available in all the relevant languages. Some care-givers were illiterate or had poor reading skills which resulted in the collection of information in an interview format. Care-givers who read questions and wrote the answers may have had a different understanding of the question asked compared to those who provided information in the form of an interview.

5.6.5. Lack of a Control Group

Randomised Control Trials are typically known to compare an experimental group receiving intervention with a control group who does not receive any form of intervention. This allows the researcher to observe the true effect of the intervention by comparing the experimental group's outcome with the usual nature of the control group.

In this current study the lack of a control group can be seen as a limitation. However, this could not be avoided due to ethical reasons related to withholding treatment from patients who are known would benefit from it. The possibility exists that infants can outgrow developmental delays without intervention (Blauw-Hospers and Hadders-Algra, 2005). Even though both groups received different forms of intervention, the researchers are unable to truly determine what the outcome of infants with motor delay will be without any intervention.

5.6.6. Parental Social Support

Marital status or the support of a father in raising a child has been found to play a role in the development of infants. Mothers who are not married or enjoy the social support of the infant's father are burdened with increased financial stress accompanied by little emotional support (Ruchala and James, 1997). This added pressure can result in an environment which is not favourable for infant development (Wigg et al. 1988). The lack of investigation of the care-givers' marital or relationship status in this current study is a limitation to establishing possible relationships between developmental performance and external factors associated with motor delay.

5.6.7. Attrition and Compliance

Attrition proved to be a major concern by the end of the intervention. The diminishing sample size caused a decrease in power for statistical analysis.

The care-givers were recommended to perform the activities approximately 5 times a week. This task proved to be difficult for the majority of the care-givers due to various reasons presented in Table 16. The inconsistent application of the home programme limits the retrieval of reliable data of the potential motor performance if the activities were performed as prescribed.

5.6.8. Time Limitation

The time limitation placed on the completion of a MSc degree may have limited the gathering and analysis of data to some extent.

If more time was spent recruiting more participants for this study then attrition may not have compromised the ability to generalise the results. Additionally, if an extended period was used to apply the intervention possible trends may have been more pronounced.

5.7. Compliance with the CONSORT checklist

TABLE 22: **Consort Checklist**

Title and abstract	Identification as a randomised trial in the title	No, needed official permission to change title
	1b Structured summary of trial design, methods, results, and conclusions	√
Introduction		
Background and objectives	2a Scientific background and explanation of	√

	rationale	
	2b Specific objectives or hypotheses	√
Methods		
Trial design	3a Description of trial design (such as parallel, factorial) including allocation ratio	√
	3b Important changes to methods after trial commencement (such as eligibility criteria), with reasons	N/A
Participants	4a Eligibility criteria for participants	√
	4b Settings and locations where the data were collected	√
Interventions	5 The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	√
Outcomes	6a Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	√
	6b Any changes to trial outcomes after the trial commenced, with reasons	N/A
Sample size	7a How sample size was determined	√
	7b When applicable, explanation of any interim analyses and stopping guidelines	N/A
Randomisation:		
Sequence generation	8a Method used to generate the random allocation sequence	√
	8b Type of randomisation; details of any restriction (such as blocking and block size)	N/A
Allocation concealment mechanism	9 Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	√

	10 Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	√
Blinding	11a If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	√
	11b If relevant, description of the similarity of interventions	√
Statistical methods	12a Statistical methods used to compare groups for primary and secondary outcomes	√
	12b Methods for additional analyses, such as subgroup analyses and adjusted analyses	√
Results	Participant flow (a diagram is strongly recommended)	√
	13a For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	√
	13b For each group, losses and exclusions after randomisation, together with reasons	√
Recruitment	14a Dates defining the periods of recruitment and follow-up	√
	14b Why the trial ended or was stopped	N/A
Baseline data	15 A table showing baseline demographic and clinical characteristics for each group	√
Numbers analysed	16 For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	√
Outcomes and estimation	17a For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	√

	17b For binary outcomes, presentation of both absolute and relative effect sizes is recommended	N/A
Ancillary analyses	18 Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	N/A
Harms	19 All important harms or unintended effects in each group	√
Discussion		
Limitations	20 Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	√
Generalisability	21 Generalisability (external validity, applicability) of the trial findings	√
Interpretation	22 Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	√
Other information		
Registration	23 Registration number and name of trial registry	N/A
Protocol	24 Where the full trial protocol can be accessed, if available	N/A
Funding	25 Sources of funding and other support (such as supply of drugs), role of funders	N/A

As can be seen in the above table, the study complied with the requirements of the CONSORT statement (Consort, 2012).

6. Conclusion

The advantages of treatment for infants with motor delay have been demonstrated in the past. Early identification and intervention is recommended to minimize complications later in life (Skellern et al., 2001; Frank et al., 2002). After a period of screening within three neighbouring, low economic areas in Cape Town, the prevalence of motor delay appeared high when compared to previous studies. These infants were representative of the infants in the three targeted areas as they were drawn from Well Baby clinics where the majority of infants in the areas go to get immunized and weighed regularly. This sample however included infants who were born prematurely and infants who had low birth weight. Additionally, 14.76% of these infants were only mildly delayed. Therefore, when only considering the 1.53% of infants who presented with significant motor delay then the prevalence is similar and lower than that of previous studies for motor delay (Delgado et al., 2007; Halpern et al., 2008; Sacker et al., 2006). A cause for concern is that nurses in the Well Baby clinics did not identify infants with delay because of the overwhelming numbers of infants attending the clinic (Harrison, 2010; The World Bank, 2008; The World Bank, 2006). The applied screening tool has also not been standardised for the study population and therefore lacks validity.

A further limitation was the number of false positive identified at screening. There were 14 (34.15%) false positives recruited during the screening process which is a cause for concern regarding the specificity of the screening tool. The specificity may have been much better if only participants who were classified as 'at risk' (level 5 or 6) during the screening, continued for further assessments. Yet, after using the BINS III it is recommended to include infants who have an 'emerging risk' for motor delay, because even though there were a few of the 'emerging risk' infants who produced normal scores on assessment, the majority had mild or significantly delayed assessment outcomes.

The BSID II was an appropriate assessment tool in conjunction with the screening tool of the same family, the BINS III, since it is highly recommended by researchers who have reviewed 15 other neuromotor assessment tools (Heineman and Hadders-Algra, 2008). Even though it has been used before in research in similar geographic and economic areas in South Africa, standardisation of the tool in a South African context should be considered as some objects and even phrases proved to be difficult and foreign to the participants and their socio-economic culture (Ferguson and Jelsma, 2009; Baillieu and Potterton, 2008). For example, many of the infants did not like the sound of the bell in both the BINS III test as well as the BSID II. The sound did not elicit the desired response and the infants often started crying instead. Additionally, the crayons and pencils presented to the infants very seldomly resulted in a reaction by the infant. Care-givers sometimes reported that the pencil was not a familiar object and that was why infants were reluctant to pick it up. Similarly, Gladstone et al. (2008) found that objects and cultural expectation were inappropriate for a rural Malawian sample of infants and children when an adjusted version of the Denver II was used.

At the baseline assessment of the infants who were found to have an emerging risk of delay or ‘at risk’ of delay, only 5.68% and 1.62% had mild and severe motor delay respectively. This is once again in accordance, or even lower, than previous prevalence studies for motor delay amongst infants (Ferguson and Jelsma, 2009; Bayley, 1993). Even mild motor delay has been shown to be a cause for concern (Sullivan and McGrath, 2003) since mild motor delay at preschool age has been associated with poor academic achievement at age 8.

It is therefore noteworthy that in this sample, prematurity by more than 3 weeks was the only factor of significance which negatively affected motor performance on the BSID III. The disappointing factor, however, remained the high attrition rate in the study which compromised the sample of infants that were recommended to undergo assessment. A true reflection of the prevalence of motor delay by assessment, in an ‘at risk’ population, is therefore limited, but a concerning reality that needs to be pursued in further research.

6.1. Intervention

The intervention during this study was successful, as the infants from both groups improved significantly from the baseline assessment until after the intervention. Contrary to expectation there was no significant difference in improvement between the two groups. However, the medium to large effect size of this difference between the motor progresses of the weekly group compared to the monthly group should be taken into consideration.

The weekly (intense) treatment group displayed early motor improvements compared with the monthly (standard) treatment group who had a more gradual trend of improvement of motor skills. This is almost definitely attributable to the more frequent reinforcement and reminding of the weekly group on how to perform activities, which initiated the early significant improvement. This important factor, together with frequent attention from the attending physiotherapist also provided the weekly care-givers the opportunity to inquire more often resulting in treatment programmes being able to be suitably adjusted as early as possible.

The results correspond with previous intervention intensity trials that concluded no significant benefit shown by the intense group in terms of motor performance (Jenkins and Sells, 1984; Christiansen and Lange, 2008; Bower et al., 2001). It cannot, however, be ignored that the improvement in both groups may have been the result of education given to care-givers thereby heightening levels of awareness of their infant's development and needs. The time spent on educating and informing the care-givers possibly also contributed to a slight increase in compliance over the intervention period (Moxley-Haegert and Serbin, 1983).

Previous research that investigated various intensities of treatment for infants with motor difficulties generally recruited participants who had severe motor delay or even diagnosed CP (Jenkins and Sells, 1984; Christiansen and Lange, 2008; Bower et al., 2001; Mayo, 1991; Trahan & Malouin, 2002; Tsorlakis et al., 2004). However, with previous evidence associating even mild delay with later academic performances, there is a possibility that intervention treating motor delay may alleviate future complications (Sullivan and McGrath, 2003).

The limitation of attrition towards the end stages of the research period resulted in the failure to perform data analysis on the required level of power for this study. Even though the monthly group displayed better skill retention after treatment sessions were discontinued for 6 weeks, a bigger sample size is required to confirm these results. According to further calculations the difference between the slight improvement of the monthly group motor scores compared to the slight regression of the weekly group scores produced a medium effect size. This noteworthy phenomenon corresponds with the research of Wulf and Schmidt (1989) and Winstein and Schmidt (1990) who determined that better retention of skills is achieved if there is a decrease in the amount of guidance and feedback given to the participants. However, their theories were only tested on students and not infants.

6.2. Compliance and Satisfaction

Compliance was an important factor during the intervention period because all the participants received home programmes. There was no statistical significance between the two groups in terms of compliance measured by a self-formulated questionnaire. A qualitative component to the questionnaire allowed care-givers to express daily occurrences such as work, household responsibilities, the infant becoming sick and the needs of other children that most frequently interfered with complying with the home programme. There was, however, a slight increase in compliance towards the end of the intervention possibly because of the educational component in the intervention which may have contributed to motivation and in turn compliance (Moxley-Haegert and Serbin, 1983). A possible solution to improving compliance may be to get dyads that live in close proximity to each other to perform home programmes together in groups. The therapist can also give the responsibility to another family member to motivate and assist the care-giver and check that they perform the home activities.

Further investigation included the comparison of satisfaction levels between the two groups which was also measured using a self-structured questionnaire. Satisfaction has previously been said to contribute to motivation and compliance, and interestingly, the monthly group had slightly higher levels of satisfaction and the lowest scores were given by care-givers in the weekly group. Analysis of these VAS scores produced results that showed no statistical difference between the two groups in terms of the care-giver's level of satisfaction. It can therefore be recommended that a validated standardised measure of care-giver's satisfaction be used in future research that could be more sensitive to the opinions of care-givers.

6.3. Recommendations

6.3.1. For Future Research

To minimize the limitations experienced in this study when attempting similar studies in the future a few methodological issues will require consideration.

Participant attendance and attrition was the greatest limitation of the study. A larger sample size, which may require a longer recruitment period, is recommended to maintain the power of the study throughout. Offering participants more money for transport or even arranging transport, for them should be considered to reduce attrition.

The use of a pilot study would assist in the improvement of questionnaires to ensure correct use during the true study. This will ensure more reliable and valid results.

Additional recruitment sites can be considered such as crèches or private paediatric health care facilities. This will ensure the inclusion of people who do not make use of public services and even perhaps those who neglect to take their infants for growth monitoring and immunizations.

To ensure the collection of valid and true data, the application of validated outcome measures is recommended. Additionally, written questionnaires should be disregarded and the satisfaction and compliance data should be collected in the form of an interview to accommodate people who are illiterate and practice consistent data collection methods.

Researchers should consider retrieving further information about external factors that contribute to motor delay such as the marital status of the care-giver as well as maternal depression (Ruchala and James, 1997; Wigg et al. 1988; Cornish et al., 2005). Knowledge of this information will allow the researcher to identify or exclude any relationships between these factors and motor performance.

The findings in this study give rise to possible future research questions to investigate combinations of treatment protocols. Combinations such as: initial intense treatment followed by standard monthly treatment with which care-givers seem to be slightly more satisfied. Further research comparing such combinations is recommended to achieve the most effective treatment protocol for infants with motor delay living in low socio-economic areas.

6.3.2. For Clinical Practice

No treatment regime emerged as being superior to the other. However, it was likely that the both interventions did result in improved functioning, although this was not proved as there was no control group who received a sham intervention. The numbers of infants requiring intervention, coupled with the results of this study, would indicate that monthly, group based intervention might be a cost-effective method of providing support to infants and care-givers.

6.4. Final Conclusions

The prevalence of infants with motor delay has been found to be comparable to the figures produced by previous studies (Ferguson and Jelsma, 2009; Bayley, 1993). However, the failure to identify these infants by the staff at the Well Baby clinic is of concern.

When comparing an intense (weekly) treatment protocol with a standard (monthly) treatment protocol for infants with motor delay, no significant difference was found between the two groups in terms of motor performance, compliance and satisfaction levels of the care-givers. Both groups improved their motor performance significantly over a three month intervention period. The initial rapid improvement shown by the intense group was different to the gradual improvement displayed in the standard group that also showed signs of better retention of skills once treatment ceased.

These findings give rise to possible future research questions to investigate combinations of treatment protocols. Combinations such as: initial intense treatment followed by standard monthly treatment with which care-givers seem to be slightly more satisfied. Further research to compare such combinations and possible long term effects on later milestones and developmental domains is recommended.

Nelson Mandela said: “There can be no keener revelation of a society’s soul than the way in which it treats its children” (Mandela, 2012). With the knowledge that intervention in any form can benefit children, no matter how small it may be, how can one deny them that opportunity?

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Appendices

A Comparison of Treatment Protocols for Infants with Motor Delay

By

Odette Olivier

February 2012

Table of Contents on Appendices

Appendix 1: Instruments

1.1. Participant Demographic and Medical Information

1.1.1. English Demographic Form

INCLUSION/EXCLUSION CHECKLIST

Participant Code: _______

1. Date of Birth **Baby**: ___/___/_________
2. Age of the **Baby:**_______
3. Age of the **Parent or Guardian:**_________
4. Does the baby have any of the following medical conditions or disability known by the parent or recorded in medical files?

- TB (resp/meningitis) ☐
- Major surgery (eg: CHD , heart) ☐
- Heart disease ☐
- Major respiratory disease (eg. CF) ☐
- Recurrent episodes of pneumonia or Chest infection etc ☐
- Recurrent episodes of diarrhea (> 2 per month) ☐
- Majorly malnourished (*near or below 60% of average weight according to the RTHC)* ☐
- Cerebral Palsy ☐
- Down's syndrome ☐
- Blindness ☐
- Other overt disability (specify: ___________________) ☐
- HIV positive ☐
- Apgar Score < 7 ☐
- Epilepsy ☐
- Had trauma at birth (specify: ____________________) ☐
- Encephalopathy ☐

At this stage, if participants have any of the above then they will be excluded.

Participant Demographic and Medical Information

5. Name of Baby: ________________________________
6. Name of Parent/Guardian: __________________________________
7. Relationship with Baby: __________________________________
8. What was your child's birth weight (grams)?____________________________
9. Was your child premature and by how many days/weeks?_______________________
10. Has your child ever been hospitalized in the past? **Yes/No**
    If yes, give details: ____
    ____

    Specify period of hospitlaisation: ______________________
    Illness: ____
11. Has your child ever been severely ill in the past (not hospitalized)? **Yes/No**
    If yes, give details: __________________________________
12. Does your child get sick often? (Choose one of the options below)
    Yes, once/month ☐
    Yes, every other month ☐
    Yes, once-twice/year (NORMAL) ☐
11. Has your child received any surgery in the past? **Yes/No**
    If yes, give details (what was it for and when):______________________________________
    ____
12. Any other relevant past medical history:____
    ____
13. Employment Status of the Parent/Guardian: (please circle answer)

    employed/unemployed

14. Level of education of Parent or guardian: (please circle answer)

    none/grade 5/grade 7/grade 9/grade 12/collage diploma/university degree

15. What type of house do you reside in? (please circle answer)

    Informal settlement or shack/brick house/duplicate apartment or flat

16. Do you have any other children? ***Yes/No***
17. If yes, are they under your care? ***Yes/No***
18. Do yo u live in *Gugulethu/Vanguard/Bishop Lavis/Heideveld*? (Please circle answer)
19. What is your income per month? (Please circle answer)
    None/<R2000/R2000-R5000/R5000-R10000/>R10000/Live off a Government Grant
20. Will you be able to attend all the therapy sessions if your child was found to be motor delayed?
    Yes/No

Telephone/Cell number:____________________________

1.1.2. Xhosa Demographic Form

UPHONONONGO LOKUNGENELA / NOKUNGANGENELI

Ikhowudi yomthathi-nxaxheba_______

1. Usuku lokuzalwa komntwana: _/__/____
2. Ubudala bomntwana: _______________
3. Ubudala bomzali:___________________

4. Ngokolwazi lomzali okanye amaphepha kagqirha ingaba umntwana unalo na olunye uhlobo lwengulo kwezi zingezantsi?

Isifo sephepha…………………………………………………………………☐
Uqhaqho …………………………………………………………………………☐
Isifo sentliziyo…………………………………………………………………☐
Isifo semiphunga………………………………………………………………☐
Inyumoniya okanye isifuba………………………………………………☐
Isifo sorhudo (mhlawumbi kabini ngenyanga)……………………☐
Ukungondleki okungaphantsi kwezinga elivumelekileyo……..☐
I-Cerebral Palsy…………………………………………………………………☐
Isifo sobuthathaka bengqondo……………………………………………☐
Ukungaboni………………………………………………………………………☐
Olunye uhlobo lwenkubazeko (cacisa)…………………………………☐
Isandulela-Gawulayo…………………………………………………………☐
Amanqaku ngokukaApgari angezantsi kwesixhenxe………………☐
Isifo sokuwa………………………………………………………………………☐
Uhlukumezeko ekuzalweni(cacisa)………………………………………☐
Isifo sengqondo …………………………………………………………………☐

<u>**Kesisigaba, ukuba umthathi-nxaxheba unento kwezi zingentla, akazi kungenela**</u>

Ubume Neenkcukacha Ngempilo Yomthathi-nxaxheba

1. Igama lomntwana ___________________________________
2. Igama lomali / umgcini __________________________________
3. Unxul;umano nomntwana ________________________________
4. Ubunzima ekuzalweni okungaphantsi (grams)? ________________
5. Ukuzalwa phambi kexesha ngaphantsi keeveki (cacisa___________)
6. Kwixa elingaphambili wakhe wangena esibhedlela umntwana? **Ewe/hayi**

Uba uthi 'ewe ' nika izizathu:____

____

Chaza ithuba esesibhedlela____

Isigulo: ____

7. Umntwana wayekhe wagula kakhulu kodwa akaya sibhedlele? **Ewe / hayi**
   Uba uthi 'Ewe' nika isizathu____
8. Umntwana wakho ugula rhoqo? (Khetha apha ngezantsi)
   Ewe, kanye ngenyanga……………………………………………….☐
   Ewe, inyanga emva kwenye …………………………………..……☐
   Ewe, kanye-kabini ngonyaka (Kuqhelekile oko)…………☐
9. Umntwana wakho wakha wafumana uqhaqho ngaphambili? **Ewe / hayi**
   Uba uthi "Ewe" yayilolwantoni, nini?_______________________________
10. Kwixa elingaphambili ikhona enye into engonyango ebalulekileyo ?_______
    ____
11. Isimo sengqesho kumzali / umgcini: (phawula ngesangqa)
    Uyasebenza / Awusebenzi
12. Ibakala lenfundo yomzali / umgqini: phawula ngesangqa: *Alikho / elesihlanu / elesixhenxe / elethoba / eleshumi elinambini / idiploma yekholeji /isidanga enyuvesi.*
13. Uhlala kwindlu enjani: (phawula ngesangqa)
    Etyotyombeni / kwindlu yesitena / kuludwe lweeflethi.
14. Unabo abanye abantwana? **Ewe / hayi**
15. Ukuba unabo baphantsi kwakho ? **Ewe / hayi.**
16. Uhlala eGugulethu /Vanguard /Bishop Lavis /Heideveld? (Phawula ngesangqa)
17. Ufumana malini ngenyanga: (phawula ngesangqa)
    Ayikho /R2000 /R2000 - R5000/ R5000-R10000/ Imali yesibonelelo.
18. Uzakubanako ukuzihamba zonke eziseshoni zonyanngo ukuba umntwana wakho ufumaniseke enolulibaziseko lwenkqubela- phambili? **Ewe / hayi**

Telephone/Cell number:________________________

1.1.3. Afrikaans Demographic Form

INCLUSION/EXCLUSION CHECKLIST

Participant Code: _______

1. Date of Birth **Baby**: ___/___/_________
2. Age of the **Baby:**_______
3. Age of the **Parent or Guardian:**_________
4. Does the baby have any of the following medical conditions or disability known by the parent or recorded in medical files?

- TB (resp/meningitis) ☐
- Major surgery (eg: CHD , heart) ☐
- Heart disease ☐
- Major respiratory disease (eg. CF) ☐
- Recurrent episodes of pneumonia or Chest infection etc ☐
- Recurrent episodes of diarrhea (> 2 per month) ☐
- Majorly malnourished (*near or below 60% of average weight according to the RTHC)* ☐
- Cerebral Palsy ☐
- Down's syndrome ☐
- Blindness ☐
- Other overt disability (specify: ___________________) ☐
- HIV positive ☐
- Apgar Score < 7 ☐
- Epilepsy ☐
- Had trauma at birth (specify: ____________________) ☐
- Encephalopathy ☐

At this stage, if participants have any of the above then they will be excluded.

Demografiese en Mediese Informasie van Deelnemer

5. Baba se naam: ______________________________

6. Naam van Ouer/Voog: ______________________________

7. Verwantskap met baba: ______________________________

8. Wat was u baba se geboorte gewig (gram)?______________________________

9. Was u baba te vroeg gebore (dae/weke)?______________________________

10. Was u baba al gehospitaliseer? **Ja/Nee**

    As 'ja', verduidelik: ______________________________

    ____

    Hoe lank was die baba in die hospitaal?: ______________________________

    Siekte?: ______________________________

11. Was u baba al ooit ernstig siek in die verlede maar was nie gehospitaliseer nie? **Ja/Nee**

    As 'ja', verduidelik: ______________________________

12. Word u baba gereeld siek? (Kies een van die onderstaande opsies)

    Ja, een keer per maand ☐

    Ja, elke tweede maand ☐

    Ja, een of twee keer a jaar (NORMAAL) ☐

11. Het u baba al ooit 'n operasie gehad? **Ja/Nee**

    As 'ja', verduidelik (waarvoor en wanneer): ______________________________

    ____

12. Enige ander relevante mediese geskiedenis?:______________________________

    ____

13. Werkstatus van ouer/voog: (omkring u antwoord)

    Het werk/werkloos

14. Vlak van opvoeding van ouer/voog: (omkring u antwoord)

    Geen/graad 5/ graad 7/ graad 9/ graad 12/ diploma/ universiteitsgraad

15. In watter tipe huis woon u? (omkring u antwoord)

    Informele nedersetting of 'n shack/baksteen huis /duplikaat huisies of woonstel

16. Het u enige ander kinders? ***Ja/Nee***

17. Indien ja, is hul in u sorg? ***Ja/Nee***

18. In watter area bly u? (omkring u antwoord) *Gugulethu/Vanguard/Bishop Lavis/Heideveld*

19. Wat is u maandelikse inkomste?(omkring u antwoord)

    Geen/<R2000/R2000-R5000/R5000-R10000/>R10000/Live off a Government Grant

20. Sal u al die terapie sessies kan bywoon indien u ons vind u kind het is agter in sy/haar bewegingsmylpale?

    Ja/Nee

Telephone/Cell number:______________________________

1.2. Bayley Infant Neuromotor Screener III

Bayley
Scales of Infant and Toddler Development™
THIRD EDITION
SCREENING TEST

Screening Test Record Form

Child's name: ____________________

Sex: ☐ M ☐ F ID #: ____________________

Examiner's name: ____________________

School/Child care program: ____________________

Reason for referral: ____________________

____

Subtest Scores

Subtests	Total Raw Score	Risk Category: At Risk	Risk Category: Emerging	Risk Category: Competent
Cognitive		☐	☐	☐
Receptive Communication		☐	☐	☐
Expressive Communication		☐	☐	☐
Fine Motor		☐	☐	☐
Gross Motor		☐	☐	☐

Comments:

Calculate Age

	Years	Months	Days
Date Tested			
Date of Birth			
Age			
Age in Months and Days	Years × 12 + months		
Adjustment for Prematurity	Adjust through 24 months		
Adjusted Age			
Start Point	Calculate start point according to chart below		

Age*	Start Point
1–6 months	A
7–12 months	B
13–24 months	C
25–42 months	D

*Round child's age to the nearest month.

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7 8 9 10 11 12 A B C D E

Fine Motor Subtest

Reversal Rule: The child must obtain a score of 1 on the first item at the start point of any age to go forward. If the child obtains a score of zero on the first item, go back to the start point for the previous age and administer those items.

Discontinue Rule: Stop administration when the child obtains scores of zero on four consecutive items.

	Item	Materials	Score Criteria and Comments	Score
A	1. Eyes Follow Moving Person	None	**Score:** Child's eyes follow moving person through midline to left and right.	1 0
	2. Eyes Follow Ring (Horizontal)	Ring with string	Trials: 3 **Score:** Child's eyes follow ring through one complete excursion.	1 0
	3. Attempts to Bring Hand to Mouth	None	**Score:** Child purposely attempts to place his or her hand in mouth.	1 0
	4. Retains Ring	Ring with string	**Score:** Child retains ring for at least 2 seconds.	1 0
	5. Eyes Follow Ring (Circular)	Ring with string	Trials: 3 **Score:** Child's eyes follow ring through one complete excursion (upper and lower halves of the circle).	1 0
B	6. Grasps Suspended Ring	Ring with string	Trials: 2 **Score:** Child uses at least one hand to grasp ring for at least 2 seconds.	1 0
7 9	7. Block Series: Reaches for Block	Block without hole	Trials: 2 **Score:** Child extends one or both arms forward to reach block. Child does not have to grasp block.	1 0
8 11	8. Food Pellet Series: Whole Hand Grasp	Food pellet	**Score:** Child uses his or her whole hand to grasp pellet.	1 0
7 9	9. Block Series: Thumb-Fingertip Grasp	Block without hole	Trials: 2 **Score:** Child uses pad of his or her thumb and any fingertip to grasp block.	1 0
C	10. Lifts Cup by Handle	Cup with handle	**Score:** Child lifts cup by handle using one hand.	1 0
8 11	11. Food Pellet Series: Thumb-Fingertip Grasp	Food pellet	**Score:** Child uses pad of his or her thumb and any fingertip to grasp pellet.	1 0

	Item	Materials	Score Criteria and Comments	Score
12 18 19 26	12. Grasp Series: Palmar Grasp	Crayon Sheet of blank unlined white paper	**Score:** Child grasps crayon using a palmar grasp while making a mark on the paper.	1 0
	13. Isolates Extended Index Finger	Pegboard	**Score:** Child extends his or her index finger while keeping other fingers curled.	1 0
D	14. Scribbles Spontaneously	Crayon Sheet of blank unlined white paper	**Score:** Child spontaneously and purposely scribbles on the paper.	1 0
15 20	15. Block Stacking Series: 2 Blocks	12 blocks	Trials: 3 **Score:** Child stacks at least two blocks. Number of blocks in tallest tower:	1 0
16 22 23	16. Imitates Stroke Series: Random	2 crayons Sheet of blank unlined white paper	**Score:** Child produces a stroke in any direction.	1 0
	17. Places 10 Pellets in Bottle (60 Seconds)	12 food pellets Bottle without lid Stopwatch 60 seconds	**Score:** Child places 10 pellets in bottle in 60 seconds or less, one pellet at a time.	1 0
12 18 19 26	18. Grasp Series: Transitional Grasp	Crayon Sheet of blank unlined white paper	**Score:** Child grasps crayon using fingers and partial thumb opposition while making a mark on the paper.	1 0
12 18 19 26	19. Grasp Series: Intermediate (Tripod) Grasp	Crayon Sheet of blank unlined white paper	**Score:** Child grasps crayon using a static tripod (thumb and two fingers) or quadrupod (thumb and three fingers) grasp while making a mark on the paper.	1 0
15 20	20. Block Stacking Series: 6 Blocks	12 blocks	Trials: 3 **Score:** Child stacks at least six blocks.	1 0
	21. Uses Hand to Hold Paper in Place	Crayon Sheet of blank unlined white paper	**Score:** Child holds paper in place with one hand while he or she scribbles or draws with the other.	1 0
16 22 23	22. Imitates Stroke Series: Horizontal	2 crayons Sheet of blank unlined white paper	**Score:** Child's horizontal stroke is within approximately 30° of your horizontal line.	1 0

16
22
23

Item	Materials	Score Criteria and Comments	Score
23. Imitates Stroke Series: Circular	2 crayons Sheet of blank unlined white paper	**Score:** Child produces a mostly curved shape.	1 0
24. Strings 3 Blocks	Shoelace 3 blocks with holes	**Score:** Child strings at least three blocks on shoelace.	1 0
25. Snips Paper	2 blank index cards (3" x 5") Safety scissors	**Score:** Child makes two snips at least ½ inch long.	1 0
26. Grasp Series: Dynamic Grasp	Crayon Sheet of blank unlined white paper	**Score:** Child grasps crayon using a mature, controlled, dynamic grasp while making a mark on the paper.	1 0
27. Builds Wall	8 blocks	**Score:** Child replicates wall.	1 0

12
18
19
26

Total Raw Score (FM) /27

Comments

Gross Motor Subtest

Reversal Rule: The child must obtain a score of 1 on the first item at the start point of any age to go forward. If the child obtains a score of zero on the first item, go back to the start point for the previous age and administer those items.

Discontinue Rule: Stop administration when the child obtains a score of zero on four consecutive items.

	Item	Materials	Score Criteria and Comments	Score
1 2 5 A	1. Controls Head While Upright Series: Lifts Head	Stopwatch	**Score:** Child intermittently lifts head free of your shoulder without support. Time head held upright:	1 0
1 2 5	2. Controls Head While Upright Series: 3 Seconds	Stopwatch	**Score:** Child holds head erect for at least 3 seconds without support. Time head held upright:	1 0
	3. Turns Head to Sides	Object of interest	**Score:** Child turns head from one side to the other by raising his or her head off the supporting surface enough to clear the nose. Child must be able to turn to both sides.	1 0
	4. Makes Crawling Movements	None	**Score:** Child makes any alternating crawling movements with his or her legs.	1 0
1 2 5	5. Controls Head While Upright Series: 15 Seconds	Stopwatch 15 seconds	**Score:** Child holds head erect and steady for at least 15 seconds without support.	1 0
	6. Elevates Trunk While Prone: Elbows and Forearms	Object of interest	**Score:** Child elevates head and upper trunk by pushing up on elbows or forearms.	1 0
7 8	7. Sits With Support Series: Briefly	Stopwatch	**Score:** Child tenses muscles in an effort to maintain sitting position. Elapsed time sitting:	1 0
7 8 B	8. Sits With Support Series: 30 Seconds	Stopwatch 30 seconds	**Score:** Child sits with slight support for at least 30 seconds.	1 0
	9. Rolls From Back to Sides	Bell or rattle	**Score:** Child turns from back to both right and left sides.	1 0

	Item	Materials	Score Criteria and Comments	Score
	10. Rolls From Back to Stomach	Bell or rattle	**Score:** Child rolls from back to stomach, rolling from either side.	1 0
	11. Sits Without Support and Holds Object	Object of interest Stopwatch 60 seconds	**Score:** Child sits alone for at least 60 seconds while manipulating an object.	1 0
	12. Crawls On Stomach	Object of interest	**Score:** Child uses both arms to move forward on stomach approximately three feet or more.	1 0
13 16 C	13. Walks Series: With Support	None	**Score:** Child walks by making coordinated, alternating stepping movements.	1 0
	14. Sits Down With Control	None	**Score:** Child purposely lowers from a standing to a sitting position in a controlled manner.	1 0
	15. Stands Alone	None	**Score:** Child stands alone for at least 3 seconds after you release his or her hands.	1 0
13 16 D	16. Walks Series: Alone With Coordination	None	**Score:** Child takes at least five steps independently, displaying coordination and balance.	1 0
	17. Squats Without Support	Object of interest	**Score:** Child moves from standing to squatting to standing while maintaining balance without using any support.	1 0
	18. Walks Down Stairs With Both Feet on Each Step, With Support	Stairs	**Score:** Child walks down at least three steps, using wall or handrail for support. Child places both feet on each step before stepping down to the next.	1 0
19 26	19. Balances on Left Foot Series: With Support	Stopwatch	**Score:** Child balances on left foot while you hold one of his or her hands. Elapsed time without support:	1 0
	20. Jumps From Bottom Step	Stairs	**Score:** Child jumps to floor.	1 0

Item	Materials	Score Criteria and Comments	Score
21. Kicks Ball	Large ball	Trials: 3 **Score:** Child maintains balance while kicking ball in a forward direction at least 2 feet.	1 0
22. Walks Forward on Path	Stepping path	**Score:** Child walks with at least one foot (i.e., left foot or right foot) on path for at least 5 feet.	1 0
23. Walks Up Stairs Series: Both Feet on Each Step, Alone	Stairs	**Score:** Child walks up three steps without using wall or handrail for support. Child places both feet on each step before stepping up to the next.	1 0
24. Jumps Forward 4 Inches	Stepping path	Trials: 3 **Score:** Child jumps at least 4 inches in any trial.	1 0
25. Balances on Right Foot for 2 Seconds, Alone	Stopwatch	**Score:** Child balances alone on right foot for at least 2 seconds.	1 0
26. Balances on Left Foot Series: 2 Seconds, Alone	Stopwatch	**Score:** Child balances alone on left foot for at least 2 seconds.	1 0
27. Walks Backward Close to Path	Stepping path	**Score:** Child walks backward unassisted close to the path for at least 5 feet.	1 0
28. Walks Up Stairs Series: Alternating Feet, Alone	Stairs	**Score:** Child walks up stairs without using wall or handrail for support and alternates feet on each step.	1 0

23 28

19 26

23 28

Total Raw Score (GM) /28

Comments

1.3. Bayley Scales of Infant Development II hild's ame ______ Child's Gender ______

aregiver's ame ______

aycare/ :hool Program ______

ace of ɘsting ______

ɘacher ______

ɛaminer ______

ɘason for Referral ______

Bayley Scales of Infant Development™ Second Edition

Motor Scale Record Form

	Year	Month	Day
Date of Testing			
Date of Birth			
Chronological Age			
Adjustment for Prematurity			
Corrected Age			

Scale	Factor	Raw Score	MDI	PDI	Confidence Interval (____%)	Percentile	Classification
Mental							
Motor							
Behavior Rating	Attention/ Arousal						
	Orientation/ Engagement						
	Emotional Regulation						
	Motor Quality						
	Additional Items						
	Total Raw Score						

ɔservations and General Comments ______

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9 10 11 12 A B C D E

015-402804-5

Begin 1, 2 & 3 months

Age Group	Item	Position	Materials	Next Item Scored	Next Item Admin.	Previous Item in Series	Comments/ Scoring Criteria/ Trial & Counted Information	Score C, NC, RF, RPT, 0
month	1. Thrusts Arms in Play	Supine						
	2. Thrusts Legs in Play	Supine						
	3. Lifts Head When Held at Shoulder	Supine		4, 5, 7	15			
	4. Holds Head Erect for 3 Seconds (Vertical Position)	Upright at Shoulder		5, 7		3		
	5. Adjusts Posture When Held at Shoulder	Upright at Shoulder		7		4		
	6. Hands are Fisted							
months	7. Holds Head Erect and Steady for 15 Seconds	Upright at Shoulder				5		
	8. Lifts Head (Dorsal Suspension)	Upright						
	9. Holds Legs Up for 2 Seconds	Supine						
	10. Makes Crawling Movements	Prone						
months	11. Turns from Side to Back	Supine						
	12. Attempts to Bring Hand to Mouth							
	13. Retains Ring	Supine	Ring with String					
	14. Adjusts Head to Ventral Suspension	Prone				8		
	15. Holds Head Steady While Being Moved	Upright at Shoulder				7		
	16. Displays Symmetric Movements	Supine						

◯ Incidental Observation

Number of Items Child Received Credit (C) for This Page

Begin 4, 5 & 6 months

End 1, 2 & 3 months

Age Group	Item	Position	Materials	Next Item Scored	Next Item Admin.	Previous Item in Series	Comments/ Scoring Criteria/ Trial & Counted Information	Score C, NC, RF, RPT, O
months	(17.) Holds Head in Midline Position	Supine						
month	(18.) Elevates Self by Arms	Prone						
	19. Balances Head	Upright				15		
	20. Maintains Head at 45° and Lowers with Control	Prone		24				
months	21. Sits with Support	Seated		22, 28, 34				
	22. Sits with Slight Support for 10 Seconds	Seated		28, 34, 36		21		
	(23.) Keeps Hands Open					6		
	24. Maintains Head at 90° and Lowers with Control	Prone				20		
months	25. Shifts Weight on Arms	Prone				18		
	26. Turns from Back to Side	Supine	Bell or Rattle	38		11		
	(27.) Rotates Wrist		Cube, Rattle, Bell or Other Small Toy					
months	28. Sits Alone Momentarily	Seated		34, 36		22		
months	29. Uses Whole Hand to Grasp Rod	Seated	Rod				Type of Grasp:	
	(30.) Reaches Unilaterally						Hand ______	
	31. Uses Partial Thumb Opposition to Grasp Cube	Seated	Cube	37				
	32. Attempts to Secure Pellet	Seated	Sugar Pellet	41				

◯ Incidental Observation

Number of Items Child Received Credit (C) for This Page

Begin 7 & 8 months

End 4, 5 & 6 months

Age Group	Item	Position	Materials	Next Item Scored	Next Item Admin.	Previous Item in Series	Comments/ Scoring Criteria/ Trial & Counted Information	Score C, NC, RF, RPT, O
	33. Pulls to Sitting Position	Supine		45				
	34. Sits Alone for 30 Seconds	Seated		36		28		
7 months / months	**35.** Sits Alone While Playing with Toy	Seated	Rabbit, Bell, Rattle or Other Small Toy			34		
	36. Sits Alone Steadily	Seated				35		
	37. Uses Pads of Fingertips to Grasp Cube	Seated	Cube			31		
	38. Turns from Back to Stomach	Supine	Bell or Rattle			26		
	39. Grasps Foot with Hands	Supine	Facial Tissue					
	40. Makes Early Stepping Movements	Standing			44			
nonths	**41.** Uses Whole Hand to Grasp Pellet	Seated	Sugar Pellet	49, 56		32		
months	**42.** Attempts to Raise Self to Sit	Supine	Bell or Rattle					
	43. Moves Forward, Using Prewalking Methods	Seated	Bell or Rattle			25		
	44. Supports Weight Momentarily	Standing		46, 53		40		
	45. Pulls to Standing Position	Supine				33		
	46. Shifts Weight While Standing	Standing		53		44		
	47. Raises Self to Sitting Position	Supine	Bell or Rattle			42		
onths	**48.** Brings Spoons or Cubes to Midline	Seated	2 Spoons or Cubes					

Number of Items Child Received Credit (C) for This Page

egin 11, 12, 14–16 onths

End 7, 8, 9 & 10 months

Age Group	Item	Position	Materials	Next Item Scored	Next Item Admin.	Previous Item in Series	Comments/ Scoring Criteria/ Trial & Counted Information	Score C, NC, RF, RPT, O
onths	**49.** Uses Partial Thumb Opposition to Grasp Pellet	Seated	Sugar Pellet	56		41		
	50. Rotates Trunk While Sitting Alone	Seated	Bell			36	**Scoring Criterion:** 1 of 2 Trial 1____ 2_____	
nonths / nths	**51.** Moves from Sitting to Creeping Position	Seated	Bell			50		
	52. Raises Self to Standing Position	Supine	Bell or Rattle			47		
	53. Attempts to Walk	Standing		60, 61		46		
nonths	**54.** Walks Sideways While Holding on to Furniture	Standing				53		
	55. Sits Down	Standing						
	56. Uses Pads of Fingertips to Grasp Pellet	Seated	Sugar Pellet			49		
	57. Uses Partial Thumb Opposition to Grasp Rod	Seated	Rod			29		
nonths	**58.** Grasps Pencil at Farthest End	Seated	Pencil & Paper	70				
	59. Stand Up I	Seated		68		52		
onths	**60.** Walks with Help	Standing		61, 62 63		54		
months	**61.** Stands Alone	Standing		62, 63		60		
onths	**62.** Walks Alone	Standing		63		61	Number of Steps ______	
6 months	**63.** Walks Alone with Good Coordination	Standing	Any toy that interests child			62	Number of Steps ______	
onths	**64.** Throws Ball	Standing	Ball					

Incidental Observation

Number of Items Child Received Credit (C) for This Page

in 17–19, 22, 23–25 & 26–28 months

End 11, 12, 13 & 14–16 months

Age Group	Item	Position	Materials	Next Item Scored	Next Item Admin.	Previous Item in Series	Comments/ Scoring Criteria/ Trial & Counted Information	Score C, NC, RF, RPT, O
	65. Squats Briefly	Standing				55		
19 months	66. Walks Up Stairs with Help	Standing	Stairs & any toy that interests child	79	69			
	67. Walks Backward	Standing	Pull Toy			63	Number of Steps ______	
	68. Stands Up II	Standing				59		
onths	69. Walks Down Stairs with Help	Standing	Stairs & any toy that interests child	80		66		
22 months	70. Grasps Pencil at Middle	Seated	Pencil & Paper	74, 75, 90		58		
	71. Walks Sideways	Standing	Pull Toy			67		
onths	72. Stands on Right Foot with Help	Standing			82			
	73. Stands on Left Foot with Help	Standing			83	72		
	74. Uses Pads of Fingertips to Grasp Pencil	Seated	Pencil & Paper	75, 90		70		
25 months	75. Uses Hand to Hold Paper in Place	Seated	Pencil & Paper	90				
onths	76. Places 10 Pellets in Bottle in 60 Seconds	Seated	12 Sugar Pellets, Bottle &			56	Number of Pellets ______	
	77. Runs with Coordination	Standing	Ball			71		
28 months	78. Jumps off Floor (Both Feet)	Standing	Jumping Rope					
4-16 onths	79. Walks Up Stairs Alone, Placing Both Feet on Each Step	Standing	Stairs & any toy that interests child	95	80	69		
	80. Walks Down Stairs Alone, Placing Both Feet on Each Step	Standing	Stairs & any toy that interests child		81	79		

Incidental Observation

Number of Items Child Received Credit (C) for This Page

1.4. Compliance Check List

1.4.1. English Compliance Check list

Check List

Participant Code: _________

Did you perform the exercises as prescribed?

1. Yes, all ☐
2. Yes, some ☐
3. None ☐

If not, why? ____

How often did you perform the excises?

1. Everday ☐
2. More than twice a week ☐
3. Less than twice a week ☐
4. Never ☐

If "never", why? ____

What were the barriers to performing these exercises? (Tick all that apply)

Not enough time ☐
Child sick ☐
Other children needing attention ☐
Other: (Please specify) ________________________
____
____

1.4.2. Xhosa Compliance Check List

Check List

*Ikhowudi Yomthathi-nxaxheba*_______

Imithambo uyiqhube ngokwemigaqo?

1. **Ewe, yonke ……………………………………….☐**
2. **Ewe, eminye ……………………………………..☐**
3. **Hayi, nakwenye…………………………………..☐**

Ukuba uthi hayi, kutheni?_______________________________________

Uyenze amaxa amangaphi lemithambo?

1. **Yonke imihla ………………………………...☐**
2. **Ngaphezulu kwesibini ngeveki……………..☐**
3. **Ngaphantsi kwesibini ngeveki………………☐**
4. **Andizange…………………………………….☐**

Ukuba "awuzange", kutheni?_______________________________________

Ibiyintoni ekuthintela ekwenzeni lemithambo? (Phawula okufanelekileyo)

Lixesha elingonelanga………………………………☐

Kukugula komntwana………………………………☐

Uhoyo lwabanye abantwana………………………… ☐

Ezinye (Nceda uchaze) ______________________________

____

____

1.4.3. Afrikaans Compliance Check List

Nasien lys

Deelnemer Kode:_______

Het u die oefening, soos voorgeskryf, gedoen?

1. Ja, alles ☐
2. Ja, sommige ☐
3. Geen ☐

Indien nie, hoekom?

____

Hoe gereeld het u die oefeninge gedoen?

1. Elke dag ☐
2. Meer as 2 keer per week ☐
3. Minder as 2 keer per week ☐
4. Nooit ☐

Indien "nooit", hoekom?

____

Wat was die hindernisse om hierdie oefeninge te doen? (Merk almal van toepassing)

Nie genoeg tyd ☐
Kind siek ☐
Ander kinders benodig aandag ☐
Ander: (Spesifiseer asseblief) ______________________________

____

____

1.5. Satisfaction Questionnaire

1.5.1. English Satisfaction Questionnaire

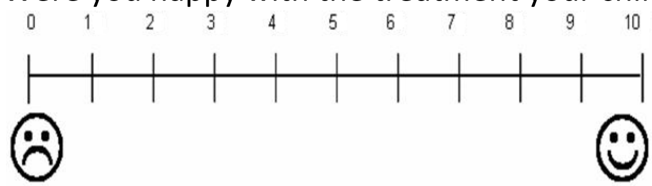
A COMPARISON OF TREATMENT PROTOCOLS FOR INFANTS WITH MOTOR DELAY: STANDARD VERSUS INTENSE THERAPY

Please answer the following questions by making a circle around the rating you feel is appropriate. The ratings on the scale range from **0** being **not good** to **10** being **exceptionally good**.

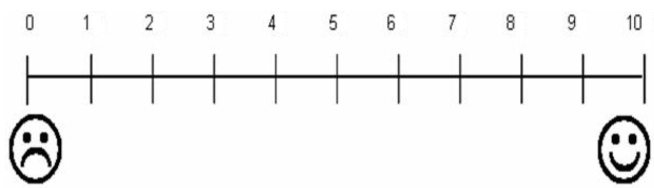
Satisfaction Questionnaire

Group:__________

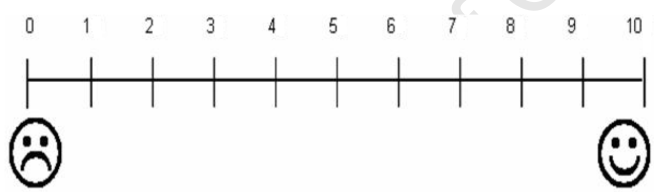
1. Were you happy with the treatment your child received?



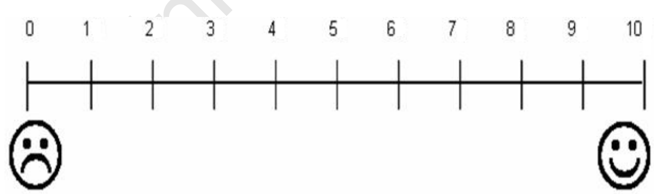
2. Do you feel you will be able to apply the exercises and the knowledge you got from the treatment classes on your baby or other children at home?



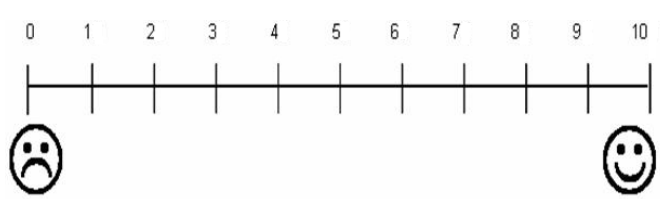
3. Did you like the **weekly** treatment classes?



4. Do you feel that all your questions were answered in the treatment classes?



5. Do you feel your baby's function has improved since he/she started coming to the treatment classes?



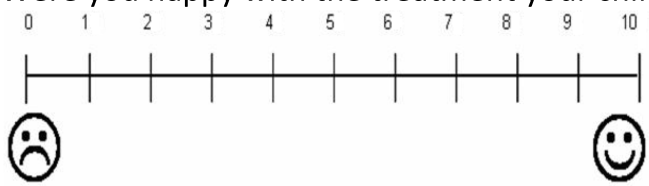
(Picture reference: Chatterjee, Helen. (2008). Staying Essential: Articulating the Value of Object Based Learning. [Online Image]. http://edoc.hu-berlin.de/umacj/1/chatterjee-helen-1/XML/Chatterjee.xml#linkcontact. 30 April, 2010.)

A COMPARISON OF TREATMENT PROTOCOLS FOR INFANTS WITH MOTOR DELAY: STANDARD VERSUS INTENSE THERAPY

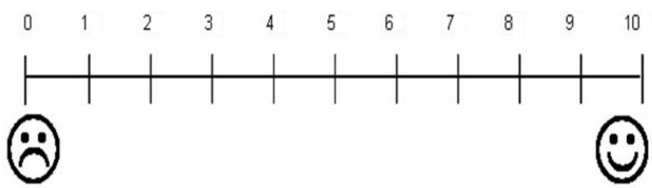
Please answer the following questions by making a circle around the rating you feel is appropriate. The ratings on the scale range from **0** being **not good** to **10** being **exceptionally good**.

Satisfaction Questionnaire **Group:__________**

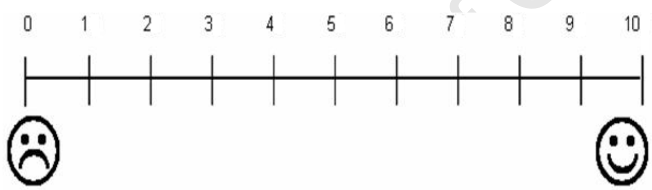
1. Were you happy with the treatment your child received?



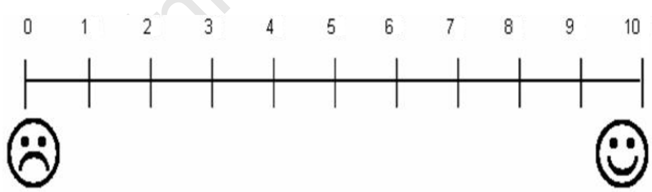
2. Do you feel you will be able to apply the exercises and the knowledge you got from the treatment classes on your baby or other children at home?



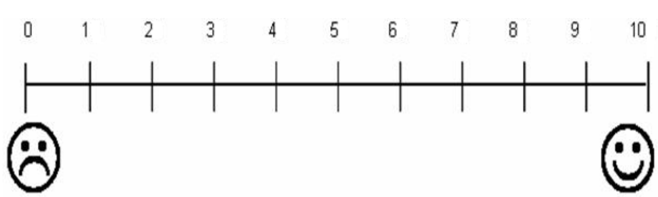
3. Did you like the **monthly** treatment classes?



4. Do you feel that all your questions were answered in the treatment classes?



5. Do you feel your baby's function has improved since he/she started coming to the treatment classes?



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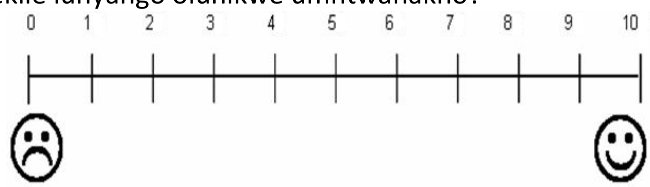
1.5.2. Xhosa Satisfaction Questionnaire

UTHELEKISO KWIMIGAQO YONYANGO LWABANTWANA ABANOLIBAZISEKO KUPHUHLISO LWENKQUBELA PHAMBILI: UNYANGO OLUQHELEKILEYO NELO LUTHE QABAVU

Nceda uphendule lemibuzo ilandelayo ngokuthi ubiyele ngesangqa kumlinganiselo ocinga ukuba ngofanelekileyo.Imilinganiselo yesisikali isuka ku-**0** othi **<u>Ayilunganga</u>** ikuya kutsho ku-**10** othi **<u>Elunge ngokugqibeleleyo.</u>**

<u>Imibuzo Yokuzanelisa</u> **Group:_______**

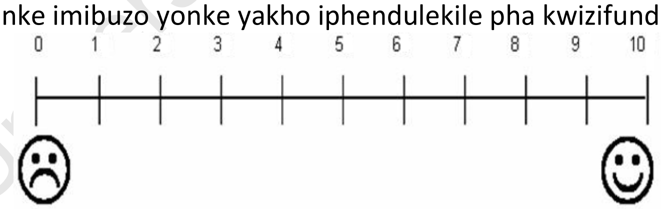
1. Wanelisekile lunyango olunikwe umntwanakho?



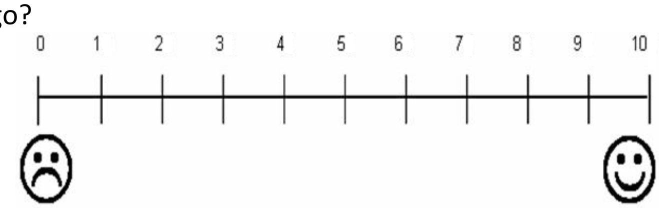
2. Uziva unakho ukulusebenzisa imithambo nolwazi olufumene kwizifundo zonyango kumntwana wakho okanye abantwana ekhayeni?

3. Uzithandile izifundo zonyango **zeveki**?

4. Uziva yonke imibuzo yonke yakho iphendulekile pha kwizifundo zonyango?



5. Ucinga ukuba ukhona umahluko kumntwana wakho oko ethe waya kwizifundo zonyango?



UTHELEKISO KWIMIGAQO YONYANGO LWABANTWANA ABANOLIBAZISEKO KUPHUHLISO LWENKQUBELA PHAMBILI: UNYANGO OLUQHELEKILEYO NELO LUTHE QABAVU

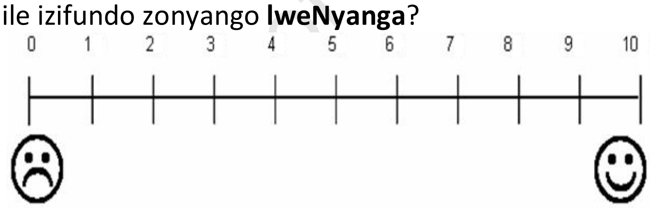
Nceda uphendule lemibuzo ilandelayo ngokuthi ubiyele ngesangqa kumlinganiselo ocinga ukuba ngofanelekileyo.Imilinganiselo yesisikali isuka ku-**0** othi **Ayilunganga** ikuya kutsho ku-**10** othi **Ilunge ngokugqibeleleyo.**

Imibuzo Yokuzanelisa **Group:_______**

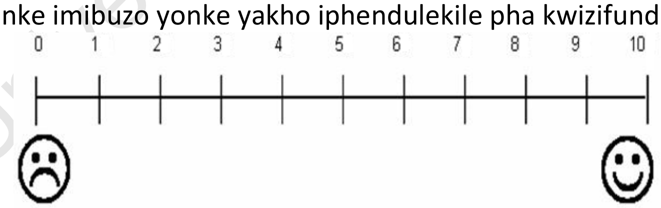
1. Wanelisekile lunyango olunikwe umntwanakho?

2. Uziva unakho ukulusebenzisa imithambo nolwazi olufumene kwizifundo zonyango kumntwana wakho okanye abantwana ekhayeni?

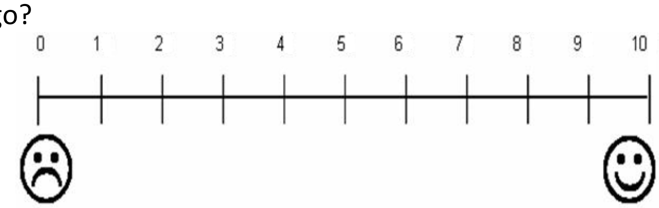
3. Uzithandile izifundo zonyango **lweNyanga**?



4. Uziva yonke imibuzo yonke yakho iphendulekile pha kwizifundo zonyango?



5. Ucinga ukuba ukhona umahluko kumntwana wakho oko ethe waya kwizifundo zonyango?



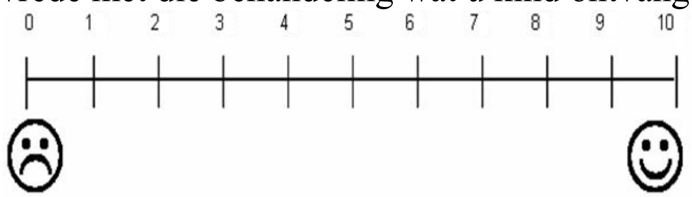
1.5.3. Afrikaans Satisfaction Questionnaire

‘N VERGELYKING VAN BEHANDELINGS PROTOKOLLE VIR BABAS MET MOTORVERTRAGING: STANDAARD TEENOOR INTENSIEWE TERAPIE

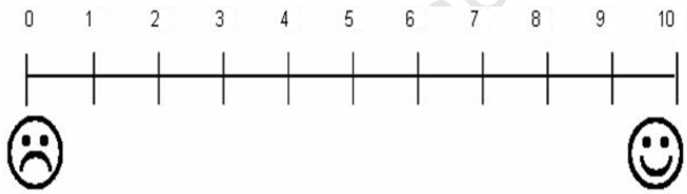
Beantwoord asseblief die volgende vrae deur n sirkel te trek om die gradering van jou keuse. Die gradering se skaal is van **0** wat **swak** aandui tot **10** wat **baie goed** aandui.

<u>**Tevredenheidsvraelys**</u> **Groep:______**

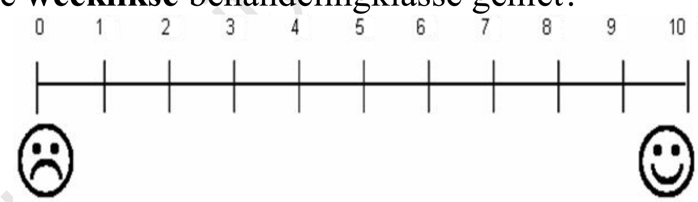
1. Was u tevrede met die behandeling wat u kind ontvang het?



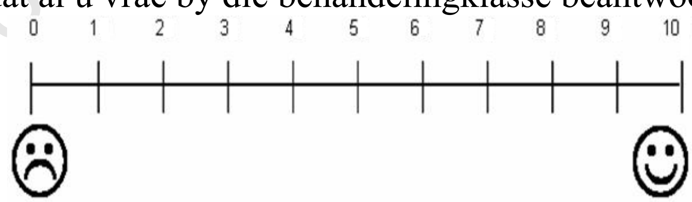
2. Na aanleiding van die ondervinding wat u opgedoen het, voel u u is in staat om die oefeninge en kennis op u kind of ander kinders tuis toe te pas?



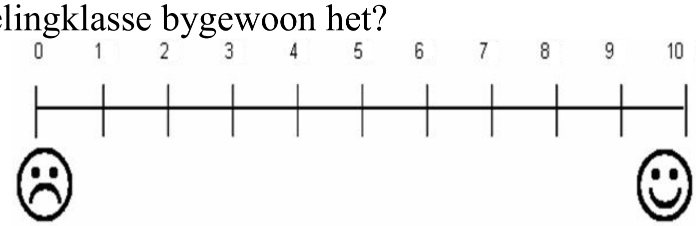
3. Het u die **weeklikse** behandelingklasse geniet?



4. Voel u dat al u vrae by die behandelingklasse beantwoord is?



5. Voel u dat u baba se funksie verbeter vandat sy/hy die behandelingklasse bygewoon het?

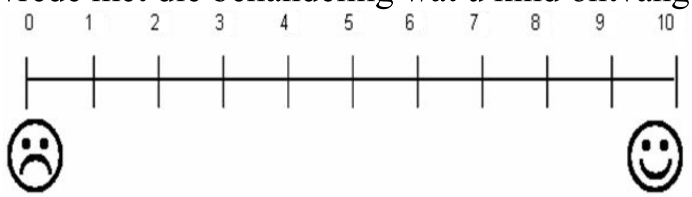


‘N VERGELYKING VAN BEHANDELINGS PROTOKOLLE VIR BABAS MET MOTORVERTRAGING: STANDAARD TEENOOR INTENSIEWE TERAPIE

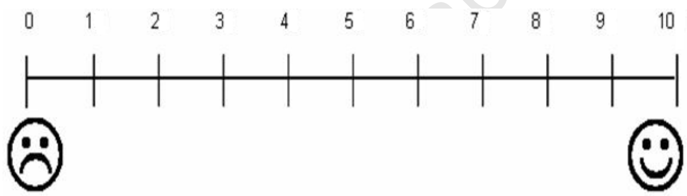
Beantwoord asseblief die volgende vrae deur n sirkel te trek om die gradering van jou keuse. Die gradering se skaal is van **0** wat **swak** aandui tot **10** wat **baie goed** aandui.

Tevredenheidsvraelys **Groep:______**

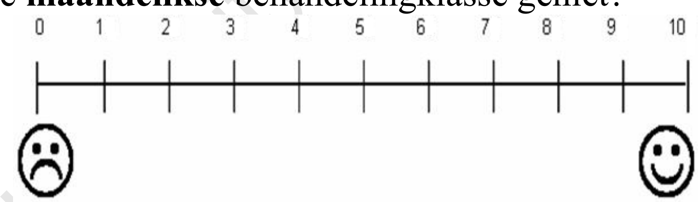
1. Was u tevrede met die behandeling wat u kind ontvang het?



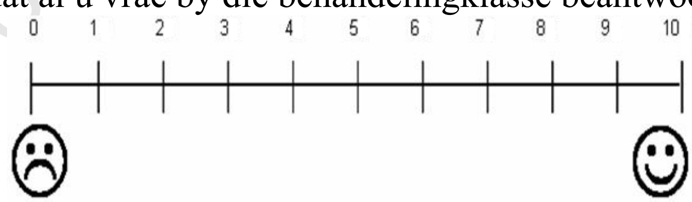
2. Na aanleiding van die ondervinding wat u opgedoen het, voel u u is in staat om die oefeninge en kennis op u kind of ander kinders tuis toe te pas?



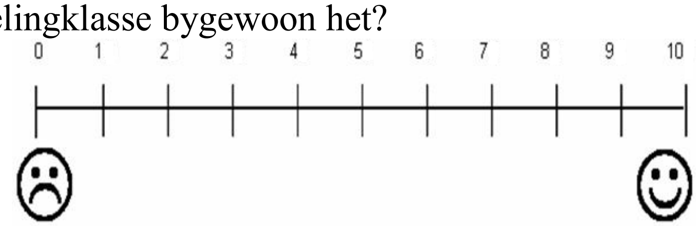
3. Het u die **maandelikse** behandelingklasse geniet?



4. Voel u dat al u vrae by die behandelingklasse beantwoord is?



5. Voel u dat u baba se funksie verbeter vandat sy/hy die behandelingklasse bygewoon het?



Appendix 2: Consent Forms

2.1.1. English Consent Forms

A COMPARISON OF TREATMENT PROTOCOLS FOR INFANTS WITH MOTOR DELAY: STANDARD VERSUS INTENSE THERAPY

Information Sheet

Principal Investigators: Odette Olivier (MSc student affiliated with the University of Cape Town)

Ethical approval for this study has been granted by the Research and Ethical Committee, Faculty of Health Sciences at the University of Cape Town (REC REF).

Introduction

South Africa faces many risk factors which can cause a delay in the development of milestones (rolling, sitting, crawling, standing, walking, etc.) in infants. At the moment the road to health chart is being used at primary health care facilities (such as the clinics) to identify children who are behind (delayed) in their milestones from where they get referred to other health professionals such as physiotherapists and occupational therapists to treat and manage their delay. These treatments usually happen once a month in a one-on-one session with a therapist. In order to supply the best treatment for a child with a delay in milestones, more research needs to be done to look atdifferent types of treatment and its affect on our unique South African society.

It is important for you to know everything about this study before you decide if your child or your baby should participate or not. If you do not want to be part of the study no health care will be witheld from you.

This is a consent form which will give you information about the study. You will need to sign this form if you want your child or your baby to participate. Feel free to ask the researcher any questions about the study if you feel uncertain about anything.

Reason for this study

This study will contribute to the completion of a Masters degree in Physiotherapy. This study will be comparing the effect of 2 different types of treatment. One will be the standard once a month treatment and the other will be a more intense form of treatment (once a week). We will be looking at the effect of the treatment on your baby's physical development (milestones) and your family's quality of life throughout the study and whether your baby keeps his/her developmental ability even after treatment has been stopped. We will also be looking at the effect of treatment in a group has on the development of your baby.

What do I have to do if my baby is in this study?

If you give permission for your baby to be **screened** to see if he/she has a delay in milestones your baby will undergo screening (quick test) done by the researcher while you are waiting in the queue at the well baby clinic. Please be assured that you will not lose your place in the queue because you have chosen to take part in the research. We will need you to answer a few questions while your baby is being screened so that we have got a clear understanding of your baby's medical and developmental background - questions such as birthweight, was the baby premature at birth or not, your level of education, any medical condition the child might have and if there was any problems at birth. We will also look at any relevant information in your medical file if consent was granted by the facility manager to do so.

If your baby happens to have a delay in milestones you can to attend St. Josephs Home in Montana for your child to be assessed to find out what developmental problems your baby is experiencing if you would like to continue taking part in the study. All babies that are found to have a delay in their milestones will be referred to a doctor with a letter from the researcher for an assessment even if you do not wish to take part in the study. It is your choice whether or not you would like to go and see a doctor about your baby's development. If you take part in the study you will also need to answer a few questions and complete a quality of life questionnaire – about family, living conditions, employment status and how you are coping. After this 1st assessment your baby will be randomly allocated to one of 2 groups (random allocation is the separation of participants into groups by pure chance – like flipping a coin). You and the researcher will know what group you are in.

How many sessions?

The number of sessions is dependant on whether your baby will be allocated into Group A or B.
Babies in Group A will need to attend St. Josephs for treatment and follow up assessments once every month for 3 months.
Babies in Group B will need to attend St. Josephs for treatment and follow up assessments once a week for 3 months.
After that all the participants will return for a final assessment 6 weeks after the last assessment.

What will happen in each session?

Treatment will take place in a group format and the treatment classes will be presented by the researcher is a physiotherapist. You will learn about development of babies, how to stimulate your baby's development. The physiotherapist will also show you exercises and games that you can do with your babay at home. At the end of each session, the therapist will ask you questions about the exrcises you are doing with your baby.

How long will each session last?

About 1 hour

How many mothers and babies will take part in the study?

About 40 to 50 babies and their mothers will take part in the study. Each group will consist of 10 mothers and their babies.

How long will my baby and I be in this study?
You and your baby will be in this study for about 5 months.

What are the risks of the study for me?
Other mothers in the treatment group will know that the infants are delayed. However, all mothers/guardians are required to sign an agreement of confidentiality before being allowed to participate in the study. The mothers may need to take time off work to attend the therapy and assessment sessions.

What are the risks of the study for my baby?
The infant may become tired during the session.

Is there Insurance Cover?
Please note that UCT does offer a no-fault insurance that will cover all participants in the event that something may go wrong. This insurance will compensate for any trial-related injury by means of payment according to the Association of the British Pharmaceutical Industry (ABPI) guidelines (1991). These guidelines recommend that UCT, without any legal commitment, should compensate you without you having to prove that UCT is at fault. An injury is considered trial-related if, and to the extent that, it is caused by study activities. You must let the study investigators know immediately in the event of any injuries to you or your baby during the trial, whether they are research-related or other related complications. UCT reserves the right not to provide compensation if, and to the extent that, you or your baby's injury came about because you chose not to follow the instructions that you were given while taking part in the study. You have the right to claim compensation for an injury in the event of neglegence on the researcher's behalf.

What are the benefits of this study for me and my baby?
If we find that your baby is behind in his/her milestones and they receive treatment it has been proven that there is a good chance that there will be progress in your baby's development. You will also gain knowledge about your baby and his/her development which you will be able to use at home.

What about confidentiality?
The information about you and your baby will be kept confidential however we cannot guarantee complete confidentiality. In the study records you and your baby's information will be recorded under a code instead of your baby's name. No information will be given out without your written consent.

Will we receive any payment?
We will give you transport money (R30 for every trip you need to take to St. Joseph's Home) and lunch every time you and your baby have to go to St. Joseph's Home.

What are our rights as participants?

You are taking part in this study voluntarily. You have the right to refuse consent. If you decide to participate you will be allowed to withdraw from the study at any time you feel the need to. We will however ask you why you would like to withdraw. Your participation in this study will not affect the services you receive at the clinic. You are allowed to ask any questions at any time during the study.

Who can I contact if I have any questions?

Miss Odette Olivier (Researcher)
BSc Physiotherapy
Cell: 082 469 5844
Email: ods.olivier@gmail.com

Gillian Ferguson (Research supervisor)
Tel: 021 406 60 45
Email: gillian.ferguson@uct.ac.za

Professor Marc Blockman
Chair: Research Ethics Committee
UCT Faculty of Health Science
Tel: 0027 (21) 406-6492

____
Odette Olivier

A COMPARISON OF TREATMENT PROTOCOLS FOR INFANTS WITH MOTOR DELAY: STANDARD VERSUS INTENSE THERAPY

By signing this consent form I **give permission for my baby to be screened** for motor delay. I understand the information sheet and what is required of my baby and me. I have been given the opportunity to ask questions and they have been answered.

____
Baby's Name (print)

________________________________	____________________	_______________
Baby's parent or legal guardian (print)	Signature	Date
________________________________	____________________	_______________
Study staff conducting consent discussion (print)	Signature	Date
________________________________	____________________	_______________
Witness (print)	Signature	Date

A COMPARISON OF TREATMENT PROTOCOLS FOR INFANTS WITH MOTOR DELAY: STANDARD VERSUS INTENSE THERAPY

By signing this consent form I **give permission for my baby take part in the study**. I understand the information sheet and what is required of my baby and me. I have been given the opportunity to ask questions and they have been answered. I hereby agree to keep any information regarding other participants in this study confidential.

____
Baby's Name (print)

________________________________	____________________	________________
Baby's parent or legal guardian (print)	Signature	Date
________________________________	____________________	________________
Study staff conducting consent discussion (print)	Signature	Date
________________________________	____________________	________________
Witness (print)	Signature	Date

2.1.2. Xhosa Consent Form

UTHELEKISO KWIMIGAQO YONYANGO LWABANTWANA ABANOLIBAZISEKO KUPHUHLISO LWENKQUBELA PHAMBILI: UNYANGO OLUQHELEKILEYO NELO LUTHE QABAVU

Iphepha leenkcukacha

Abaphandi abazintloko: Odette Olivier (MSc student affiliated with the University of Cape Town)

Ezizifundo zigunyaziselwe uluntu yi-Komiti yezophando noluntu, kwiCandelo lweeNzululwazi kweZempilo zeDyunivesiti yeKapa (REC REF 266-2010)

Intshayelelo

UMzantsi Afrika ujongene neengxaki ezininzi ezithi zibangele ulibaziseko kwinkqubela-phambili ezintsaneni umzekelo:(ukuqengqeleka, ukuhlala, ukukhasa, ukuma nokuhamba). Okwangoku indlela ekhoyo kumqulu wezempilo isetyenziswa kwiindawo zonyango ezinje (ngekliniki) ukuqwalasela abo bantwana bathe balibaziseka ekuphuhleni ukuze bathunyelwe kwiingcaphephe zonyango ezifana noogqirha bamathambo nabancedisi babo ukunyanga nokulawula ololibaziseko lwenkqubela phambili. Olunyango ludla ngokuqhubeka kanye enyangeni apho kuya ibengumtu omnye nogqirha kwi-seshoni nganye.

Ukuze umntwana lowo usilelayo ngokwasengqondweni afumane unyango olugqibeleleyo kufuneka kwenziwe uphando kwindidi zonyango ezahlukeneyo, kanye nokuchaphazeleka koluntu loMzantsi Afrika.

Kubalulekile ke kuwe ukuba wazi konke okuthethwa apha phambi kokuba uthathe isigqibo sokuba umntwana okanye usana lwakho lungayinxalenye na okanye hayi. Ukuba awufuni kuthatha inxaxheba kwezizifundo akukho nyango luyakurhoxiswa ngakuwe.

Ke le fomu yemvisiswano izakukunika iinkcukacha ngezizifundo. Kufuneka uyisayine le fomu ukuba ufuna umntwana okanye usana lwakho luthathe inxaxheba. Khululeka umbuze umphandi nawuphi na umbuzo ongezizifundo xa uziva ungoneliseki.

Isizathu sezizifundo

Ezi zifundo zizakuncedisa ekugqibezeleni esisidanga sibizwa ukuba (*Masters degree of Physiotherapy).* Ezi zifundo zizakuthelekisa okuthi kufumaneke kwintlobo ezimbini zonyango. Olokuqala unyango loluqhelekileyo oluqhutywa kanye ngenyanga, olunye loluthe xaxe kunolo, lona lukanye ngeveki. Sizakuthi ke sijonge iziphumo zolunyango kwimpilo nophuhliso lomzimba womntwana wakho kunye nezinga lobom bosapho lwakho kuyo yonke lenkqubo yezizifundo, kwangokunjalo nokuba lusagcinakele na uphuhliso lomzimba womntwana nangona sele engasalufumani unyango. Sizakuthi Sijonge iziphumo zonyango ekuphuhliseni umzimba wontwana ngokwamaqela.

Kufuneka ndenze ntoni xa umntwana wam ekwezizifundo?

Ukuba uyavuma ukuba umntwana wakho afakwe egesini ukuze kubonwe ukuba unalo na ulibaziseko ngokwasengqondweni, umntwana wakho aye egesini (uvavanyo olukhawulezayo) nto leyo isenziwa ngumphandi elixesha wena ulinde emgceni kuloo-kliniki yabantwana. Uncede ke ube kanti uqinisekisiwe ukuba awuzi kuphulukana nendawo yakho apho emgceni kuba ukhethe ukuthatha inxaxheba apho koluphando. Sizakuthi ke sifune uba uphendule imibuzo embalwa elixesha umntwana akuvavanyo khonukuze sifumane ulwazi olugqibeleleyo ngobume bempilo nophuhliso ngomntwana wakho – mibuzo leyo efana nale: *Ubunzima ngokuya wayezalwa; Uzelwe phambi kwexesha okanye hayi? Ibanga lakho ezifundweni; Olunye uhlobo umntwana anganalo ngokwasempilweni okanye wakhe wanengxaki ekuzalweni kwakhe?* Sizakuthi sifune neenkcukacha ezibalulekileyo ezikumaxwebhu angempilo yakho ngokwemigaqo yegosa elo laliqhuba loomsebenzi.

Ukuba umntwana wakho uye wafumaniseka enalo ulibaziseko kuphuhliso kwinkqubela phambili unako ke wena ukuya eSt Josephs Home phaya eMontana ukwenzela umntwana wakho akhe abhilabhilwe kutsho kuzofumaneka nengxaki leyo ibangele ukuba makasilele, phofu xa wena uthe wabe kanti uyazibandakanya nezizifundo. Bonke abantwana abathe bafumaneka benalengxaki baya kuthunyelwa kugqirha benencwadi esuka kumphandi ukuze babhilabhilwe nokuba awuzibandakanyanga ezifundweni. Uyakuzikhethela wena ke ukuba uye kugqirha okanye ungayi na ngenkqubekela-phambili yomntwana wakho.

Ukuba uyazibandakanya nezifundo singathanda uba uphendule imibuzo nje embalwa engobume ngobomi bakho- usapho lwakho; indlela ophila ngayo; uhlobo lwempangelo,kwanento yokuba umelana njani nezizinto zonke. Emveni kobhilobhilo lokuqala umntwana wakho uyakukhethwa ngokungajonganga ukuba ngubani, afakwe kwelinye kulamaqela mabini. Apho izakubanguwe nomphandi abazakuyazi ukuba ukweliphi iqela.

Zingaphi eziSeshoni ?

Inani leseshoni lixhomekeka kumntwana lowo uba ufakwe keliphi iqela kukho u-A kukho u-B.
Abantwana abaku-A kufuneka beye e-St Josephs ukufumana unyango nobhilwabhilo kanye ngenyanga kangangenyanga ezintathu.
Abantwana abaku-B, kufuneka beye e-St Josephs ukufumana unyango nokubhilabhilwa kanye ngeveki kangangenyanga ezintathu.
Emveni koko bonke abathathi- nxaxheba babuyele ubhilwabhilo lokugqibela kwiiveki ezintandathu emva kobhilwabhilo lokugqibela.

Kuza kwenzeka ntoni kwiSeshoni nganye?

Unyango luzoqhubeka ngokwamaqela, nezifundo zonyango zizawuqhutywa ngumphandi ne Physiotherapist. Nizakufundiswa indlela zokuphuhlisa nenkuthazo Emntwaneni. Ugqirha wamathambo uzakunibonisa imithambo nemidlalo onokuyenza nomntwana ekhaya. Ukuphela kweseshoni nganye ugqirha uzakubuza imibuzo emalunga nemithambo leyo uyenza nomntwana wakho.

Iseshoni inye ithatha ixesha elingakanani?
Ngange-yure enye

Bangaphi omama nabantwana abazawuthatha inxaxheba kwezizifundo?
Abantwana ukusuka kumashumi amane ukuya kumashumi amahlanu no-nina babo bazakuthatha inxaxheba kwezizifundo. Iqela ngalinye liyakuba noomama abalishumi nabantwana babo.

Siyawuthatha ixesha elingakanani sikwezizifundo mna nomntwana wam?
Kwezizifundo niyakuthatha iinyanga ezintlanu wena nomntwana wakho.

Kwezizifundo zintoni ezinokundenza ndibe madol'wanzima ngam?
Abanye oomama apha kumaqela onyango bazakuyazi ukuba iintsana zinolibaziseko lwengqondo. Kungoko ke oomama nabagcini-bantwana kufuneka betyikitye izivumelwano eziyimfihlo phambi kokuba bavunyelwe ukuthatha inxaxheba kwezizifundo. Oomama kungade kufuneke becele amakhefu emisebenzini uze babekhona kolubhilwabhilo nothomalaliso.

Kwezizifundo zintoni ezenza ndibemadol'wanzima ngomntwana wam?
Usana olo lunganakho ukudinwa kwiseshoni.

Ikhona na ingxowa ebekelwe okubi okunokwehla?
Qaphela, i-UCT inayo indlowa ebekelwe abathathi-nxaxheba xa izinto zihambe kakubi. Le ndlowa iyakuhlawula nakuyiphi na ingozi edibaniselene novavanyo ngokwesikhokelo seliqumrhu"British Pharmaceutical Industry (ABPI ; 1991) Esi sikhokelo sithanda ukuba i-UCT iyenze imbuyekezo inganyanzelwanga ngumthetho okanye kuphandwe ubutyala bayo. Ingozi ithathwa njemgeyovavanyo xa yenzeke apha ezifundweni. Mazise kwangoko umphandi-zifundo xa ulimele okanye umntwana wakho apho kuvavanyo, kuphando, okanye okunxulumene noko. I-UCT inelungelo lokungakubuyekezi kwingozi ethe yehla ngokutyeshela imiyalelo oyinikwe phaya ezifundweni. Unalo ilungelo lokufuna imbuyekezo ngengozi eyenzeke ngentswela-nkathalo kubaphandi abo.

Kwezizifundo zintoni ezinokubayinzuzo kum nakumntwana wam?
Ukuba ngaba sifumanise uba umntwana wakho unosilelo lwengqondo kwaye befumana unyango, kwafumaniseka ukuba aliqela amathuba empumelelo kuphuhliso lomntwana. Uzawuthi ufumane nolwazi ngomntwana nenkqubekela phambili yakhe ,lwazi olo uyakuba nako ukulisebenzisa ekhaya.

Kuthekani ngokuyimfihlo?
Iinkcukacha ngawe nomntwana wakho ziyakugcinwa ziyimfihlo nangona singenakukunika isiqinisekiso ngokupheleleyo. Kumaxwebhu ezifundo ezi iinkcukacha zakho nomntwana wakho ziphawulwe nge-khowudi hayi igama lomntwana wakho. Akukho nkcukacha ziyakukhutshwa ngaphandle kwemvumelwano yakho ebhaliweyo.

Ikhona intlawulo esizakuyifumana?

Sizakukunika imali yokukhwela (R30.00 kuhambo ngalunye ekufuneka uye e-St Josephs Home) kunye nesidlo sasemini wonke amaxesha wena nomntwana kufuneka niye e-St Josephs Home.

Ngawaphi amalungelo ethu, njengabathathi-nxaxheba?

Uthatha inxaxheba kolufundo ngokuzithandela. Unalo ilungelo lokungavumi. Ukuba ugqibe uba mawungenele uvumelekile ezifundweni naninina ubone kuyimfuneko. Kwananjalo sizakukubuza imbangi yokuba ukhethe ukurhoxa. Intatho-nxaxheba yakho kwezizifundo ayizichaphazeli iinkonzo ozinikwa ekliniki..Uvumelekile ukubuza nayiphi na imibuzo nangaliphi na ixesha ezifundweni.

Ndingahlangana nabani xa ndinemibuzo?

Miss Odette Olivier (Umphandi)
BSc Physiotherapy
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Email: ods.olivier@gmail.com

Gillian Ferguson (Ophethe Umphandi)
Tel : 021 406 6045
Email: Gillian.ferguson@uct.ac.za

Professor Marc Blockman
Chair: Research Ethics Committee
UCT Faculty of Health Science
Tel: 0027 (021) 406

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Odette Olivier

UTHELEKISO KWIMIGAQO YONYANGO LWABANTWANA ABANOLIBAZISEKO KUPHUHLISO LWENKQUBELA PHAMBILI: UNYANGO OLUQHELEKILEYO NELO LUTHE QABAVU

Ngokusayina elixwebhu lwemvumelwano **ndiyavuma ukuba umntwana wam ayekuhlolwa egesini** ngolulibaziseko kwinkqubela phambili. Ndivile kwiphepha lenkcukacha nokufunekayo ngomntwana wam kunye nam. Ndilinikiwe nethuba lokubuza imibuzo nayo yaphendulwa.

Igama lomntwana

Umzali womntwana/Umgcini wakhe

Abalawuli zingxoxo zemvumelwano

Ingqina

UTHELEKISO KWIMIGAQO YONYANGO LWABANTWANA ABANOLIBAZISEKO KUPHUHLISO LWENKQUBELA PHAMBILI: UNYANGO OLUQHELEKILEYO NELO LUTHE QABAVU

Ngokutyikitya elixwebhu lwemvumelwano **ndiyavuma ukuba umntwana wam athathe inxaxheba kwezizifundo.** Ndivile kwiphepha lenkcukacha nokufunekayo ngomntwana wam kunye nam. Ndilinikiwe nethuba lokubuza imibuzo nayo yaphendulwa. Ndiyavuma ukugcina iinkcukacha ziyimfihlo ngokuphathelele nakwabanye abathathi nxaxheba kwezizifundo.

Igama lomntwana

Umzali womntwana/Umgcini wakhe

Abalawuli zingxoxo zemvumelwano

Ingqina

2.1.3. Afrikaans Consent Form

‘N VERGELYKING VAN BEHANDELINGSPROTOKOLLE VIR BABAS MET MOTORVERTRAGING: STANDAARD TEENOOR INTENSIEWE TERAPIE

Inligting

Hoof Navorser: Odette Olivier (MSc student: Universiteit Kaapstad)

Etiese goedkeuring vir hierdie studie is verleen deur die *Research and Ethical Committee, Faculty of Health Sciences* by Universiteit Kaapstad (REC REF 2656 2010).

Inleiding

Suid Afrika het baie faktore wat as risiko’s beskou word vir die ontwikkeling van babas en kan bydra tot die vertraging van hul ontwikkelingsmylpale (rol, sit, kruip, staan, loop ens.). Op die oomblik word die “*Road to Health Chart*” grootliks gebruik om babas wat agter is in hul mylpale te identifiseer in gesondheidsfasiliteite (byvoorbeeld klinieke) van waar sulke babas dan verwys word na ander gesondheidspersoneel, soos arbeidsterapeute en fisioterapeute, wat hulle dan verder verys of behandel. Sulke behandelingssessies vind gewoonlik een keer ‘n maand plaas in ‘n intieme sessie met die terapeut. Meer navorsing wat verskillende soorte behandeling ondersoek in ‘n unieke Suid Afrikaanse konteks is nodig om die beste behandeling te bied vir ‘n baba wat lei aan ‘n vertraging van mylpale.

Dit is belangrik dat u alles van die bogenoemde studie verstaan voordat u besluit of u wil of nie wil toelaat dat u kind aan die studie moet deelneem nie. Wees versker dat geen gesondheidsdienste van u sal weerhou word indien u nie aan die studie wil deelneem nie.

Hierdie is ‘n toestemmingsvorm wat inligting inhou oor die studie. U moet dit onderteken indien u besluit dat u kind aan die studie mag deelneem. Vrae word verwelkom indien daar enige onsekerheid oor die studie is. Die narvorsers sal dit so duidelik as moontlik beantwoord.

Rede vir die studie

Hierdie studie vorm deel van die vereistes om ‘n Meestersgraad in Fisioterapie te voltooi. Die studie vergelyk die effek wat twee verskillende tipes behandeling (terapie) het op die uitkoms van babas wat agter is in die ontwikkeling van hul bewegingsmylpale. Een van die behandelings bestaan uit maandelikse terapie. Die ander, ‘n weeklikse, meer intens vorm van terapie. Ons wil ook die effek wat die verskillende soorte behandeling op die familie se lewenskwaliteit het, ondersoek, en of die baba sy/haar ontwikkelingsstandaard behou nadat die terapie gestaak is. Ons gaan ook kyk na die uitkoms van die baba se ontwikkeling wanneer die terapie aangebied word in 'n groep in plaas van indiwiduele sessies.

Wat moet ek doen indien ek besluit my baba moet in die studie wees?

As u toestemming gee vir u baba om 'n siftingstoets (*screening test*) te ondergaan om te sien of hy/sy al die bewegingsmylpale vir sy ouderdom bereik het sal u baba 'n vinnige toets, uitgevoer deur die navorser, ondergaan terwyl u in die ry wag vir u baba se afspraak. Wees asseblief verseker dat u nie u plek in die ry sal verloor as gevolg van u deelname aan die studie nie. Ons benodig u samewerking deur 'n paar vrae te beantwoord terwyl u baba die siftingstoets ondergaan sodat ons goeie begrip het oor u baba se mediese geskiedenis en ontwikkeling tot dusver. Vrae soos: geboorte gewig, prematuriteit, of u 'n skool of universiteitsgraad het, enige mediese toestand wat u baba mag hê en of daar probleme was gedurende die geboorte. Ons sal ook inligting uit die baba se mediese lêer gebruik wat in konteks is met ons studie, met die toestemming van die bestuurder van die fasiliteit.

Hoeveel sessies?

U baba se groepsplasing (Groep A of B) sal die hoeveelheid sessies bepaal.
Groep A: 1 keer 'n maand vir 3 maande by St. Joseph's vir terapie en 'n opvolg ondersoek.
Groep B: 1 keer 'n week vir 3 maande by St. Joseph's vir terapie en 'n opvolg ondersoek.
Al die deelnemers moet 6 weke na die finale behandelingssessie terugkom vir 1 finale assessering.

Wat gebeur by elke sessie?

Die terapie sal aan die groep ouers/voogde en hul babas gelyktydig aangebied word deur die navorser. U sal meer leer oor die ontwikkeling van u baba en hoe om ontwikkeling te stimuleer. Die fisioterapeut (navorser) sal ook vir u 'n paar oefeninge en speletjies wys waarmee u u baba kan stimuleer by die huis. Aan die einde van elke sessie sal die navorser u 'n paar vrae vra oor die oefeninge of aktiwiteite wat u gebruik om u baba te stimuleer by die huis.

Hoe lank is elke sessie:

Ongeveer 1 uur.

Hoeveel ouers/voogde en babas sal in die studie deelneem?

Tussen 40 en 50 babas saam met hul ouers/voogde. Die grootte van elke behandelingsgroep is sowat 10 babas.

Hoe lank sal ek en my baba deelmeem aan die studie:

5 maande.

Watter risiko's is daar vir my as ek deelneem aan die studie?

Alle deelnemers (ouers en voogde) moet ‘n ooreenkoms van vertroue teken voordat hulle deel van die studie mag wees.
Die ander ouers/voogde sal weet dat daar ‘n vertraging in u baba se ontwikkeling is.
Die ooreenkoms van vertroue bind hul aan ‘n belofte om alle inligting gekoppel aan die studie vertroulik te hou.
Die baba se ouer/voog mag dalk tyd by die werk moet afstaan om die sessies by te woon.

Watter risiko’s is daar vir my baba?

U baba mag dalk moeg raak gedurende die sessies.

Is daar versekeringsdekking?

Neem waar dat die Universiteit van Kaapstad (UK) bied ‘n geen fout versekering wat alle deelmemers in die studie dek indien iets verkeerd gaan. Hierdie versekering dek enige studie verwante besering deur betaling soos gestipuleer deur die “*Association of the British Pharmaceutical Industry (ABP) (1991)*”. Hierdie riglyne stel voor dat UK, sonder wettige verpligtinge, u moet vergoed sonder dat hulle hoef te bewys dat UK verkeerd is. ‘n Besering is beskou as studie verwant wanneer dit aangedoen is tydens die studieaktiwiteite. U moet die navorsers onmiddellik in kennis stel indien u of u baba enige beserings opdoen gedurende die studie, al is die beserigs nie a.g.v. die studie nie. UK het die reg om deelnemersvergoeding te weier as die besering opgedoen is omdat die deelnemer (ouer/voog) geweier het om instruksies te volg gedurende die studie. U het die reg om vergoeding te eis in die geval van ‘n besering a.g.v. die navorser se nalatigheid.

Watter voordele is daar vir my en my baba as ons deelneem aan die studie?

As ons sien daar is ‘n vertraging in die ontwikkeling van u baba om sy/haar mylpale te bereik en hy/sy ontvang terapie, is daar ‘n goeie kans dat daar vooruitgang sal wees in die baba se ontwikkeling soos bewys in vorige studies.
U as ouer of voog, sal ook die kans kry om kennis op te doen oor die ontwikkeling en stimulasie van u baba, wat u by die huis kan toepas.

Wat van vertroulikheid?:

Informasie oor u of u baba sal vertroulik gehou word, alhoewel ons nie totale konfidensialiteit kan waarborg nie. Die gebruik van kodes sal toegepas word wanneer studiemateriaal (rekords) ingevul word i.p.v. u baba se naam. Geen informasie sal uitgegee word sonder u goedkeuring nie.

Sal ek enige betaling ontvang?

‘n Bedrag van R30 sal aan u gegee word vir vervoerkostes van u huis af na St. Joseph’s.
‘n Ligte middagete sal verskaf word vir elke sessie by St. Joseph’s. Middagete sal bestaan uit tee en toebroodjies vir ouer/voog.
Ouer/voog moet u baba se kos self voorsien.

Wat is my regte as 'n deelnemer in hierdie studie?

Deelname aan hierdie studie is vrywillig. Indien u besluit om deel te neem, het u die reg om enige tyd te onttrek sou u so voel. Ons sal egter vir u vra hoekom u wil onttrek. U deelname aan hierdie studie sal geen dienste wat u ontvang by die kliniek ontvang by die kliniek affekteer nie. U het die reg om enige vrae te vra gedurende die studie.

Kontak besonderhede as ek vrae het?

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Odette Olivier

‘N VERGELYKING VAN BEHANDELINGSPROTOKOLLE VIR BABAS MET MOTORVERTRAGING: STANDAARD TEENOOR INTENSIEWE TERAPIE

Deur hierdie vorm te teken, gee ek toestemming dat my baba die **siftingstoets** vir die identifisering van ontwikkelingsvertraging in beweging kan ondergaan. Ek verstaan alles op die inligtingsvorm en wat van my en my baba verwag word. Ek is die geleentheid gegee om vrae te vra en al my vrae is beantwoord.

____

Baba se Naam (Drukskrif)

_______________________________ _________________________________

Baba se ouer/wettige voog (drukskrif) Handtekening en datum

_______________________________ _________________________________

Studiepersoneel wat toestemming-
Proses behartig (drukskrif) Handtekening en datum

_______________________________ _________________________________

Getuie (drukskrif) Handtekening en datum

'N VERGELYKING VAN BEHANDELINGSPROTOKOLLE VIR BABAS MET MOTORVERTRAGING: STANDAARD TEENOOR INTENSIEWE TERAPIE

Deur hierdie vorm te teken, gee ek toestemming dat my baba **mag deelneem aan die studie.** Ek verstaan alles op die inligtingsvorm en wat van my en my baba verwag word. Ek is die geleentheid gegee om vrae te vra en al my vrae is beantwoord.

____
Baba se Naam (drukskrif)

______________________________	________________________	_________
Baba se ouer/wettige voog (drukskrif)	Handtekening	Datum
______________________________	________________________	_________
Studie personeel wat toestemming-proses behartig (drukskrif)	Handtekening	Datum
______________________________	________________________	_________
Getuie (drukskrif)	Handtekening	Datum

Appendix 3: Additional Information and Results

3.1. Sample Size Calculation Figures

	Value
Population Mean Mu1	84.0000
Population Mean Mu2	94.0000
Population S.D. (Sigma)	7.7000
Standardised Effect (Es)	-1.2987
Type I Error Rate (Alpha)	0.0500
Critical Value of t	2.0739
Power Goal	0.8300
Actual Power for Required N	0.8598
Required N (per group)	12.0000

3.2. Comparing variables of dyads who arrived baseline assessment (n=41) vs. those who did not arrive or withdrew (n=23)

Variable	Consent (n=41)	withdraws + DNA's (n=23)	statistic	P
Infant mean age (months)	5.71 (SD=2.49)	6.1 (SD=2.58)	U = 409 Z = .87	.39
Care-giver mean age (years)	31.02 (SD=9.78) Range: 18-60	27.33(SD=11.36) Range: 17-67	U = 300 Z = 1.93	.05
Mean Birth weight (grams)	2968.17 (SD=778.23)	3049.09 (SD=636.3)	U = 396 Z = .79	.43
Mean weeks prematurity	0.81 (SD=2.12)	0.74 (SD=2.2)	U = 452 Z = .27	.79
Mean years of education	10.42 (SD=2.25)	9.65 (SD=2.82)	U = 397.5 Z = 1.28	.21
Employment	unemployed: 31 employed:10	unemployed:19 employed:4	Chi-squared = .42	.52
Gender	Male:22 Female:19	Male:10 Female:13	Chi-squared = .61	.44
Income	<R2000:34 R2000-	<R2000:19 R2000-	Chi-squared = .63	.73

	R5000:6 >R5000:1	R5000:4 >R5000:0		
Area of residence	Area1 :5 Area 2 :25 Area 3 :11	Area 1 :8 Area 2 :8 Area 3 :7	Chi-squared = 5.73	.057
Type of residence	flat:6 brick house:24 informal:11	flat:7 brick house:12 informal:4	Chi-squared = 2.48	.29

3.3. Distribution of group A PDI scores

	Assessment 1	**Assessment 2**	**Assessment 3**	**Assessment 4**	**Assessment 5**
W-statistic	0.81	0.74	0.95	0.96	0.92
p-value	.01	.002	**.69**	**.79**	**.35**

3.4. Distribution of group B PDI Scores

	Assessment 1	**Assessment 2**	**Assessment 3**	**Assessment 4**	**Assessment 5**
W-statistic	0.89	0.84	0.94	0.93	0.95
p-value	**.13**	**0.3**	**.47**	**.44**	**.59**

3.5. Exploring Other Screening tools

3.5.1. *The Denver Developmental Screen Test II*

The Denver Developmental Screen Test II (Frankenburg, 1990) can be applied to infants and children ranging from 1 month to 6 years of age. It consists of items scored according to direct observation and some items by means of parental report (Ringwalt, 2008; Hamilton, 2006). This screening tool also investigates a wide range of developmental domains which form part of a child's normal overall development such as gross motor, fine motor, adaptive fine motor, social-personal and language skills. It is the most popular screening tool amongst paediatricians (Sand et al., 2010). The test takes 10 to 20 minutes to administer and has high level of sensitivity; however the Denver II has shown limited specificity (43%) with many false positive identifications and a high over-referral rate (Drotar et al., 2008; Glascoe et al., 1992). In another study by Glascoe (2001) results confirmed the poor specificity when 42% of those who received a developmental delay diagnosis from the Denver II were in fact false positives. However, these participants continued to perform significantly lower in other screening tests than the participants with true negative results (p = .001).The Denver II has also been found to have a limited positive predictive value ranging between 23%-42% (Glascoe et al., 1992). The availability of recent research examining both the inter- and intra-rater reliability of the Denver II is limited. These are important characteristics of a screening tool. Therefore this tool may not be appropriate for use because it has poor specificity and the reliability is unknown.

3.5.2. *The Ages and Stages Questionnaire (ASQ) second edition*

The Ages and Stages Questionnaire (ASQ) second edition (Bricker and Squires, 1999) is quick to administer and also investigates a wide range of developmental domains. This screening tool is intended for infants aged 4-48 months. This test requires the parent/guardian to complete a questionnaire which may not be suitable for participants who are unable to read (Drotar et al., 2008). When used on 167 ex-premature infants who attended a Growth and Development Clinic in Australia, the ASQ has been shown to have good sensitivity (90%), reasonable specificity (77%), a limited positive predictive value (40%) and an outstanding negative predictive value (98%) (Skellern et al., 2001). The over-referral and under-referral rates were 20% and 1% respectively. When regarding areas in South Africa, where Xhosa and Afrikaans are home languages, it is possible that the use Ages and Stages Questionnaire may be problematic. The tool has only been translated into French, Spanish and Korean (Drotar et al., 2008). This, together with the lower levels of parental education may contribute to misinterpretation of the questionnaires, as the Ages and Stages Questionnaire has not yet been standardised in South Africa (Miller and Sonti, 2006).

3.6. Exploring Other Assessment Tools

3.6.1. *The Gross Motor Function Measure*

A good example of a frequently used criterion-referenced assessment tool is the Gross Motor Function Measure (GMFM; Palisano et al., 1997), typically used as a measuring tool for children with Cerebral Palsy (CP). However, the GMFM has been used before by Kolobe et al. (1998) to compare its response as an outcome measure with the Peabody Developmental Gross Motor Scale (PDMS-GM) for infants with CP and infants with motor delay. The results suggested that the tools were comparable. The GMFM-66, which is a shortened and tested version of the GMFM-88 (the original GMFM) also used to assess the motor development of Down's syndrome (Russel et al., 1998). The GMFM-66 has good inter- and intra-reliability and construct validity. Its hierarchical structure and interval scaling provides better understanding of motor development than the GMFM-88 and is less time consuming (Russel et al., 2000). However the use of the GMFM is more suitable for the criteria for which it was developed, being Cerebral Palsy.

3.6.2. *The Peabody Developmental Motor Scale II*

The Peabody Developmental Motor Scale II (PDMS-2; Folio and Fewell, 2000) is a standardised norm-referenced tool used to assess the motor skills of children from birth to the age of 5 years. The PDMS-2 was formulated after considering reviews and criticism from researchers directed at the original Peabody Developmental Motor Scale II (Folio and Fewell, 2000). The internal validity was tested and ranged between 0.90-0.96. Furthermore, the test-retest-reliability coefficient amounted to >0.90 (Folio and Fewell, 2000). In a review of 15 methods of assessing neuromotor function, Heineman and Hadders-Algra found the construct, concurrent and the predictive validity of the PDMS-2 to be of moderate standard and the inter-observer reliability to be good to very good (Folio and Fewell, 2000; Palisano, 1986; Heineman and Hadders-Algra, 2008).

The PDMS-2 was used in the Congo to compare the motor development of HIV infected children with non-HIV infected children (Van Rie et al., 2008). The researchers chose not to culturally adjust the motor assessment tools for it to be comparable to past and future studies. Furthermore, the motor performance results of the non-HIV infected children were similar to those of the American reference sample for the PDMS-2 indicating possible construct validity for use in other African countries with similar socio-economic circumstances. The PDMS-2 was also recently used to assess the motor performance of low birth weight infants in a hospital in Cape Town. Researchers were satisfied with the reliability and validity values of the tool and reported no limitation regarding the application process (Burger et al., 2011).

3.6.3. *The Alberta Infant Motor Scale*

The Alberta Infant Motor Scale (AIMS) was developed in 1994 by Martha Piper and Johanna Darrah. Although the AIMS can be used to identify motor delay, it can also be used to evaluate progress of and infant’s development over time. Therefore it is a better assessment tool because it consists of 58 items because it can be more time consuming than other screening tools (Piper and Darrah, 1994). The AIMS is used to evaluate motor development of infants between the ages of birth and 18 months and takes up to 20 minutes to complete (Beligere et al., 2007; Drotar et al., 2008). It has shown good intra-rater reliability (> .95) and inter-rater reliability (> .95) when tested on premature infants in Taiwan. Correlation between the 6 month AIMS and BSID-II scores (r = .78) were not as high compared to the 12 month AIMS and BSID-II results (r = .90) (Jeng et al., 2000). Furthermore, a study conducted in 2008 found correlations between the AIMS and BSID-II to also vary between good to excellent (r = 0.95, r = 0.74 and r = 0.89), depending on the ages of the infants (Almeida et al., 2008). In a recent study in Cape Town, the motor performance of low birth weight infants using the AIMS was in co-ordinance with the results obtained by a PDMS-2 conducted within the same week (Burger et al., 2011). This information provides confidence to the user that data collected while using the AIMS is likely to be reliable and valid.

Appendix 4: Intervention Programme

4.1. Group A

4.1.1. Session 1

Treatment Session 1 – Group A

Education

What are the normal milestones? (Gross motor and fine motor)

- No more head lag - 2 months
- Puppy Prone - 3 months
- Rolling - 4 to 6 months
- Sitting - 6 months
- Crawling - 9 months
- Walking - 12 months

What is motor delay?

- Motor delay is when there is a lag in the child's movement milestones (motor = movement). The child has not yet acquired the milestones or skills at the age that children usually do.

What causes motor delay?

- Diseases
- Injuries (before or after birth)
- Social environment – found that there is a connection between poor development and poverty, factors related to the home environment, decreased stimulation at home and maternal depression. Infants living in poor communities where the household income is very low are more prone to illness and lack of stimulation as parents can not afford to provide adequate nutrition and care.
- Link between the education of the parent and motor development of a child.
- The expetations of parents can also affect the motor development of infants. Low levels of expectation can lead to poor motor development because parents do not create a stimulating environment suitable to challenge their infant's motor abilities.
- Unexplained developmental delay.

What can happen if we don't address motor delay?

- Short and long term consequences.
- Children who had better motor performance scores at age 4 had better age-8 academic scores.
- Children who were born preterm made use of the school services more often compared to the group who were born at full term.
- Early intervention (treatment) of infants with motor delay to help them close the gap between them and normal developing infants.
- Some children can outgrow their motor delay but they usually don't outgrow all the delayed domains of their delay.

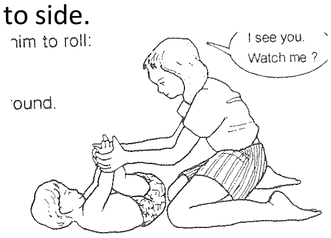
- Challenge your baby – In the treatment sessions we are trying to get babies to do certain movements. The babies will not perform these movements unless they have a reason to move or need to perform a task. That is why we use the toys and speak to them in a certain tone of voice to encourage them to move. You need to challenge your child in these sessions and at home so that the baby can keep on progressing. For example, if you're swinging a toy around in the air and want your baby to reach it, start off by hanging it in a place where he/she can reach it easily and then keep moving it further away every time your baby grabs it. Research has shown that if parents have low levels of expectation for their child's performance then the child is more at risk for developmental delay.
- Mother-child interaction.
  This is a very important part of a baby's development. If the mother is reluctant to interact with her child or never makes eye contact with the child or doesn't play and stimulate the child, it can affect the baby's development. It is also important how you communicate with your child and the tone of voice you use can be either rewarding or disapproving of a task. Some mothers have to work so they don't have much time to spend with their baby. Try to make a concerted effort every day to spend some time with your baby and play and chat to them.
- If your baby has a floppy head, make sure the head is always supported when holding or lifting your baby. (Demonstrate)
- When carrying your baby, avoid carrying your baby on your back as much as you can. This might be convenient for you but it causes the abdominals to not develop properly and there is also very little visual stimulation (things the baby can look at) because of the limited visual field. Here is an example of a better way to carry your baby.


- Allow your baby to play with different objects (choke-safe if not supervised) of different textures, colours, shapes and noises if as much as possible. This helps with the fine motor development.
- When picking up your baby, roll baby slightly to the side before picking him/her up. (Demonstrate)

Practical Session

<table>
<tr><th>< 7 Months</th><th>>7 Months</th></tr>
<tr><td>

- Pull to sit by protracting shoulders. Then pull to sit by the child's hands. If you can do this with the baby holding onto your 2 index fingers then it is brilliant!
- Drop the legs while baby is lying on its back (supine).
- Suspend in prone and side lying.
- Facilitate rolling- raise baby's bottom off the ground, curl baby into ball, roll from side to side.



Then facilitate by using leg and opposite arm as key point (holding point).

Then only use one leg. But remember to change sides.

- Tummy time – Lie baby on his/her tummy across your legs while sitting on chair. Use toy – let baby reach for toy. Hold toy in different positions low, if baby can reach it let them grab it.

</td><td>

- Start by facilitating rolling – towards toy using only a leg as key point (holding point).

- Baby sits on mom's leg. Get side bending movement by putting toy on floor next to mom's leg and let baby reach and pick it up.
- Mom now rolls leg from side to side to get lateral tilting of the pelvis.
- Put toy on floor in positions where baby has to twist his/her body to reach for it.
- Facilitate crawling by placing a toy in different positions around the baby while the baby is sitting on the ground. Get baby to stretch in a manner where they have to twist and lean on the hand on the same side of the toy.

Then place it further away to get baby to lean on his/her one hand to be able to reach it. Then place toy out of reach and facilitate the movement into 4 point kneeling.

- Crawling while being suspended by blanket.

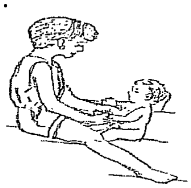
</td></tr>
</table>

- Lie baby on his/her tummy on the floor, if baby can't rest on arms prop him/her up on their forearms or roll up blanket so that they are slightly raised from their trunk to their legs.

Progress this exercise by lifting the toy higher.

- Sit on the floor with the child sitting between your legs for support with the baby facing away from the mother. Hold the toy in front of the child so that the child can reach for it. Distance of the reach must be easy.

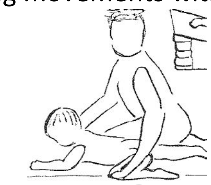
- Now sit on the floor with the baby sitting between your legs and facing towards you.



Talk to your baby and let baby take the toy. You may need to hold your baby up a little if he/she is unstable. Do so by placing your hand behind baby's shoulder/back.

#End#

If baby can't then put baby in crawling position over your leg and facilitate crawling movements with legs.



- Lying to sitting – good for abdominals. Baby lying on back, pull baby's right arm across the body so baby rolls onto side, pull baby's right arm upwards so he/she leans on left arm as baby sits up. Repeat on other side. Do it slowly and make your baby work with you. Tell your baby what to do. Help baby to go down the same way.

- If baby can crawl, put he/she in 2 point kneeling supported by mom from behind, with a chair in front of baby so that baby can reach for toy.

#Continue#

	• Sitting to standing from sitting on mom's lap (with mom in kneeling) in order to get a toy on the ground in front of baby. Mother must support chest and buttocks. (Dads can help with this exercise by dangling toy). 1.  2. 

Home Advice

Exercises must be done as often as possible, preferably 5 times a week.

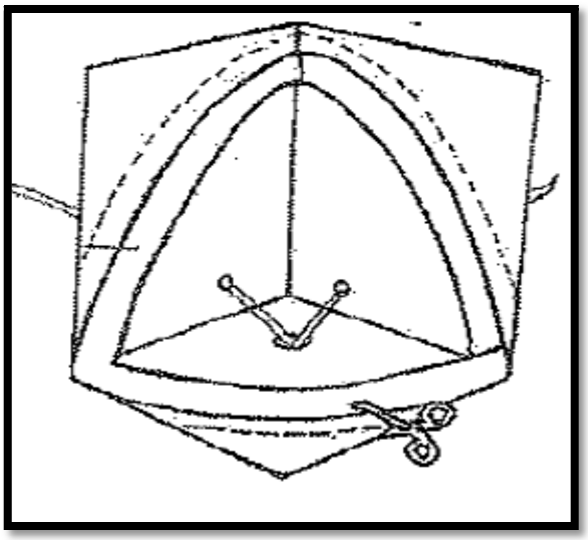
< 7 Months	>7 Months
- Lying on back and playing. Dangling toys (can make your own) Make toys bright colours. Help baby to bring his/her hands to touch objects. Make sounds to baby – wait for baby to respond. Copy the sounds that your baby makes.  - Lying on your lap and playing. Encourage baby to play with his/her hands in the middle and to look at them. Bring baby's hands to your face and hair. Get baby to watch your face and objects in different position (by turning his/her head from side to side.  	- Baby sitting on your lap with very little support – dangle a colourful toy within reach around eye level and upwards so that baby reaches for it (middle and both right and left sides)  - Tummy time!!!!! With toys scattered around baby in the baby's view. 

Both < and > 7 months

- Lie with baby on your chest and let the baby play with your face.

- Tie bows or bells to your baby's toes and bring your baby's feet closer to his/her face so that baby can play with it.

- How to make a cardboard seating box.



If your child struggles to sit unassisted you can make a seat for him to support him while he/she is sitting. Sitting helps to activate the trunk (back and stomach) muscles.

- For older babies, correct them if they do not hold a cup or a bottle by the ear if it has hone. This helps to develop fine motor skills.

4.1.2. Session 2

Treatment Session 2 – Group A (monthly)

Education

Theories of Movement Development

There are different opinions about how and why babies develop.

- There are biological factors – it is programmed into us to develop different movements. So as our baby grows, so does his/her brain grow and become more developed. The brain is where the messages for movement are sent from.
- There are social and environmental factors – the environments babies live in and the people babies are exposed to most often affect the development of a baby. Therefore parents need to create a suitable environment for your baby to develop in. It must be stimulating, challenging and safe.
- Skills develop as a baby tries to perform tasks; such as rolling to move from one position to another in order to reach a toy.
- The more a baby performs a movement the more skilled he/she becomes in doing that movement and then later the baby can use that movement in a different situation.
- Babies also learn by means of 'trial and error'. Meaning, the baby may fall over when he/she first starts to sit, but the baby soon learns that he/she must use the trunk and body muscles so that he/she doesn't fall over.

- The trunk of a person is the chest, stomach and back. As discussed in last month's sessions the trunk muscles (especially the stomach muscles) are very important for rolling, sitting, crawling and walking and should therefore develop properly. The trunk muscles play a very important role in maintaining the balance of a baby when the body is kept upright. Without good balance your baby will keep on falling over when he/she tries to sit up or stand up.
- Do not let your child W-sit (demonstrate). This position stretches muscles and ligaments in the baby's hips and decreases the stability in the hips. It can therefore hinder the walking pattern.

- Do not allow your child to use a walking ring. This walking pattern is not the same as the one your baby needs to learn on his/her own. Rather let your baby explore an area using his/her own methods of movement – this is much better for the developmental process.

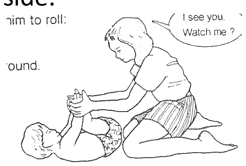
Balance

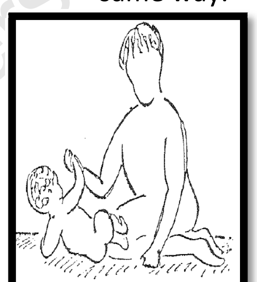
- There are different sets of reactions which need to combine to create good balance.

1. Orientation of the head in relation to space and the body. Orientation of the body in relation to space. This orientation requires good head control – something a baby starts developing early on in life.
2. Protective reactions – when a person puts their hand out to stop from falling or arranges their body in such a way that they cushion a fall. This usually develops after the head control.
3. Equilibrium reactions – when you arrange your body in such a way to try and keep your centre of gravity within your base of support as much as possible.

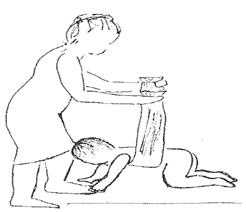
- Centre of gravity (explain)
- Base of support (explain)

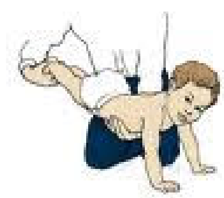
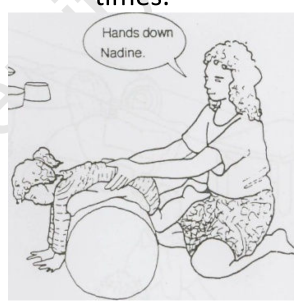
Practical

	< 7 months		
Facilitate Rolling • Lift his/her bottom off the ground, curl him/her into a ball, roll from side to side.  Now only hold onto one leg and opposite arm as to roll baby over.  Only bend one leg and hold other one straight to roll baby over. 	Sitting balance • Let your baby sit on your knees facing you.  Hold baby's body loosely so that he/she can adapt to holding that position.	Sitting balance • Baby sitting on floor between your legs facing away from you. Let baby play with toy and turn around to look at toy. Hold lightly around baby's hips.  Now let baby sit between your legs while he/she is facing you. Make sounds and chat to baby. Let baby hold or reach for toy. 	Lying on tummy • Roll up a blanket and put it under baby's arm pits. In this position get baby to play with a toy in front of him/her. 

		Younger than 7 months		
Facilitate Rolling from tummy to back: • Bend baby's left leg under his/her chest. Straighten the right arm forward under baby's body so that baby cannot hurt it when he/she rolls over. Roll baby over onto side then onto back by rolling left leg backwards. Repeat this on both sides. 	Pull to sitting • With baby lying on his/her back, get the baby to hold your thumbs and then pull baby into sitting. Do it slowly so that baby can assist you doing the above action. If the head flops back then rather pull baby up by his/her shoulder. 	Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit. Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. 	Sitting • Get your baby to lean on his/her hands for support (if he/she can't do it in sitting then do it in lying on tummy). You can also get your baby to sit on one side and get baby to lean on the arm on the same side. You might need to hold the baby's arm there. 

	Older 7 months and younger than 10 months			
Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit.Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Baby sits on your lap facing away from you. Slowly lift one knee to lean your baby gently to one side. Then slowly lift the other knee so that your child learns to keep their balance in sitting. You may have to hold lightly around your baby's waist. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. Get your baby to reach and grab objects in front and to the sides. 	Baby from sitting to 4 point kneeling – protective reaction. • Get your baby to sit on your knees while you are kneeling flat on the ground. Tilt your baby's upper body forward so that baby has to stop him/herself from falling flat on his/her face by putting out their hands. In this position, move baby's body from side to side (slowly) to shift weight between hands. 

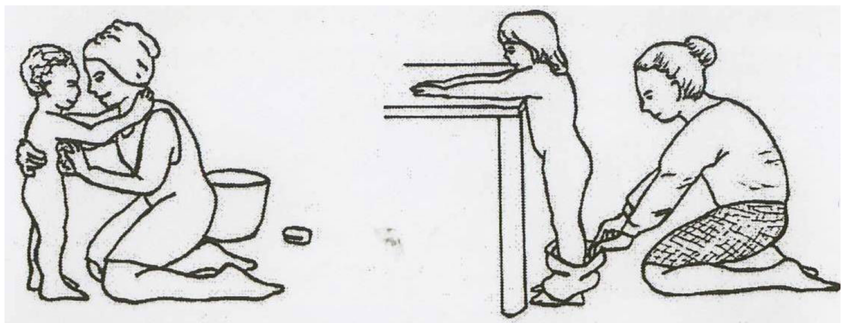
	Older 7 months and younger than 10 months			
Baby crawls • Place a scarf/towel/folded blanket uner the baby's chest. Baby's hands must be under his shoulders and knees under his/her hips. Hold the ends of the towel up so that baby's chest doesn't drop. Have a toy in front of baby so he/she tries to move towards it. 	Crawling position • Put baby in crawling position over one of your legs. Rock your baby's buttocks slowly from one side to the other so that your baby has to shift his/her weight from one leg to another. Get your baby to reach and grab toys in this position.	Facilitate sitting to crawling • Facilitate sitting to crawling by placing the toy in different positions around baby so that baby has to turn and stretch outside base of support to fetch it.  Then place it further away to get baby to lean on his/her one hand to be able to reach it. Then place toy out of reach and facilitate the movement into 4 point kneeling. 	Kneeling • Have baby kneeling at a low table or chair; hold baby at the hips. Move baby slowly from side to side to get the baby to shift weight on his/her legs.  Baby can play with spoons on the low surface.	Standing with help. • Stand your baby on the floor in front of you, you should be kneeling. Hold baby under his/her armpits across baby's chest. As the baby gets better in holding his/her balance, hold the baby lower down towards the waist. 

	10 months and older			
Sitting • Sit baby on little bench – baby should preferably not be able to touch the ground with his/her feet. Get baby to reach for toy and sit while playing with toy in baby's hand. Stay close to baby in case he/she loses balance. 	Wheelbarrow • Get baby into crawling position. Lift baby's legs a little at the same time and slowly. Keep one hand under baby's tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy. 	Using protective movements • Put baby on tummy on the gym ball. Hold onto baby's feet/legs and roll ball forward slowly. Watch baby put their hands down on the floor to support his/her body. Then roll ball back up. Repeat a few times. 	Kneeling to standing • Using a wall as assistance get your baby into kneeling on one knee with his/her other foot infront and the baby facing wall. Put one of your hands on baby's front knee and the other hand around baby's waist. Help baby up with slight guidance. 	Standing exercise • Stand baby up next into a long surface below baby's shoulder height such as a low table or a couch. Put down on surface out of baby's reach so that baby would have to walk sideways, while supporting him/herself with the couch, in order to reach it. You might have to keep your hands around your baby's waist to support baby if he/she is unstable. Motivate baby to move to toy. 

	10 months and older			
Standing exercise • Stand baby up next into a long surface below baby's shoulder height such as a low table or a couch. Put down on surface out of baby's reach so that baby would have to walk sideways, while supporting him/herself with the. Now put toy on another chair close by so that baby will have to bridge a small gap between the furnature (10cm) to get to toy. 	Crawling with weight shift • Get baby to crawl around. Hold a toy at the baby's eye level and get baby to reach for it. Baby will have to take weight on only one hand to reach with the other hand. If baby struggles to do it put your hand under baby's chest for a little support so that he/she can reach for it. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. Get your baby to reach and grab objects in front and to the sides in the air.  • Now put objects on the floor besides the baby and get baby to pick it up while sitting on roller. 	Sitting balance • Sit baby on gym ball. By holding on to the baby's thighs move rock the ball slowly forwards and backwards so that the baby has to change his/her trunk position to stay on the ball. • Now rock the ball from side to side so that the baby will have to twist or tilt their trunk to stay upright  • You can also make slight bouncing movements with baby while sitting on ball.	Standing and bending • While baby is standing while holding onto furniture, put a toy of interest on the floor so that baby bends down to pick it up while you are close by to assist if needed. 

Home Advice

- Perform at least 2 of the prescribed exercises every day for 15min. Keep repeating them, repetition is a good way of mastering a skill.
- When dressing or washing your baby, do so in a functional position such as sitting or if possible standing while the baby holds onto something. This is illustrated in the pictures below.



- If you've considered buying a walking ring for your baby, rather buy a pushcart (picture below) or something similar which your child can use to move around. Please supervise your child when he/she first starts walking with a push cart.

For small babies (under 6 months)

- Play with your baby's hands and feet in midline (in the middle of his/her body or face).
- Take the baby's hands and put them on the sides of your face. Put both hands at your mouth and blow in them.
- Clap your baby's hands for him/her.

All babies

Never leave your baby unattended when he/she is eating finger food.

For babies older than 6 months

- Let your baby play with tupperware so that he/she can open and close the lids.
- Let your baby put objects in a box.
- Get your baby to pull a toy on a string towards him/her.
- Play peek-a-boo.

4.1.3. Session 3

Treatment Session 3 – Group A (Monthly)

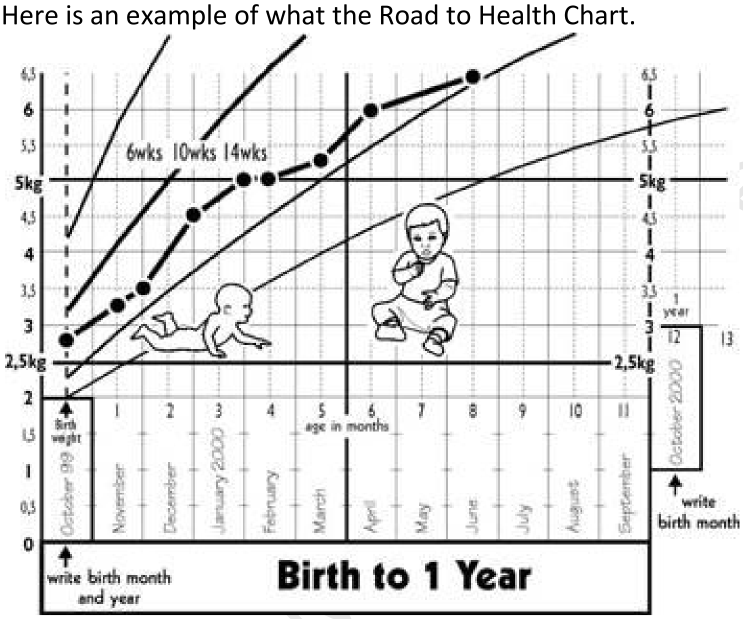
Education

Studies have shown that infants who are overweight or severely underweight run the risk of being motor delayed.

How do I know if my baby is overweight or underweight?

The Road to Health Chart issued to you when your baby is born logs your baby's growth and whether the growth is within normal ranges or not. If you haven't been told, you are more than welcome to ask the nursing staff at your local clinic (where your baby gets weighed and immunized) if your child is within the normal weight limits.

Here is an example of what the Road to Health Chart.



Home Advice

What can I do if my child is overweight/underweight?

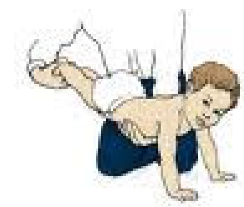
It is best to consult the dietician at your closest clinic site on methods do normalize your baby's weight.

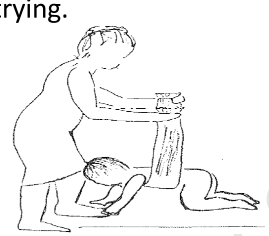
Overweight

Breast milk is enough for a baby younger than 6 months unless you have problems breastfeeding. **No juices of fizzy drinks! No chips or sweets,** just because you like it, doesn't mean your child will**.** Decrease the fruit intake and rather give vegetables. Feed smaller amounts more often.

Underweight

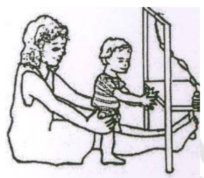
Add more sugar and butter to your baby's porridge in the morning. Still try to stay away from fruit juices – they can cause your baby to have a runny tummy.

Younger than 7 Months				
Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit. Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. 	Sitting and reaching • Baby sitting on floor between your legs facing away from you. Let baby play with toy and turn around to look at toy. Hold lightly around baby's hips if he/she requires a little bit of support.  Let baby reach for toys in front of him/her and to the baby's sides.	Stands with help • Let baby stand against you and hold baby under the arms around the chest and waist. As baby's balance improves position your hands lower towards the waist so that you're giving less support. You can also let your baby stand on your lap facing you – and bounce baby up and down in this position. 	Wheelbarrow • Get baby kneeling on his/her hands and feet. Slowly lift baby's legs a little at the same time. Keep one hand under baby's tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy. 

<table>
<tr><th colspan="4">Older than 7 months and younger than 10 months</th></tr>
<tr>
<td>High sitting
Sit baby on stool or chair – baby must not be able to touch the ground with his/her feet. Stay close by. Softly throw a ball or soft toy onto your baby's lap and wait for your baby to respond. Allow your baby to throw the toy back if he/she is able to. Otherwise just take the toy and throw it onto the baby's lap again.
</td>
<td>Crawling
If your baby struggles to crawl – give him/her support by suspending a towel/blanket around their middle while they try to crawl. Allow your baby to move forward if you see that they are trying.

If your baby crawls with ease – hold a toy of interest out to the side and above the baby's head so that the baby must shift weight and reach up with 1 hand to get it.
</td>
<td>Sitting to standing
Repeat this exercise for as long as the baby allows you to. Let your baby sit on your lap while you are kneeling flat on the floor. Help baby to stand up by holding around baby's hips and gently pushing his/her weight forward over the baby's feet. Say 'up' or 'let's stand up' when you perform this exercise.
</td>
<td>Kneeling to standing
Your baby must be in half-kneeling (one knee on ground and the other foot in front of him on the ground). Keep baby in this position by pressing down on the front knee. Get your baby to play with toys in front of him/her in this position.

Now progress this exercise by getting your baby in this position up against a wall for the baby to lean onto and assist baby to stand up by holding around baby's waist.
</td>
</tr>
</table>

<table>
<tr><th colspan="4">Older than 10 months</th></tr>
<tr>
<td>Crawling to standing
• Use a colourful ribbon tied to a bell, or make a bow in the end of the ribbon and stick it up on the wall using little stickers or some press-stick so that your baby needs to be in a standing position to reach it. Attract your baby’s attention to the ribbon. Let the baby crawl towards the wall, go from crawling to standing and grasp the ribbon. If your baby needs assistance to stand then hold lightly around his waist and guide the movement.

(ribbon and stickers)</td>
<td>Standing exercise
• Support your child in standing with your leg between baby’s legs. Hold around baby’s waist and hold the hips straight. Without support for the baby to lean on, get your baby to reach to the front and to the sides towards an object. You may need someone to assist you to dangle a toy out for the child to reach to.

• If baby manages nicely, let baby walk while you are holding onto both of the baby’s hands above his/her head. You are allowed to stand in front or behind baby.
</td>
<td>Standing alone
• Let your baby stand and support baby by holding around his/her waist. Very slowly loosen your grip and take your hands away from your baby’s body a little bit to allow your baby to stand unassisted for as long as they can balance. Urge your baby to take one or 2 steps forward towards you.
</td>
<td>Walks one hand held
• Holding onto one hand of your baby, walk towards an object or toy. Speak to your baby and tell him/her what you want to go and fetch such as ‘let's go fetch the ball’.
</td>
</tr>
</table>

Part 2

Education

Research has shown that babies who sleep on their backs spend less time on their tummies when they are awake. It is however important for a baby to have tummy-time for the development of fine and gross motor movements and therefore, if your baby prefers to sleep on his/her back you need to make a concerted effort to position your baby on his/her tummy when they are awake.

Put them on their tummies so that they can play in that position or even let them play in a supported standing position if they are able to.

Home Advice

Activities your baby can do in prone

(If your baby is unable to lift his head and trunk up off the floor please put a rolled up towel under his/her chest)

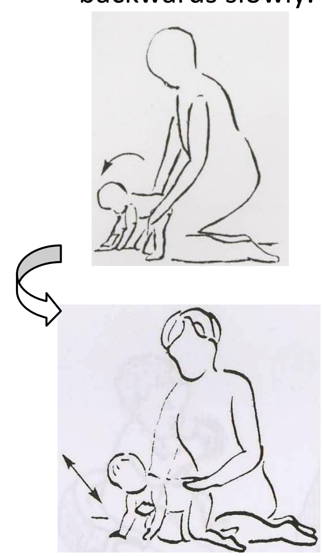
- Let baby play with toys that make a sound.
- Hang a toy in front of your baby that they can reach or hit and let it swing.

Activities your baby can do in sitting

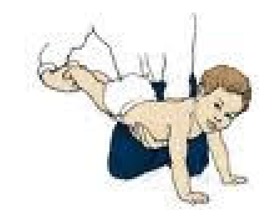
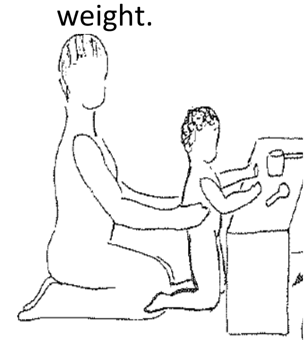
- Knock baby over gently and say "boom!"
- Roll a ball to your baby and urge baby to roll it back to you.
- If your baby copies you, you need to show delight and praise him/her.

Activities a baby can do in standing

- Push a little car – you need to make the sound: "Brrrrrrr"
- Give your baby a damp cloth and let them wipe the table.
- Give your baby a few spoons – the spoons make a sound when you tap them together and picking them up is good for fine motor control.
- Let your baby throw things off the table and bend to pick them up (supervised – stay close to your baby).

Younger than 7 Months			
Rolling • Bend one leg and hold the opposite leg straight to roll baby over towards toy and onto his/her tummy. Repeat both ways.  • Then bend baby's left leg under his/her chest. Straighten the right arm forward under baby's body so that baby cannot hurt it when he/she rolls over. Roll baby over onto side then onto back by rolling left leg backwards. 	Sitting balance • Baby sits on your lap facing away from you. Slowly lift one knee to lean your baby gently to one side. Then slowly lift the other knee so that your child learns to keep their balance in sitting. You may have to hold lightly around your baby's waist. 	Tripod sitting • Get your baby to sit and lean on his or her outstretched arms. Slowly release your hands to offer less and less support to the baby. If your baby is able to maintain this position well, show your baby a toy so that he/she follows it by looking from side to side. Finally hand baby the toy.   	Baby on Tummy • Baby sitting on mom's lap while she's kneeling on floor. Tilt baby forward so that baby puts arms out in front on the floor. From here position baby in 4 point kneeling position and hold hand under baby's tummy for support. Rock baby forwards and backwards slowly. 

<table>
<tr><th colspan="4">Older than 7 Months and Younger than 10 Months</th></tr>
<tr>
<td>Sitting and picking up Ball
Let baby sit on floor in front of you. Roll a ball towards your baby and urge baby to pick it up. Say: “pick up the ball.”

Then urge baby to roll/throw it back to you by saying: “Ta Ball” or “Roll me the ball”.
Roll the ball to baby in a different position every time. In front/Right side/ left side/ even slightly behind baby.</td>
<td>Wheelbarrow
Get baby into crawling position. Lift baby’s legs a little at the same time and slowly. Keep one hand under baby’s tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy.
</td>
<td>Kneeling
Get baby into kneeling position in front of a step/stool or little chair. Put toys on the stool for him/her to play with in this kneeling position. Once your baby can stay in this position unsupported you can even move his buttocks slowly move his buttocks from side to side so that the baby get’s used to shifting weight.
</td>
<td>Standing supported and Shifting weight
Let your baby stand while you are supporting them by holding around his/her waist. Softly and slowly shift their pelvis/buttocks towards the right and see how they respond to shifting their weight. Then slowly shift their weight to the other side and give them time to adjust their bodies to the new weight shift.
</td>
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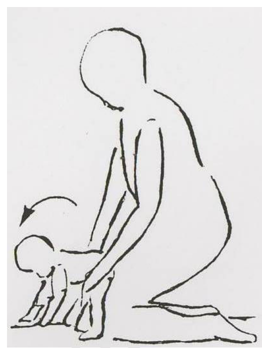
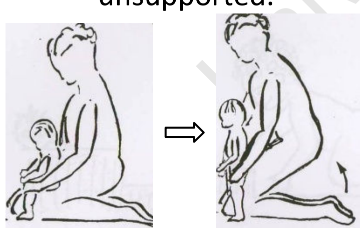
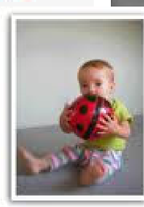
Older than 7 months younger than 10 months		
Crawling • If your baby is unable to crawl put a rolled up towel up or soft (melon size) ball under your baby's chest and stomach so that your baby is forced to take weight through the hands and knees. Rock baby backwards and forwards in this position. Place toys around baby which interest baby and see how baby has to shift weight to free a hand.  • If your baby is able to crawl, hold a toy of interest slightly above and to the side of baby's head so that baby needs to shift weight and stretch free arm to reach it. 	Baby from sitting to 4 point kneeling – protective reaction. • Get your baby sitting on your knees while you are kneeling flat on the ground. Tilt your baby's upper body forward so that baby has to stop him/herself from falling flat on his/her face by putting out their hands. In this position, move baby's body from side to side (slowly) to shift weight between hands. 	High sit and reach for toy • Baby sit on high chair or table (stay close to baby). Hold a toy to the side of the baby and let baby stretch to reach it. Continue to hold and place toys in different positions to grab toy. Every now and then hold the opposite arm in such a way that the baby is unable to lean on it and has to rely on his strong core to balance.  

Older than 10 Months				
Standing and bending • While baby is standing while holding onto furniture, put a toy of interest on the floor so that baby bends down to pick it up while you are close by to assist if needed. 	Moves from sitting to standing • Let baby sit on your lap while you are kneeling flat on the floor. Urge the baby to go from sitting to standing by saying: “Stand up”. Your baby may initially need you to guide the movement by letting them hold onto your hands. But later on you need to offer very little or if possible, no support for this movement and let them stand unsupported. 	High sit and reach or catch ball/toy • Baby sit on high chair or table (stay close to baby at all times). Let baby reach to the sides and up for a toy. **OR** if your baby can - throw a toy or ball towards baby (onto baby’s lap) so that baby can pick it up. Say to baby while clapping your hands and holding them open: “throw the toy back to me”.   	Standing exercise • Stand baby up next into a long surface below baby’s shoulder height such as a low table or a couch. Put down on surface out of baby’s reach so that baby would have to walk sideways, while supporting him/herself with the. Now put toy on another chair close by so that baby will have to bridge a small gap between the furniture (10cm) to get to toy. 	Walking and holding onto one hand. • Walk next to baby holding on to only one of baby’s hands – you may have to bend down slightly to accommodate baby’s balance. Allow baby to walk towards object or toy.  • If your baby manages nicely with this exercise hold onto his/her hand while walking up and down 1 or 2 steps. 

Part 3

Education

General Health and Safety tips

- After pregnancy the mother's abdominal muscles are usually not as strong as they were before, therefore care needs to be taken when picking up your baby especially in the 1st year of life when they are very dependent on being carried around. Make sure you brace your stomach muscles when you lift up your child and keep your back straight. Use your legs to straighten out instead of your back.
  (DEMONSTRATE).
  Do not carry your baby on the same side of your body all the time; swop sides so that both sides of the body are required to support your position and you don't only exhaust the one side of your body.
- If your baby is prone to frequent chest infections and any of the people who live in the same house as this baby are smokers, try to be considerate and smoke outside. If you do smoke outside, wear a different jacket or jersey which you can remove once you go back inside the house. Do not smoke near the baby. Frequent illness limits your baby's interaction and stimulation and can therefore have an effect on the baby's development.

Finally

A delay in functional milestones, such as rolling, sitting, crawling and walking may indicate a hindrance in postural control which may indicate poor balance performance later in life. This just once again highlights the importance of attending to the special needs of your baby by doing the exercises. You as parents or guardians have already taken the 1st step in addressing your baby's needs by just attending these sessions. **WELL DONE!!!**

Home Advice

If your baby drools a lot – do not wipe his/her mouth, rather pat it with a cloth.

Younger than 7 months

- Have a mirror where baby can roll towards and look into – babies usually enjoy this. Remember to turn your baby around after a while so that he/she can roll in the other direction.
- Let your baby play with a toy while lying on his/her side.

Older than 7 months and younger than 10 months

- Let your baby crawl on different surfaces. Wood or tiled floors are usually easier than sand and grass.
- When baby is playing at a surface where they are standing or kneeling, show them pictures of objects or family that they are familiar with.

Older than 10 months

- Look through books with pictures – point to the pictures and tell your baby what you see.
- When dressing your child tell your baby what body parts you are handling for example say: "Look, I'm putting your foot through this hole. I am pulling this shirt over your head."

When playing with your baby, half hide a toy under a cloth and ask your baby: "Where is it?" or "Find it!" And remember to show delight when they do find the toy.

4.2. Group B

4.2.1. Session 1

Treatment Session 1 - Group B
Education

What are the normal milestones? (Gross motor and fine motor)

- No more head lag - 2 months
- Puppy Prone - 3 months
- Rolling - 4 to 6 months
- Sitting - 6 months
- Crawling - 9 months
- Walking - 12 months

What is motor delay?

- Motor delay is when there is a lag in the child's movement milestones (motor = movement). The child has not yet acquired the milestones or skills at the age that children usually do.

What causes motor delay?

- Diseases
- Injuries (before or after birth)
- Social environment – found that there is a connection between poor development and poverty, factors related to the home environment, decreased stimulation at home and maternal depression. Infants living in poor communities where the household income is very low are more prone to illness and lack of stimulation as parents can not afford to provide adequate nutrition and care.
- Link between the education of the parent and motor development of a child.
- The expetations of parents can also affect the motor development of infants. Low levels of expectation can lead to poor motor development because parents do not create a stimulating environment suitable to challenge their infant's motor abilities.
- Unexplained developmental delay.

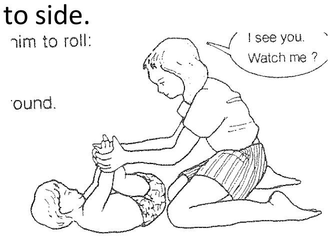
What can happen if we don't address motor delay?

- Short and long term consequences.
- Children who had better motor performance scores at age 4 had better age-8 academic scores.
- Children who were born preterm made use of the school services more often compared to the group who were born at full term.
- Early intervention (treatment) of infants with motor delay to help them close the gap between them and normal developing infants.
- Some children can outgrow their motor delay but they usually don't outgrow all the delayed domains of their delay.

Practical Session

<table>
<tr><th>< 7 Months</th><th>>7 Months</th></tr>
<tr><td>

- Pull to sit by protracting shoulders. Then pull to sit by the child's hands. If you can do this with the baby holding onto your 2 index fingers then it is brilliant!
- Drop the legs while baby is lying on its back (supine).
- Suspend in prone and side lying.
- Facilitate rolling- raise baby's bottom off the ground, curl baby into ball , roll from side to side.



Then facilitate by using leg and opposite arm as key point (holding point).

Then only use one leg. But remember to change sides.

</td><td>

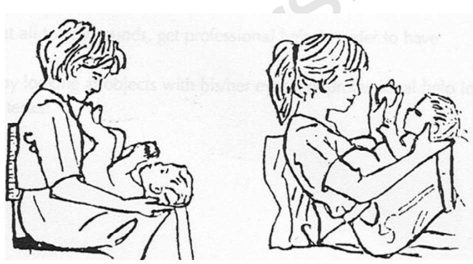
- Start by facilitating rolling – towards toy using only a leg as key point (holding point).

- Baby sits on mom's leg. Get side bending movement by putting toy on floor next to mom's leg and let baby reach and pick it up.
- Mom now rolls leg from side to side to get lateral tilting of the pelvis.
- Put toy on floor in positions where baby has to twist his/her body to reach for it.
- Facilitate crawling by placing a toy in different positions around the baby while the baby is sitting on the ground. Get baby to stretch in a manner where they have to twist and lean on the hand on the same side of the toy.

</td></tr>
</table>

Home Advice

Exercises must be done as often as possible. Preferably 5 times a week.

< 7 Months	>7 Months
- Lying on back and playing. Dangling toys (can make your own) Make toys bright colours. Help baby to bring his/her hands to touch objects. Make sounds to baby – wait for baby to respond. Copy the sounds that your baby makes.  - Lying on your lap and playing. Encourage baby to play with his/her hands in the middle and to look at them. Bring baby's hands to your face and hair. Get baby to watch your face and objects in different position (by turning his/her head from side to side. 	- Baby sitting on your lap with very little support – dangle a colourful toy within reach around eye level and upwards so that baby reaches for it (middle and both right and left sides)  - Tummy time!!!!! With toys scattered around baby in the baby's view. 

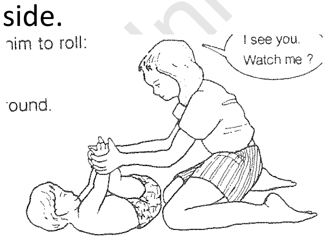
4.2.2. Session 2

Treatment Session 2 – Group B

Education

- Challenge your baby – In the treatment sessions we are trying to get babies to do certain movements. The babies will not perform these movements unless they have a reason to move or need to perform a task. That is why we use the toys and speak to them in a certain tone of voice to encourage them to move. You need to challenge your child in these sessions and at home so that the baby can keep on progressing. For example, if you're swinging a toy around in the air and want your baby to reach it, start off by hanging it in a place where he/she can reach it easily and then keep moving it further away every time your baby grabs it. Research has shown that if parents have low levels of expectation for their child's performance then the child is more at risk for developmental delay.
- Mother-child interaction.
  This is a very important part of a baby's development. If the mother is reluctant to interact with her child or never makes eye contact with the child or doesn't play and stimulate the child, it can affect the baby's development. It is also important how you communicate with your child and the tone of voice you use can be either rewarding or disapproving of a task. Some mothers have to work so they don't have much time to spend with their baby. Try to make a concerted effort every day to spend some time with your baby and play and chat to them.

Practical session

< 7 months	>7 months
• Facilitate Rolling – raise his/her bottom off the ground, curl him/her into a ball, roll from side to side.  Then facilitate using leg and opposite arm as key points (a point you hold on to so that you can start the movement).	• Facilitate sitting to crawling by placing the toy in different positions around baby so that baby has to turn and stretch outside base of support to fetch it.  Then place it further away to get baby to lean on his/her one hand to be able to reach it. Then place toy out of reach and facilitate the movement into 4 point kneeling.

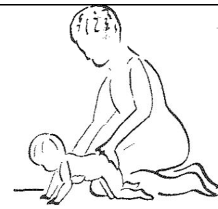
Then only use leg.

- Tummy time – Lie baby on his/her tummy across your legs while sitting on chair. Use toy – let baby reach for toy. Hold toy in different positions low, if baby can reach it let them grab it.

- If baby can't rest on arms prop him/her up on their forearms or roll up blanket so that they are slightly raised from their trunk to their legs.

Progress this exercise by lifting the toy higher.

- Facilitate rolling.



- Crawling while being suspended by blanket.

If baby can't then put baby in crawling position over your leg and facilitate crawling movements with legs.

Home Advice

Both < and > 7 months

- Lie with baby on your chest and let the baby play with your face.

- Tie bows or bells to your baby's toes and bring your baby's feet closer to his/her face so that baby can play with it.

4.2.3. Session 3

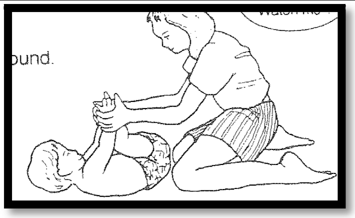
Treatment Session 3 – Group B (weekly)

Education

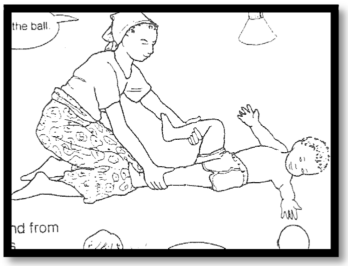
- If your baby has a floppy head, make sure the head is always supported when holding or lifting your baby. (Demonstrate)
- When carrying your baby, avoid carrying your baby on your back as much as you can. This might be convenient for you but it causes the abdominals to not develop properly and there is also very little visual stimulation (things the baby can look at) because of the limited visual field.
  Here is an example of a better way to carry your baby.
   
- Allow your baby to play with different objects (choke-safe if not supervised) of different textures, colours, shapes and noises if as much as possible. This helps with the fine motor development.
- When picking up your baby, roll baby slightly to the side before picking him/her up. (Demonstrate)

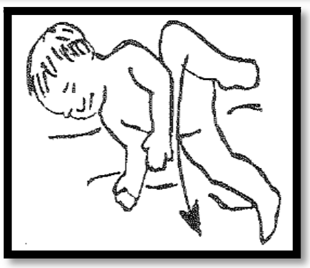
Practical Session

< 7 Months	>7 Months
• Start by lying baby flat on back and holding the baby's legs in the air and dropping his/her legs. Catch legs before they fall on the floor until baby controls the drop enough to not let them touch the floor. • Facilitating rolling - 1st by holding both hands and feet and lifting the baby's bum off the floor.	• Facilitate rolling by holding on to a leg of your baby.  • Lying to sitting – good for abdominals. Baby lying on back, pull baby's right arm across the body so baby rolls onto side, pull baby's right arm upwards so he/she



- Then hold onto 1 of the legs for a key point and facilitate rolling to the opposite side.



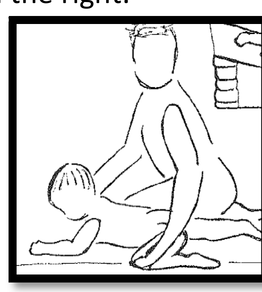


- Sit on the floor with the child sitting between your legs for support with the baby facing away from the mother. Hold the toy in front of the child so that the child can reach for it. Distance of the reach must be easy.

leans on left arm as baby sits up. Repeat on other side. Do it slowly and make your baby work with you. Tell your baby what to do. Help baby to go down the same way.

- If baby can crawl, put he/she in 2 point kneeling supported by mom from behind, with a chair in front of baby so that baby can reach for toy.

- If baby unable to crawl, put baby on his/her tummy, bend left leg, put your hand under left foot and push slightly to stimulate the baby to bush against your hand. Repeat this on the right.

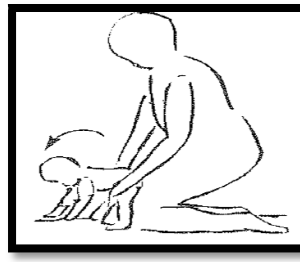


- Sitting to standing from sitting on mom's lap (with mom in kneeling) in order to get a toy on the ground

- Now sit on the floor with the baby sitting between your legs and facing towards you.

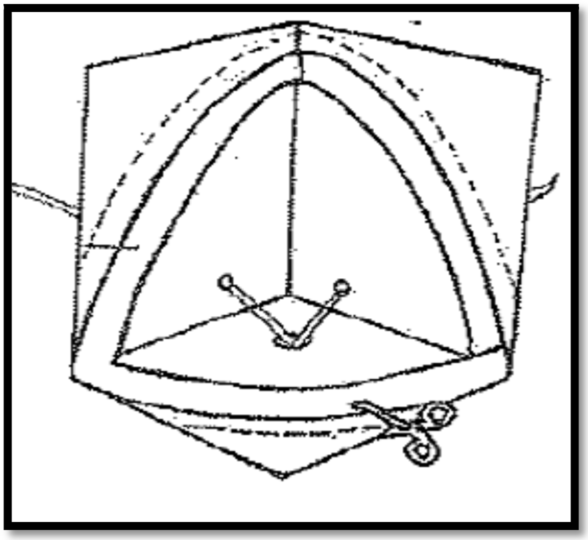
Talk to your baby and let baby take the toy. You may need to hold your baby up a little if he/she is unstable. Do so by placing your hand behind baby's shoulder/back.

in front of baby. Mother must support chest and buttocks. (Dads can help with this exercise by dangling toy).



Home Advice

- How to make a cardboard seating box.



If your child struggles to sit unassisted you can make a seat for him to support him while he/she is sitting. Sitting helps to activate the trunk (back and stomach) muscles.

- For older babies, correct them if they do not hold a cup or a bottle by the ear if it has hone. This helps to develop fine motor skills.

4.2.4. Session 4

Treatment session 4 – Group B (weekly)

This week's session will be a revision session of what we covered in the last month.

Education

<u>Motor Delay</u>

- Normal milestones
- What is motor delay and what is the cause of it?
- Why do we treat motor delay?

<u>Challenge your baby</u>

- Use toys to motivate the baby to perform a task.
- The desired movement must first be easy so that you can progressively make it more difficult.

<u>Mother-child interaction</u>

- Eye contact
- Make the sounds your baby makes.
- Tone of voice
- Make time to play with your baby.

<u>Head Support</u>

- If your baby has a floppy head, always support the head.
- When picking up child from a lying position, roll baby slightly onto side before lifting baby up.

<u>Carrying</u>

- Avoid carrying baby on back as much as possible, rather on side or front.

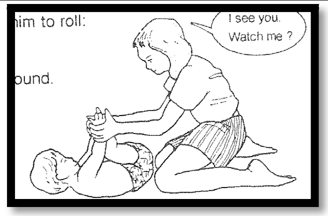
<u>Tactile stimulation</u>

- Baby must play with objects of different colours, sizes, shapes and textures (choke-safe objects if not under supervision).

Practical session

Please demonstrate any of the exercises you have been doing with your baby at home and you feel he/she performs well.
Here are some of the exercises we have done in the last few weeks.

Younger than 7 months
• Pull baby from lying to sitting by holding onto baby's shoulders and rolling them forward (protracting) while lifting baby up. • Drop baby's legs while baby's lying on his/her back and catch legs just before they land on the floor. • Hold (suspend) baby in air so that they are facing down to the floor. Also hold (suspend) baby on their side in the air. • Facilitate rolling   ➢ Hold baby's hands and feet together in the middle, lift baby's bottom off the ground and roll baby from side to side.



➢ Hold onto left arm and right lower leg, bend the leg up and over to the left while you straighten and lift up left arm so that baby can reach to toy. Repeat to right hand side.

➢ Roll baby by only using right leg and roll baby to left side. Grip onto the left leg to keep it straight while baby rolls. And same to right side.

- Lie baby on his/her tummy across your lap. Get baby to look at/reach for toy in this position.

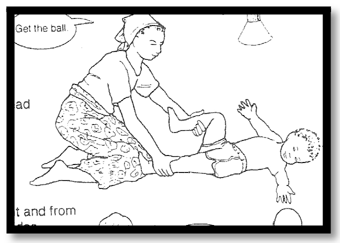
- Lie baby on his/her tummy on the floor with toys in front of baby. If baby can not rest up on forearms or hands, roll up a blanket and put it under their body and legs so that they are slightly raised. Stimulate with toys for reaching.

- Mother sits on floor with baby sitting facing away between her legs. Dangle toy in front of baby.

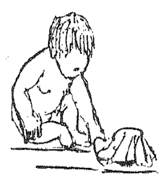
In same position turn baby around so that baby faces mother, might have to support baby a little by holding your hand behind the baby's back. Play with toys.

7 months and older

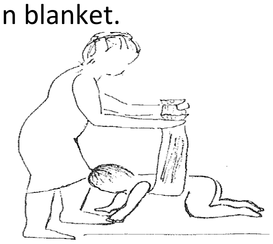
- Facilitate rolling towards a toy by taking hold of baby's right lower leg, bending the leg up and over to the left. Stabilize the left leg by holding it down and straight with your other hand. The same applies for rolling to the right except that you use the left leg to bend up and over to the right.



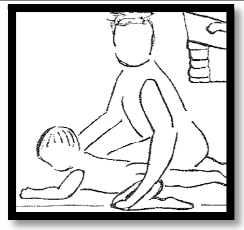
- Baby sits on floor, place toy in front of baby so that baby can reach for it. Then place toy on the side so that baby can reach for it with his/her opposite hand by twisting his/her body. The baby may need to lean on his/her arm that is not being used to reach for the toy. Keep progresing the exercise by placing the toy further and further away from baby if he/she can reach it.



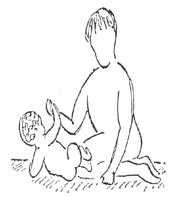
- Crawling while being suspended in blanket.



If baby struggles to propel himself/herself forward in the above position then lie baby on his/her tummy, bend left leg up as shown in the picture below and place your hand under the left foot so that baby pushes against it. Then do the same on the right.



- Pull your baby from lying (on baby's back) to sitting. Pull left arm across baby's body to the right so that they roll a little, then pull baby up into sitting. Do the same on the other side. The baby must help you.



Lower baby slowly back into lying.

- If baby can crawl, put paby in 2 point kneeling (standing on knees only) supported by mom from behind. You can have a chair or little stool in front of baby so that baby can support himself with it.

- From sitting on mom's lap to standing – see picture below.

- Baby saddle-sit on mom's leg (baby's legs on either side of mom's leg). Place toys in different places in front and to the sides of the baby. Move your leg a little bit to make the base unstable to practice the baby's balance.

Home Advice

Perform at least 2 of these exercises for 15 minutes a day for the next week. Try a new exercise every day.

4.2.5. Session 5

Treatment Session 5 – Group B (weekly)

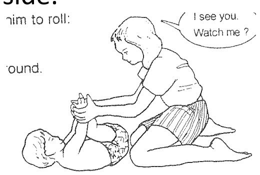
Education

Theories of Movement Development

There are different opinions about how and why babies develop.

- There are biological factors – it is programmed into us to develop different movements. So as our baby grows, so does his/her brain grow and become more developed. The brain is where the messages for movement are sent from.
- There are social and environmental factors – the environments babies live in and the people babies are exposed to most often affect the development of a baby. Therefore parents need to create a suitable environment for your baby to develop in. It must be stimulating, challenging and safe.
- Skills develop as a baby tries to perform tasks; such as rolling to move from one position to another in order to reach a toy.
- The more a baby performs a movement the more skilled he/she becomes in doing that movement and then later the baby can use that movement in a different situation.
- Babies also learn by means of 'trial and error'. Meaning, the baby may fall over when he/she first starts to sit, but the baby soon learns that he/she must use the trunk and body muscles so that he/she doesn't fall over.

Practical

<table>
<tr><th></th><th colspan="2">< 7 months</th><th></th></tr>
<tr>
<td>Facilitate Rolling
• Lift his/her bottom off the ground, curl him/her into a ball, roll from side to side.


Now only hold onto one leg and opposite arm as to roll baby over.

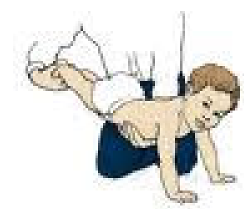
Only bend one leg and hold other one straight to roll baby over.

</td>
<td>Sitting balance
• Let your baby sit on your knees facing you.

Hold baby’s body loosely so that he/she can adapt to holding that position.</td>
<td>Sitting balance
• Baby sitting on floor between your legs facing away from you. Let baby play with toy and turn around to look at toy. Hold lightly around baby’s hips.

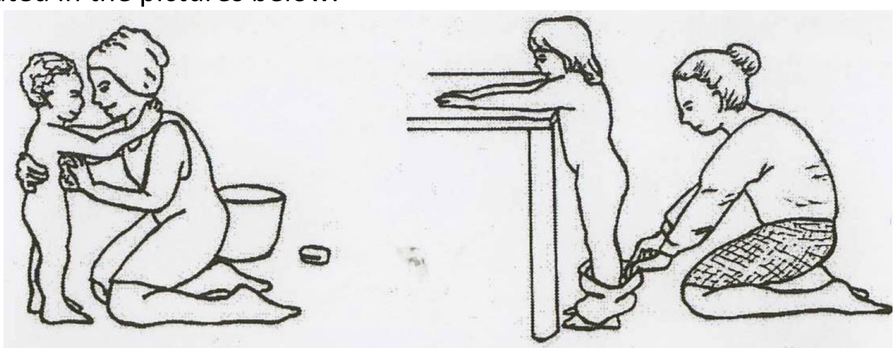
Now let baby sit between your legs while he/she is facing you. Make sounds and chat to baby. Let baby hold or reach for toy.
</td>
<td>Lying on tummy
• Roll up a blanket and put it under baby’s arm pits. In this position get baby to play with a toy in front of him/her.
</td>
</tr>
</table>

	Older 7 months and younger than 10 months		
Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit.Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Baby sits on your lap facing away from you. Slowly lift one knee to lean your baby gently to one side. Then slowly lift the other knee so that your child learns to keep their balance in sitting. You may have to hold lightly around your baby's waist. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. 	Baby crawls • Place a scarf/towel/folded blanket uner the baby's chest. Baby's hands must be under his shoulders and knees under his/her hips. Hold the ends of the towel up so that baby's chest doesn't drop. Have a toy in front of baby so he/she tries to move towards it. 

	10 months and older		
Sitting • Sit baby on little bench – baby should preferably not be able to touch the ground with his/her feet. Get baby to reach for toy and sit while playing with toy in baby's hand. Stay close to baby in case he/she loses balance. 	Wheelbarrow • Get baby into crawling position. Lift baby's legs a little at the same time and slowly. Keep one hand under baby's tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy. 	Kneeling to standing • Using a wall as assistance get your baby into kneeling on one knee with his/her other foot infront and the baby facing wall. Put one of your hands on baby's front knee and the other hand around baby's waist. Help baby up with slight guidance. 	Standing exercise • Stand baby up next into a long surface below baby's shoulder height such as a low table or a couch. Put down on surface out of baby's reach so that baby would have to walk sideways, while supporting him/herself with the couch, in order to reach it. You might have to keep your hands around your baby's waist to support baby if he/she is unstable. Motivate baby to move to toy. 

Home Advice

- Perform at least 2 of the prescribed exercises every day for 15min. Keep repeating them, repetition is a good way of mastering a skill.
- When dressing or washing your baby, do so in a functional position such as sitting or if possible standing while the baby holds onto something. This is illustrated in the pictures below.



4.2.6. Session 6

Treatment Session 6 – Group B (weekly)

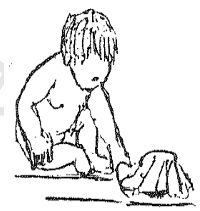
Education

- The trunk of a person is the chest, stomach and back. As discussed in last month's sessions the trunk muscles (especially the stomach muscles) are very important for rolling, sitting, crawling and walking and should therefore develop properly. The trunk muscles play a very important role in maintaining the balance of a baby when the body is kept upright. Without good balance your baby will keep on falling over when he/she tries to sit up or stand up.
- Do not let your child W-sit (demonstrate). This position stretches muscles and ligaments in the baby's hips and decreases the stability in the hips. It can therefore hinder the walking pattern.

- Do not allow your child to use a walking ring. This walking pattern is not the same as the one your baby needs to learn on his/her own. Rather let your baby explore an area using his/her own methods of movement – this is much better for the developmental process.

Practical

	Younger than 7 months		
Facilitate Rolling from tummy to back: • Bend baby's left leg under his/her chest. Straighten the right arm forward under baby's body so that baby cannot hurt it when he/she rolls over. Roll baby over onto side then onto back by rolling left leg backwards. Repeat this on both sides. 	Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit. Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. 	Sitting • Get your baby to lean on his/her hands for support (if he/she can't do it in sitting then do it in lying on tummy). You can also get your baby to sit on one side and get baby to lean on the arm on the same side. You might need to hold the baby's arm there. 

	Older 7 months and younger than 10 months		
Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. Get your baby to reach and grab objects in front and to the sides. 	Crawling position • Put baby in crawling position over one of your legs. Rock your baby's buttocks slowly from one side to the other so that your baby has to shift his/her weight from one leg to another. Get your baby to reach and grab toys in this position.	Facilitate sitting to crawling • Facilitate sitting to crawling by placing the toy in different positions around baby so that baby has to turn and stretch outside base of support to fetch it.  Then place it further away to get baby to lean on his/her one hand to be able to reach it. Then place toy out of reach and facilitate the movement into 4 point kneeling. 	Kneeling • Have baby kneeling at a low table or chair; hold baby at the hips. Move baby slowly from side to side to get the baby to shift weight on his/her legs.  Baby can play with spoons on the low surface.

	10 months and older		
Sitting balance • Sit baby on gym ball. By holding on to the baby's thighs move rock the ball slowly forwards and backwards so that the baby has to change his/her trunk position to stay on the ball. • Now rock the ball from side to side so that the baby will have to twist or tilt their trunk to stay upright.  • You can also make slight bouncing movements with baby while sitting on ball.	Crawling with weight shift • Get baby to crawl around. Hold a toy at the baby's eye level and get baby to reach for it. Baby will have to take weight on only one hand to reach with the other hand. If baby struggles to do it, put your hand under baby's chest for a little support so that he/she can reach for it. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. Get your baby to reach and grab objects in front and to the sides in the air.  • Now put objects on the floor besides the baby and get baby to pick it up while sitting on roller. 	Standing exercise • Stand baby up next into a long surface below baby's shoulder height such as a low table or a couch. Put down on surface out of baby's reach so that baby would have to walk sideways, while supporting him/herself with the couch, in order to reach it. You might have to keep your hands around your baby's waist to support baby if he/she is unstable. While baby is standing playing with toy, move his/her hips from side to side so that baby shifts weight from one leg to the other. 

Home Advice

- Continue doing at least 15min of exercises every day with your baby.
- If you've considered buying a walking ring for your baby, rather buy a pushcart (picture below) or something similar which your child can use to move around. Please supervise your child when he/she first starts walking with a push cart.

4.2.7. Session 7

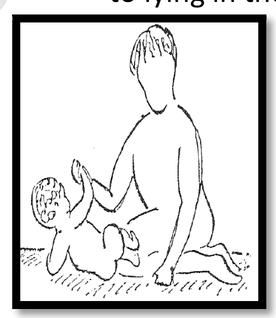
Treatment Session 7 – Group B (weekly)

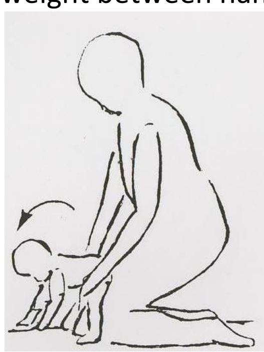
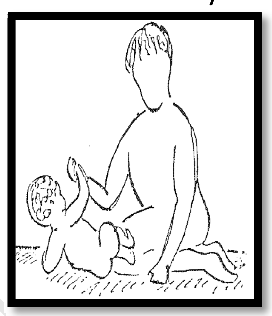
Education

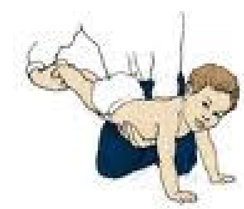
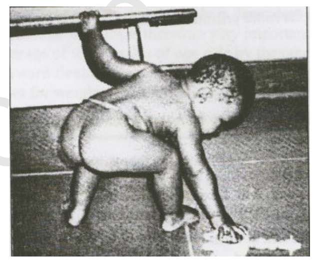
Balance

- There are different sets of reactions which need to combine to create good balance.
  1. Orientation of the head in relation to space and the body. Orientation of the body in relation to space. This orientation requires good head control – something a baby starts developing early on in life.
  2. Protective reactions – when a person puts their hand out to stop from falling or arranges their body in such a way that they cushion a fall. This usually develops after the head control.
  3. Equilibrium reactions – when you arrange your body in such a way to try and keep your centre of gravity within your base of support as much as possible.
- Centre of gravity (explain)
- Base of support (explain)

Practical

	< 7 months		
Facilitate rolling • Only bend one leg up and over and hold other one straight to roll baby over. Get baby to roll towards a toy.  	Pull to sitting • With baby lying on his/her back, get the baby to hold your thumbs and then pull baby into sitting. Do it slowly so that baby can assist you doing the above action. If the head flops back then rather pull baby up by his/her shoulder. 	Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit.Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Let your baby sit on your knees facing you.  Hold baby's body loosely so that he/she can adapt to holding that position. Hold toys in different positions so that baby turns his/her head from side to side. If your baby manages to hold him/herself up then lightly hold onto your baby's hands while you lift one of your knees slightly, then slowly lower your knee and lift the other knee. Watch how your baby adjusts his/her head and body position.

	Older 7 months and younger than 10 months		
Baby from sitting to 4 point kneeling – protective reaction. • Get your baby sitting on your knees while you are kneeling flat on the ground. Tilt your baby's upper body forward so that baby has to stop him/herself from falling flat on his/her face by putting out their hands. In this position, move baby's body from side to side (slowly) to shift weight between hands. 	Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit.Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. Get your baby to reach and grab objects in front and to the sides. 	Standing with help. • Stand your baby on the floor in front of you, you should be kneeling. Hold baby under his/her armpits across baby's chest. As the baby gets better in holding his/her balance, hold the baby lower down towards the waist. 

	10 months and older		
Using protective movements • Put baby on tummy on the gym ball. Hold onto baby's feet/legs and roll ball forward slowly. Watch baby put their hands down on the floor to support his/her body. Then roll ball back up. Repeat a few times.  	Wheelbarrow • Get baby into crawling position. Lift baby's legs a little at the same time and slowly. Keep one hand under baby's tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy. 	Standing and bending • While baby is standing while holding onto furniture, put a toy of interest on the floor so that baby bends down to pick it up while you are close by to assist if needed. 	Standing exercise • Stand baby up next into a long surface below baby's shoulder height such as a low table or a couch. Put down on surface out of baby's reach so that baby would have to walk sideways, while supporting him/herself with the. Now put toy on another chair close by so that baby will have to bridge a small gap between the furnature (10cm) to get to toy. 

Home Advice

For small babies (under 6 months)

- Play with your baby's hands and feet in midline (in the middle of his/her body or face).
- Take the baby's hands and put them on the sides of your face. Put both hands at your mouth and blow in them.
- Clap your baby's hands for him/her.

All babies

Never leave your baby unattended when he/she is eating finger food.

For babies older than 6 months

- Let your baby play with tupperware so that he/she can open and close the lids.
- Let your baby put objects in a box.
- Get your baby to pull a toy on a string towards him/her.
- Play peek-a-boo.

4.2.8. Session 8

Treatment Session 8 – Group B (weekly)

Education

Theories of Movement Development

There are different opinions about how and why babies develop.

- There are biological factors.
- There are social and environmental factors.
- Skills develop as a baby tries to perform tasks
- The more a baby performs a movement the more skilled he/she becomes in doing that movement and then later the baby can use that movement in a different situation.
- Babies also learn by means of 'trial and error'.

- The importance of the trunk muscles.
- Do not let your child W-sit.

- Do not allow your child to use a walking ring.

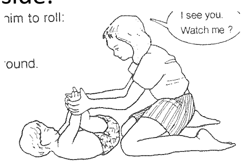
Balance

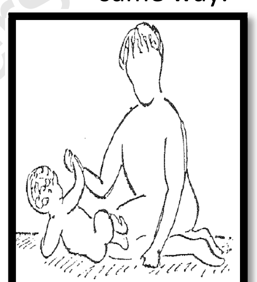
- There are different sets of reactions which need to combine to create good balance.
  1. Orientation of the head in relation to space and the body. Orientation of the body in relation to space. Head control is very important early on in a baby's development.
  2. Protective reactions
  3. Equilibrium reactions
- Centre of gravity (explain)
- Base of support (explain)

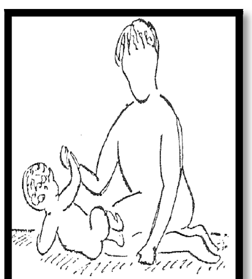
Practical

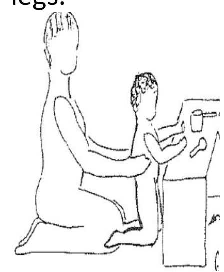
This will involve a show-and-tell format of the exercises performed at the sessions during the 2nd month.

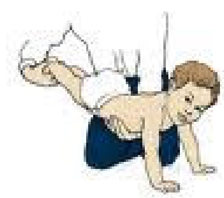
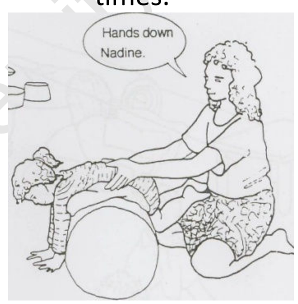
Practical

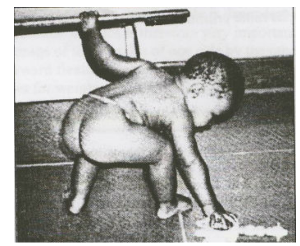
	< 7 months		
Facilitate Rolling • Lift his/her bottom off the ground, curl him/her into a ball, roll from side to side.  Now only hold onto one leg and opposite arm as to roll baby over.  Only bend one leg and hold other one straight to roll baby over. 	Sitting balance • Let your baby sit on your knees facing you.  Hold baby's body loosely so that he/she can adapt to holding that position.	Sitting balance • Baby sitting on floor between your legs facing away from you. Let baby play with toy and turn around to look at toy. Hold lightly around baby's hips.  Now let baby sit between your legs while he/she is facing you. Make sounds and chat to baby. Let baby hold or reach for toy. 	Lying on tummy • Roll up a blanket and put it under baby's arm pits. In this position get baby to play with a toy in front of him/her. 

Younger than 7 months				
Facilitate Rolling from tummy to back: • Bend baby's left leg under his/her chest. Straighten the right arm forward under baby's body so that baby cannot hurt it when he/she rolls over. Roll baby over onto side then onto back by rolling left leg backwards. Repeat this on both sides. 	Pull to sitting • With baby lying on his/her back, get the baby to hold your thumbs and then pull baby into sitting. Do it slowly so that baby can assist you doing the above action. If the head flops back then rather pull baby up by his/her shoulder. 	Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit. Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. 	Sitting • Get your baby to lean on his/her hands for support (if he/she can't do it in sitting then do it in lying on tummy). You can also get your baby to sit on one side and get baby to lean on the arm on the same side. You might need to hold the baby's arm there. 

Older 7 months and younger than 10 months				
Lying to sitting • Baby starts off lying on his/her back. Pull baby's right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit.Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way. 	Sitting balance • Baby sits on your lap facing away from you. Slowly lift one knee to lean your baby gently to one side. Then slowly lift the other knee so that your child learns to keep their balance in sitting. You may have to hold lightly around your baby's waist. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. Get your baby to reach and grab objects in front and to the sides. 	Baby from sitting to 4 point kneeling – protective reaction. • Get your baby to sit on your knees while you are kneeling flat on the ground. Tilt your baby's upper body forward so that baby has to stop him/herself from falling flat on his/her face by putting out their hands. In this position, move baby's body from side to side (slowly) to shift weight between hands. 

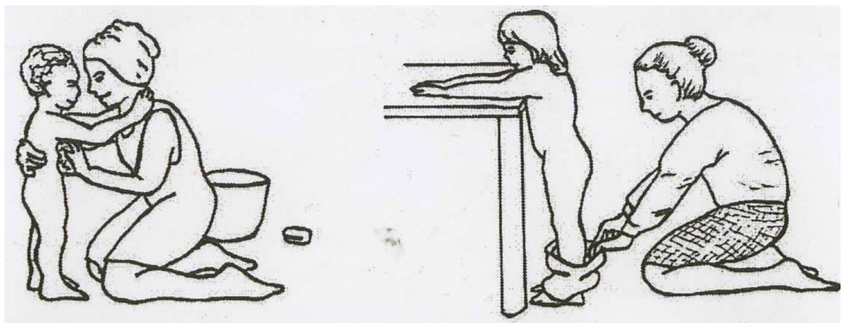
Older 7 months and younger than 10 months				
Baby crawls • Place a scarf/towel/folded blanket uner the baby's chest. Baby's hands must be under his shoulders and knees under his/her hips. Hold the ends of the towel up so that baby's chest doesn't drop. Have a toy in front of baby so he/she tries to move towards it. 	Crawling position • Put baby in crawling position over one of your legs. Rock your baby's buttocks slowly from one side to the other so that your baby has to shift his/her weight from one leg to another. Get your baby to reach and grab toys in this position.	Facilitate sitting to crawling • Facilitate sitting to crawling by placing the toy in different positions around baby so that baby has to turn and stretch outside base of support to fetch it.  Then place it further away to get baby to lean on his/her one hand to be able to reach it. Then place toy out of reach and facilitate the movement into 4 point kneeling. 	Kneeling • Have baby kneeling at a low table or chair; hold baby at the hips. Move baby slowly from side to side to get the baby to shift weight on his/her legs.  Baby can play with spoons on the low surface.	Standing with help. • Stand your baby on the floor in front of you, you should be kneeling. Hold baby under his/her armpits across baby's chest. As the baby gets better in holding his/her balance, hold the baby lower down towards the waist. 

10 months and older				
Sitting	Wheelbarrow	Using protective movements	Kneeling to standing	Standing exercise
• Sit baby on little bench – baby should preferably not be able to touch the ground with his/her feet. Get baby to reach for toy and sit while playing with toy in baby's hand. Stay close to baby in case he/she loses balance. 	• Get baby into crawling position. Lift baby's legs a little at the same time and slowly. Keep one hand under baby's tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy. 	• Put baby on tummy on the gym ball. Hold onto baby's feet/legs and roll ball forward slowly. Watch baby put their hands down on the floor to support his/her body. Then roll ball back up. Repeat a few times. 	• Using a wall as assistance get your baby into kneeling on one knee with his/her other foot infront and the baby facing wall. Put one of your hands on baby's front knee and the other hand around baby's waist. Help baby up with slight guidance. 	• Stand baby up next into a long surface below baby's shoulder height such as a low table or a couch. Put down on surface out of baby's reach so that baby would have to walk sideways, while supporting him/herself with the couch, in order to reach it. You might have to keep your hands around your baby's waist to support baby if he/she is unstable. Motivate baby to move to toy. 

10 months and older				
Standing exercise • Stand baby up next into a long surface below baby's shoulder height such as a low table or a couch. Put down on surface out of baby's reach so that baby would have to walk sideways, while supporting him/herself with the. Now put toy on another chair close by so that baby will have to bridge a small gap between the furnature (10cm) to get to toy. 	Crawling with weight shift • Get baby to crawl around. Hold a toy at the baby's eye level and get baby to reach for it. Baby will have to take weight on only one hand to reach with the other hand. If baby struggles to do it put your hand under baby's chest for a little support so that he/she can reach for it. 	Sitting balance • Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself. Get your baby to reach and grab objects in front and to the sides in the air.  • Now put objects on the floor besides the baby and get baby to pick it up while sitting on roller. 	Sitting balance • Sit baby on gym ball. By holding on to the baby's thighs move rock the ball slowly forwards and backwards so that the baby has to change his/her trunk position to stay on the ball. • Now rock the ball from side to side so that the baby will have to twist or tilt their trunk to stay upright  • You can also make slight bouncing movements with baby while sitting on ball.	Standing and bending • While baby is standing while holding onto furniture, put a toy of interest on the floor so that baby bends down to pick it up while you are close by to assist if needed. 

Home Advice

- Perform at least 2 of the prescribed exercises every day for 15min. Keep repeating them, repetition is a good way of mastering a skill.
- When dressing or washing your baby, do so in a functional position such as sitting or if possible standing while the baby holds onto something. This is illustrated in the pictures below.



- Continue doing at least 15min of exercises every day with your baby.
- If you've considered buying a walking ring for your baby, rather buy a pushcart (picture below) or something similar which your child can use to move around. Please supervise your child when he/she first starts walking with a push cart.

<u>For small babies (under 6 months)</u>

- Play with your baby's hands and feet in midline (in the middle of his/her body or face).
- Take the baby's hands and put them on the sides of your face. Put both hands at your mouth and blow in them.
- Clap your baby's hands for him/her.

<u>All babies</u>

Never leave your baby unattended when he/she is eating finger food.

<u>For babies older than 6 months</u>

- Let your baby play with tupperware so that he/she can open and close the lids.
- Let your baby put objects in a box.
- Get your baby to pull a toy on a string towards him/her.
- Play peek-a-boo.

4.2.9. Session 9

Treatment Session 9 – Group B (weekly)

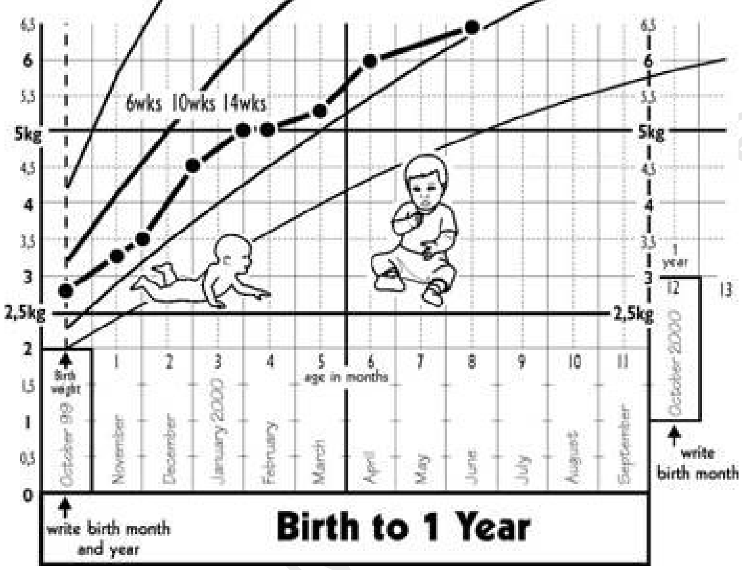
Education

Studies have shown that infants who are overweight or severely underweight run the risk of being motor delayed.

How do I know if my baby is overweight or underweight?

The Road to Health Chart issued to you when your baby is born logs your baby's growth and whether the growth is within normal ranges or not. If you haven't been told, you are more than welcome to ask the nursing staff at your local clinic (where your baby gets weighed and immunized) if your child is within the normal weight limits.

Here is an example of what the Road to Health Chart.



Home Advice

What can I do if my child is overweight/underweight?

It is best to consult the dietician at your closest clinic site on methods do normalize your baby's weight.

Overweight

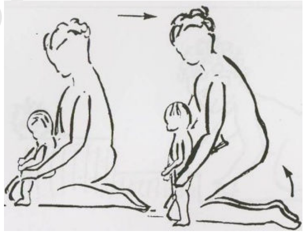
Breast milk is enough for a baby younger than 6 months unless you have problems breastfeeding. **No juices of fizzy drinks! No chips or sweets,** just because you like it, doesn't mean your child will**.** Decrease the fruit intake and rather give vegetables. Feed smaller amounts more often.

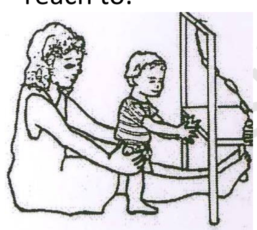
Underweight

Add more sugar and butter to your baby's porridge in the morning. Still try to stay away from fruit juices – they can cause your baby to have a runny tummy.

<table>
<tr><th colspan="4">Younger than 7 Months</th></tr>
<tr>
<td>Lying to sitting
• Baby starts off lying on his/her back. Pull baby’s right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit. Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way.
</td>
<td>Sitting balance
• Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself.
</td>
<td>Sitting and reaching
• Baby sitting on floor between your legs facing away from you. Let baby play with toy and turn around to look at toy. Hold lightly around baby’s hips if he/she requires a little bit of support.

Let baby reach for toys in front of him/her and to the baby’s sides.</td>
<td>Stands with help
• Let baby stand against you and hold baby under the arms around the chest and waist. As baby’s balance improves position your hands lower towards the waist so that you’re giving less support. You can also let your baby stand on your lap facing you – and bounce baby up and down in this position.
</td>
</tr>
</table>

Older than 7 months and younger than 10 months			
High sitting • Sit baby on stool or chair – baby must not be able to touch the ground with his/her feet. Stay close by. Softly throw a ball or soft toy onto your baby's lap and wait for your baby to respond. Allow your baby to throw the toy back if he/she is able to. Otherwise just take the toy and throw it onto the baby's lap again. 	Crawling • If your baby struggles to crawl – give him/her support by suspending a towel/blanket around their middle while they try to crawl. Allow your baby to move forward if you see that they are trying.  If your baby crawls with ease – hold a toy of interest out to the side and above the baby's head so that the baby must shift weight and reach up with 1 hand to get it. 	Sitting to standing • Repeat this exercise for as long as the baby allows you to. Let your baby sit on your lap while you are kneeling flat on the floor. Help baby to stand up by holding around baby's hips and gently pushing his/her weight forward over the baby's feet. Say 'up' or 'let's stand up' when you perform this exercise. 	Kneeling to standing • Your baby must be in half-kneeling (one knee on ground and the other foot in front of him on the ground). Keep baby in this position by pressing down on the front knee. Get your baby to play with toys in front of him/her in this position.  • Now progress this exercise by getting your baby in this position up against a wall for the baby to lean onto and assist baby to stand up by holding around baby's waist. 

Older than 10 months			
Crawling to standing • Use a colourful ribbon tied to a bell, or make a bow in the end of the ribbon and stick it up on the wall using little stickers or some press-stick so that your baby needs to be in a standing position to reach it. Attract your baby's attention to the ribbon. Let the baby crawl towards the wall, go from crawling to standing and grasp the ribbon. If your baby needs assistance to stand then hold lightly around his waist and guide the movement.  (ribbon and stickers)	Standing exercise • Support your child in standing with your leg between baby's legs. Hold around baby's waist and hold the hips straight. Without support for the baby to lean on, get your baby to reach to the front and to the sides towards an object. You may need someone to assist you to dangle a toy out for the child to reach to. 	Standing alone • Let your baby stand and support baby by holding around his/her waist. Very slowly loosen your grip and take your hands away from your baby's body a little bit to allow your baby to stand unassisted for as long as they can balance. Urge your baby to take one or 2 steps forward towards you. 	Walks one hand held • Holding onto one hand of your baby, walk towards an object or toy. Speak to your baby and tell him/her what you want to go and fetch such as 'let's go fetch the ball'. 

4.2.10. Session 10

Treatment Session 10 – Group B (weekly)

Education

Research has shown that babies who sleep on their backs spend less time on their tummies when they are awake. It is however important for a baby to have tummy-time for the development of fine and gross motor movements and therefore, if your baby prefers to sleep on his/her back you need to make a concerted effort to position your baby on his/her tummy when they are awake.

Put them on their tummies so that they can play in that position or even let them play in a supported standing position if they are able to.

Home Advice

Activities your baby can do in prone

(If your baby is unable to lift his head and trunk up off the floor please put a rolled up towel under his/her chest)

- Let baby play with toys that make a sound.
- Hang a toy in front of your baby that they can reach or hit and let it swing.

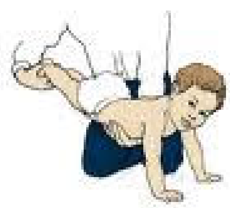
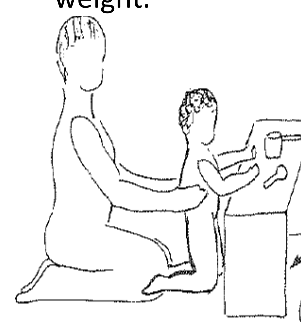
Activities your baby can do in sitting

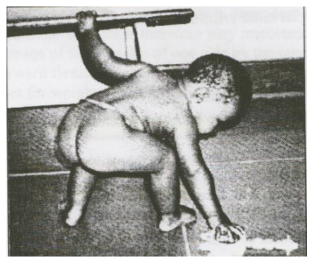
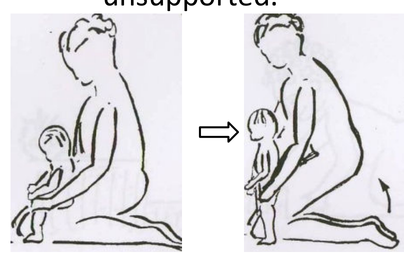
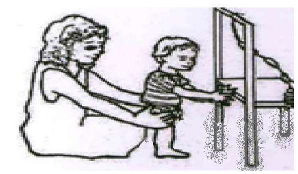
- Knock baby over gently and say "boom!"
- Roll a ball to your baby and urge baby to roll it back to you.
- If your baby copies you, you need to show delight and praise him/her.

Activities a baby can do in standing

- Push a little car – you nee to make the sound: "Brrrrrrr"
- Give your baby a damp cloth and let them wipe the table.
- Give your baby a few spoons – the spoons make a sound when you tap them together and picking them up is good for fine motor control.
- Let your baby throw things off the table and bend to pick them up (supervised – stay close to your baby).

Younger than 7 Months			
Rolling	Sitting balance	Tripod sitting	Baby on Tummy
• Bend one leg and hold the opposite leg straight to roll baby over towards toy and onto his/her tummy. Repeat both ways.  • Then bend baby's left leg under his/her chest. Straighten the right arm forward under baby's body so that baby cannot hurt it when he/she rolls over. Roll baby over onto side then onto back by rolling left leg backwards. 	• Baby sits on your lap facing away from you. Slowly lift one knee to lean your baby gently to one side. Then slowly lift the other knee so that your child learns to keep their balance in sitting. You may have to hold lightly around your baby's waist. 	• Get your baby to sit and lean on his or her outstretched arms. Slowly release your hands to offer less and less support to the baby. If your baby is able to maintain this position well, show your baby a toy so that he/she follows it by looking from side to side. Finally hand baby the toy.   	• Baby sitting on mom's lap while she's kneeling on floor. Tilt baby forward so that baby puts arms out in front on the floor. From here position baby in 4 point kneeling position and hold hand under baby's tummy for support. Rock baby fowards and backwards slowly.  

Older than 7 Months and Younger than 10 Months			
Sitting and picking up Ball • Let baby sit on floor in front of you. Roll a ball towards your baby and urge baby to pick it up. Say: "pick up the ball."  • Then urge baby to roll/throw it back to you by saying: "Ta Ball" or "Roll me the ball". • Roll the ball to baby in a different position every time. In front/Right side/ left side/ even slightly behind baby.	Wheelbarrow • Get baby into crawling position. Lift baby's legs a little at the same time and slowly. Keep one hand under baby's tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy. 	Kneeling • Get baby into kneeling position in front of a step/stool or little chair. Put toys on the stool for him/her to play with in this kneeling position. Once your baby can stay in this position unsupported you can even move his buttocks slowly move his buttocks from side to side so that the baby get's used to shifting weight. 	Standing supported and Shifting weight • Let your baby stand while you are supporting them by holding around his/her waist. Softly and slowly shift their pelvis/buttocks towards the right and see how they respond to shifting their weight. Then slowly shift their weight to the other side and give them time to adjust their bodies to the new weight shift. 

Older than 10 Months			
High sit and reach for toy • Baby sit on high chair or table (stay close to baby). Hold a toy to the side of the baby and let baby stretch to reach it. Continue to hold and place toys in different positions to grab toy. Every now and then hold the opposite arm in such a way that the baby is unable to lean on it and has to rely on his strong core to balance.  	Standing and bending • While baby is standing while holding onto furniture, put a toy of interest on the floor so that baby bends down to pick it up while you are close by to assist if needed. 	Moves from sitting to standing • Let baby sit on your lap while you are kneeling flat on the floor. Urge the baby to go from sitting to standing by saying: "Stand up". Your baby may initially need you to guide the movement by letting them hold onto your hands. But later on you need to offer very little or if possible, no support for this movement and let them stand unsupported. 	Stand and shift weight • Get baby in standing and hold gently around baby's waist. Slowly shift baby's hips to the right and see how your baby reacts to having to shift his/her weight. Now slowly shift baby's hips over to the other side. Repeat a few times.  • If baby manages nicely, let baby walk while you are holding onto both of the baby's hands above his/her head. You are allowed to stand in front or behind baby. 

4.2.11. Session 11

Treatment Session 11 – Group B (Weekly)

Education

General Health and Safety tips

- After pregnancy the mother's abdominal muscles are usually not as strong as they were before, therefore care needs to be taken when picking up your baby especially in the 1st year of life when they are very dependent on being carried around. Make sure you brace your stomach muscles when you lift up your child and keep your back straight. Use your legs to straighten out instead of your back. (DEMONSTRATE).
  Do not carry your baby on the same side of your body all the time; swop sides so that both sides of the body are required to support your position and you don't only exhaust the one side of your body.
- If your baby is prone to frequent chest infections and any of the people who live in the same house as this baby are smokers, try to be considerate and smoke outside. If you do smoke outside, wear a different jacket or jersey which you can remove once you go back inside the house. Do not smoke near the baby. Frequent illness limits your baby's interaction and stimulation and can therefore have an effect on the baby's development.

Finally

A delay in functional milestones, such as rolling, sitting, crawling and walking may indicate a hindrance in postural control which may indicate poor balance performance later in life. This just once again highlights the importance of attending to the special needs of your baby by doing the exercises. You as parents or guardians have already taken the 1st step in addressing your baby's needs by just attending these sessions.
WELL DONE!!!

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<tr><th colspan="4">Younger than 7 Months</th></tr>
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<td>Sitting balance
• Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself.
</td>
<td>Lying to sitting
• Baby starts off lying on his/her back. Pull baby’s right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit. Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way.
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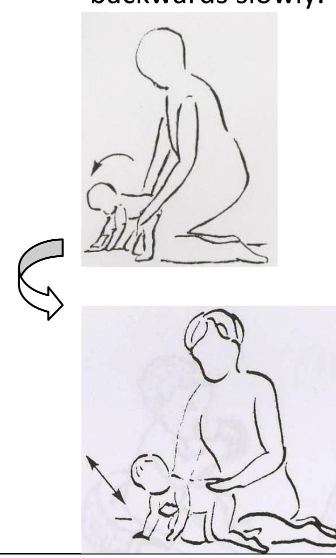
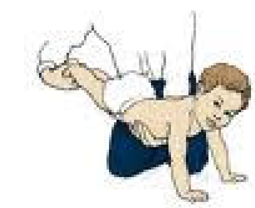
• Baby sitting on mom’s lap while she’s kneeling on floor. Tilt baby forward so that baby puts arms out in front on the floor. From here position baby in 4 point kneeling position and hold hand under baby’s tummy for support. Rock baby forwards and backwards slowly.
</td>
<td>Wheelbarrow
• Get baby kneeling on his/her hands and feet. Slowly lift baby’s legs a little at the same time. Keep one hand under baby’s tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy.
</td>
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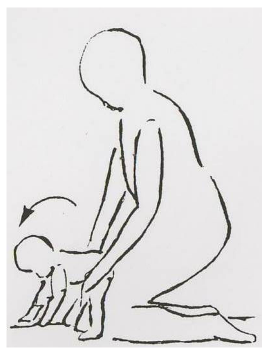
<tr><th colspan="4">Older than 7 months younger than 10 months</th></tr>
<tr>
<td>Crawling

If your baby is unable to crawl put a rolled up towel up or soft (melon size) ball under your baby's chest and stomach so that your baby is forced to take weight through the hands and knees. Rock baby backwards and forwards in this position. Place toys around baby which interest baby and see how baby has to shift weight to free a hand.

If your baby is able to crawl, hold a toy of interest slightly above and to the side of baby's head so that baby needs to shift weight and stretch free arm to reach it.


</td>
<td>Baby from sitting to 4 point kneeling – protective reaction.

Get your baby to sit on your knees while you are kneeling flat on the ground. Tilt your baby's upper body forward so that baby has to stop him/herself from falling flat on his/her face by putting out their hands. In this position, move baby's body from side to side (slowly) to shift weight between hands.


</td>
<td>Kneeling to standing

Your baby must be in half-kneeling (one knee on ground and the other foot in front of him on the ground). Keep baby in this position by pressing down on the front knee. Get your baby to play with toys in front of him/her in this position.

Now progress this exercise by getting your baby in this position up against a wall for the baby to lean onto and assist baby to stand up by holding around baby's waist.


</td>
<td>High sit and reach for toy

Baby sit on high chair or table (stay close to baby). Hold a toy to the side of the baby and let baby stretch to reach it. Continue to hold and place toys in different positions to grab toy. Every now and then hold the opposite arm in such a way that the baby is unable to lean on it and has to rely on his strong core to balance.

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</td>
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</table>

<table>
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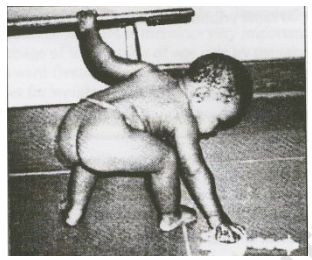
<tr>
<td>High sit and reach or catch ball/toy
• Baby sits on high chair or table (stay close to baby at all times). Let baby reach to the sides and up for a toy. OR if your baby can - throw a toy or ball towards baby (onto baby’s lap) so that baby can pick it up. Say to baby while clapping your hands and holding them open: “throw the toy back to me”.
 
</td>
<td>Standing and bending
• While baby is standing while holding onto furniture, put a toy of interest on the floor so that baby bends down to pick it up while you are close by to assist if needed.
</td>
<td>Standing exercise
• Stand baby up next into a long surface below baby’s shoulder height such as a low table or a couch. Put down on surface out of baby’s reach so that baby would have to walk sideways, while supporting him/herself with the. Now put toy on another chair close by so that baby will have to bridge a small gap between the furniture (10cm) to get to toy.
</td>
<td>Walking and holding onto one hand.
• Walk next to baby holding on to only one of baby’s hands – you may have to bend down slightly to accommodate baby’s balance. Allow baby to walk towards object or toy.

• If your baby manages nicely with this exercise hold onto his/her hand while walking up and down 1 or 2 steps.
</td>
</tr>
</table>

Home Advice

If your baby drools a lot – do not wipe his/her mouth, rather pat it with a cloth.

<u>Younger than 7 months</u>

- Have a mirror where baby can roll towards and look into – babies usually enjoy this. Remember to turn your baby around after a while so that he/she can roll in the other direction.
- Let your baby play with a toy while lying on his/her side.

<u>Older than 7 months and younger than 10 months</u>

- Let your baby crawl on different surfaces. Wood or tiled floors are usually easier than sand and grass.
- When baby is playing at a surface where they are standing or kneeling, show them pictures of objects or family that they are familiar with.

<u>Older than 10 months</u>

- Look through books with pictures – point to the pictures and tell your baby what you see.
- When dressing your child tell your baby what body parts you are handling for example say: "Look, I'm putting your foot through this hole. I am pulling this shirt over your head."

When playing with your baby, half hide a toy under a cloth and ask your baby: "Where is it?" or "Find it!" And remember to show delight when they do find the toy.

4.2.12. Session 12

Treatment Session 12 – Group B (Weekly)

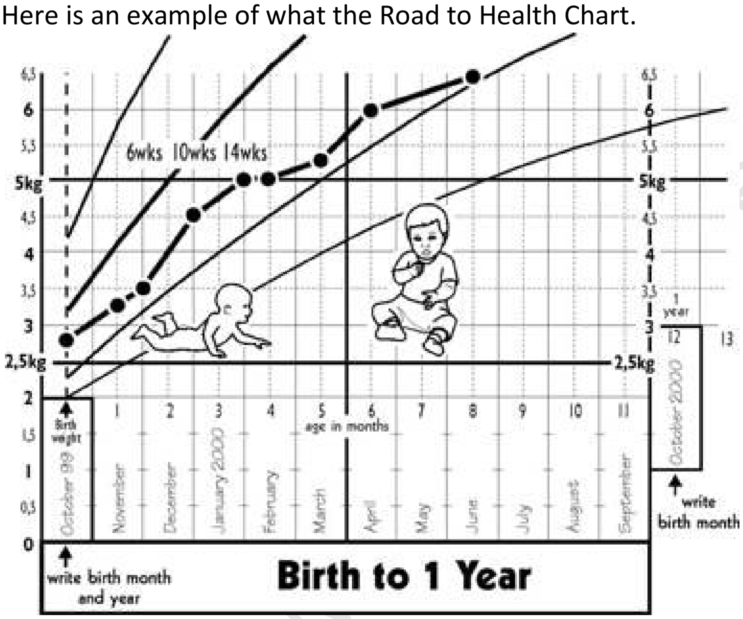
Education

Studies have shown that infants who are overweight or severely underweight run the risk of being motor delayed.

How do I know if my baby is overweight or underweight?

The Road to Health Chart issued to you when your baby is born logs your baby's growth and whether the growth is within normal ranges or not. If you haven't been told, you are more than welcome to ask the nursing staff at your local clinic (where your baby gets weighed and immunized) if your child is within the normal weight limits.

Here is an example of what the Road to Health Chart.



Home Advice

What can I do if my child is overweight/underweight?

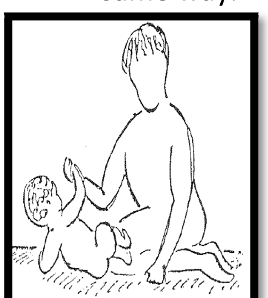
It is best to consult the dietician at your closest clinic site on methods do normalize your baby's weight.

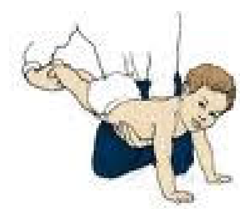
Overweight

Breast milk is enough for a baby younger than 6 months unless you have problems breastfeeding. **No juices of fizzy drinks! No chips or sweets,** just because you like it, doesn't mean your child will**.** Decrease the fruit intake and rather give vegetables. Feed smaller amounts more often.

Underweight

Add more sugar and butter to your baby's porridge in the morning. Still try to stay away from fruit juices – they can cause your baby to have a runny tummy.

<table>
<tr><th colspan="4">Younger than 7 Months</th><th></th></tr>
<tr>
<td>Lying to sitting
Baby starts off lying on his/her back. Pull baby’s right arm across the body so baby rolls onto side. Pull right arm upwards so baby leans on left arm baby comes up to sit. Do this on the other side as well. Go slowly to make baby work with you. Try get baby to go from sitting to lying in the same way.
</td>
<td>Sitting balance
Sit baby on rolled up blanket with towel wrapped around it (or a log at home). Gently rock your baby from side to side. Support your baby lightly around the waist but take your hands away later so that your baby balances himself.
</td>
<td>Sitting and reaching
Baby sitting on floor between your legs facing away from you. Let baby play with toy and turn around to look at toy. Hold lightly around baby’s hips if he/she requires a little bit of support.

Let baby reach for toys in front of him/her and to the baby’s sides.</td>
<td>Stands with help
Let baby stand against you and hold baby under the arms around the chest and waist. As baby’s balance improves position your hands lower towards the waist so that you’re giving less support. You can also let your baby stand on your lap facing you – and bounce baby up and down in this position.
</td>
<td>Wheelbarrow
Get baby kneeling on his/her hands and feet. Slowly lift baby’s legs a little at the same time. Keep one hand under baby’s tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy.
</td>
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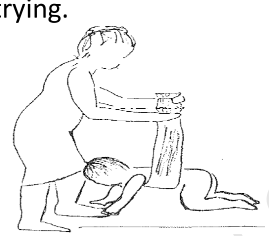
<table>
<tr><th colspan="4">Older than 7 months and younger than 10 months</th></tr>
<tr>
<td>High sitting
Sit baby on stool or chair – baby must not be able to touch the ground with his/her feet. Stay close by. Softly throw a ball or soft toy onto your baby's lap and wait for your baby to respond. Allow your baby to throw the toy back if he/she is able to. Otherwise just take the toy and throw it onto the baby's lap again.
</td>
<td>Crawling
If your baby struggles to crawl – give him/her support by suspending a towel/blanket around their middle while they try to crawl. Allow your baby to move forward if you see that they are trying.

If your baby crawls with ease – hold a toy of interest out to the side and above the baby's head so that the baby must shift weight and reach up with 1 hand to get it.
</td>
<td>Sitting to standing
Repeat this exercise for as long as the baby allows you to. Let your baby sit on your lap while you are kneeling flat on the floor. Help baby to stand up by holding around baby's hips and gently pushing his/her weight forward over the baby's feet. Say 'up' or 'let's stand up' when you perform this exercise.
</td>
<td>Kneeling to standing
Your baby must be in half-kneeling (one knee on ground and the other foot in front of him on the ground). Keep baby in this position by pressing down on the front knee. Get your baby to play with toys in front of him/her in this position.

Now progress this exercise by getting your baby in this position up against a wall for the baby to lean onto and assist baby to stand up by holding around baby's waist.
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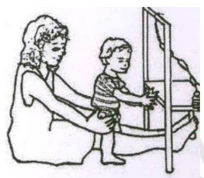
Older than 10 months			
Crawling to standing • Use a colourful ribbon tied to a bell, or make a bow in the end of the ribbon and stick it up on the wall using little stickers or some press-stick so that your baby needs to be in a standing position to reach it. Attract your baby's attention to the ribbon. Let the baby crawl towards the wall, go from crawling to standing and grasp the ribbon. If your baby needs assistance to stand then hold lightly around his waist and guide the movement.  (ribbon and stickers)	Standing exercise • Support your child in standing with your leg between baby's legs. Hold around baby's waist and hold the hips straight. Without support for the baby to lean on, get your baby to reach to the front and to the sides towards an object. You may need someone to assist you to dangle a toy out for the child to reach to.  • If baby manages nicely, let baby walk while you are holding onto both of the baby's hands above his/her head. You are allowed to stand in front or behind baby. 	Standing alone • Let your baby stand and support baby by holding around his/her waist. Very slowly loosen your grip and take your hands away from your baby's body a little bit to allow your baby to stand unassisted for as long as they can balance. Urge your baby to take one or 2 steps forward towards you. 	Walks one hand held • Holding onto one hand of your baby, walk towards an object or toy. Speak to your baby and tell him/her what you want to go and fetch such as 'let's go fetch the ball'. 

Part 2

Education

Research has shown that babies who sleep on their backs spend less time on their tummies when they are awake. It is however important for a baby to have tummy-time for the development of fine and gross motor movements and therefore, if your baby prefers to sleep on his/her back you need to make a concerted effort to position your baby on his/her tummy when they are awake.

Put them on their tummies so that they can play in that position or even let them play in a supported standing position if they are able to.

Home Advice

Activities your baby can do in prone
(If your baby is unable to lift his head and trunk up off the floor please put a rolled up towel under his/her chest)

- Let baby play with toys that make a sound.
- Hang a toy in front of your baby that they can reach or hit and let it swing.

Activities your baby can do in sitting

- Knock baby over gently and say “boom!”
- Roll a ball to your baby and urge baby to roll it back to you.
- If your baby copies you, you need to show delight and praise him/her.

Activities a baby can do in standing

- Push a little car – you need to make the sound: “Brrrrrrr”
- Give your baby a damp cloth and let them wipe the table.
- Give your baby a few spoons – the spoons make a sound when you tap them together and picking them up is good for fine motor control.
- Let your baby throw things off the table and bend to pick them up (supervised – stay close to your baby).

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Bend one leg and hold the opposite leg straight to roll baby over towards toy and onto his/her tummy. Repeat both ways.

Then bend baby's left leg under his/her chest. Straighten the right arm forward under baby's body so that baby cannot hurt it when he/she rolls over. Roll baby over onto side then onto back by rolling left leg backwards.
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Baby sits on your lap facing away from you. Slowly lift one knee to lean your baby gently to one side. Then slowly lift the other knee so that your child learns to keep their balance in sitting. You may have to hold lightly around your baby's waist.
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Get your baby to sit and lean on his or her outstretched arms. Slowly release your hands to offer less and less support to the baby. If your baby is able to maintain this position well, show your baby a toy so that he/she follows it by looking from side to side. Finally hand baby the toy.
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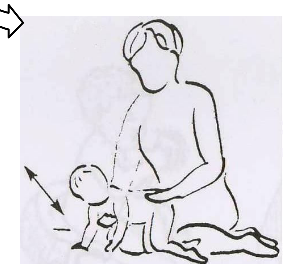</td>
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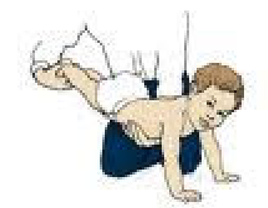
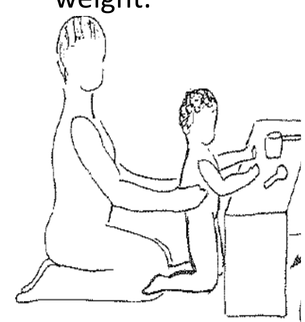
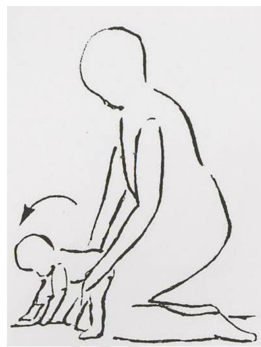
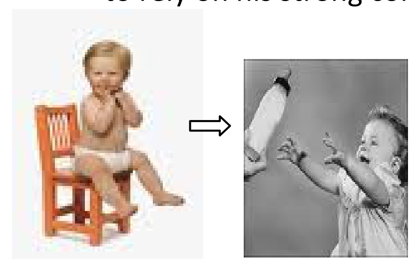
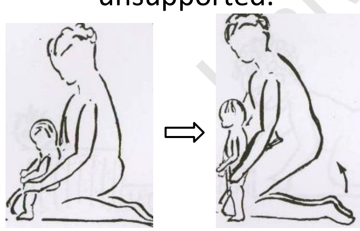
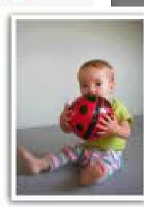
Older than 7 Months and Younger than 10 Months			
Sitting and picking up Ball • Let baby sit on floor in front of you. Roll a ball towards your baby and urge baby to pick it up. Say: "pick up the ball."  • Then urge baby to roll/throw it back to you by saying: "Ta Ball" or "Roll me the ball". • Roll the ball to baby in a different position every time. In front/Right side/ left side/ even slightly behind baby.	Wheelbarrow • Get baby into crawling position. Lift baby's legs a little at the same time and slowly. Keep one hand under baby's tummy for a little bit of support. Put object that baby likes in front of him/her and allow baby to walk on hands towards toy. 	Kneeling • Get baby into kneeling position in front of a step/stool or little chair. Put toys on the stool for him/her to play with in this kneeling position. Once your baby can stay in this position unsupported you can even move his buttocks slowly move his buttocks from side to side so that the baby get's used to shifting weight. 	Standing supported and Shifting weight • Let your baby stand while you are supporting them by holding around his/her waist. Softly and slowly shift their pelvis/buttocks towards the right and see how they respond to shifting their weight. Then slowly shift their weight to the other side and give them time to adjust their bodies to the new weight shift. 

Older than 7 months younger than 10 months		
Crawling • If your baby is unable to crawl put a rolled up towel up or soft (melon size) ball under your baby's chest and stomach so that your baby is forced to take weight through the hands and knees. Rock baby backwards and forwards in this position. Place toys around baby which interest baby and see how baby has to shift weight to free a hand.  • If your baby is able to crawl, hold a toy of interest slightly above and to the side of baby's head so that baby needs to shift weight and stretch free arm to reach it. 	Baby from sitting to 4 point kneeling – protective reaction. • Get your baby sitting on your knees while you are kneeling flat on the ground. Tilt your baby's upper body forward so that baby has to stop him/herself from falling flat on his/her face by putting out their hands. In this position, move baby's body from side to side (slowly) to shift weight between hands. 	High sit and reach for toy • Baby sit on high chair or table (stay close to baby). Hold a toy to the side of the baby and let baby stretch to reach it. Continue to hold and place toys in different positions to grab toy. Every now and then hold the opposite arm in such a way that the baby is unable to lean on it and has to rely on his strong core to balance. 

Older than 10 Months				
Standing and bending • While baby is standing while holding onto furniture, put a toy of interest on the floor so that baby bends down to pick it up while you are close by to assist if needed. 	Moves from sitting to standing • Let baby sit on your lap while you are kneeling flat on the floor. Urge the baby to go from sitting to standing by saying: “Stand up”. Your baby may initially need you to guide the movement by letting them hold onto your hands. But later on you need to offer very little or if possible, no support for this movement and let them stand unsupported. 	High sit and reach or catch ball/toy • Baby sit on high chair or table (stay close to baby at all times). Let baby reach to the sides and up for a toy. **OR** if your baby can - throw a toy or ball towards baby (onto baby’s lap) so that baby can pick it up. Say to baby while clapping your hands and holding them open: “throw the toy back to me”.   	Standing exercise • Stand baby up next into a long surface below baby’s shoulder height such as a low table or a couch. Put down on surface out of baby’s reach so that baby would have to walk sideways, while supporting him/herself with the. Now put toy on another chair close by so that baby will have to bridge a small gap between the furniture (10cm) to get to toy. 	Walking and holding onto one hand. • Walk next to baby holding on to only one of baby’s hands – you may have to bend down slightly to accommodate baby’s balance. Allow baby to walk towards object or toy.  • If your baby manages nicely with this exercise hold onto his/her hand while walking up and down 1 or 2 steps. 

Part 3

Education

General Health and Safety tips

- After pregnancy the mother's abdominal muscles are usually not as strong as they were before, therefore care needs to be taken when picking up your baby especially in the 1st year of life when they are very dependent on being carried around. Make sure you brace your stomach muscles when you lift up your child and keep your back straight. Use your legs to straighten out instead of your back.
  (DEMONSTRATE).
  Do not carry your baby on the same side of your body all the time; swop sides so that both sides of the body are required to support your position and you don't only exhaust the one side of your body.
- If your baby is prone to frequent chest infections and any of the people who live in the same house as this baby are smokers, try to be considerate and smoke outside. If you do smoke outside, wear a different jacket or jersey which you can remove once you go back inside the house. Do not smoke near the baby. Frequent illness limits your baby's interaction and stimulation and can therefore have an effect on the baby's development.

Finally

A delay in functional milestones, such as rolling, sitting, crawling and walking may indicate a hindrance in postural control which may indicate poor balance performance later in life. This just once again highlights the importance of attending to the special needs of your baby by doing the exercises. You as parents or guardians have already taken the 1st step in addressing your baby's needs by just attending these sessions. **WELL DONE!!!**

Home Advice

If your baby drools a lot – do not wipe his/her mouth, rather pat it with a cloth.

Younger than 7 months

- Have a mirror where baby can roll towards and look into – babies usually enjoy this. Remember to turn your baby around after a while so that he/she can roll in the other direction.
- Let your baby play with a toy while lying on his/her side.

Older than 7 months and younger than 10 months

- Let your baby crawl on different surfaces. Wood or tiled floors are usually easier than sand and grass.
- When baby is playing at a surface where they are standing or kneeling, show them pictures of objects or family that they are familiar with.

Older than 10 months

- Look through books with pictures – point to the pictures and tell your baby what you see.
- When dressing your child tell your baby what body parts you are handling for example say: "Look, I'm putting your foot through this hole. I am pulling this shirt over your head."

When playing with your baby, half hide a toy under a cloth and ask your baby: "Where is it?" or "Find it!" And remember to show delight when they do find the toy.

4.3. Reference list for pictures

Reference List for Pictures used in Intervention Pamphlet

Playing with Ball (2009). (Online). Available: http://www.inkity.com/catalog/product/2/999/Baby-Pushing-Big-Ball.html. 14 November, 2010.

Department of Physical Therapy (2010). (Online). Available: www.vcu.edu/pt/prospectivestudents/tdpt.htm. 15 October, 2010.

First Steps (2010). (Online). Available: http://www.dreamstime.com/royalty-free-stock-image-first-steps-image6526616. 14 November, 2010.

Freeman Babies (2010). (Online). Available: http://www.freemanhealth.com/babies. 15 October, 2010.

Axalan-Dalisay, A.M. (2010). *4 Games to Boost Your Baby's Motor Development.* (Online). Available: http://www.smartparenting.com.ph/baby/activities/4-Games-to-Boost-Your-Baby-s-Motor-Development. 14 October, 2010.

Lund, J. & Breakey, A. (2010). *Baby Sit on Chair.* (Online). Available: http://www.jupiterimages.com/Image/royaltyFree/76132663. 15 October, 2010.

Meyerhoff, M. (2010). *How to Exercise Your Newborn.* (Online). Available: http://tlc.howstuffworks.com/family/baby/how-to-exercise-with-a-newborn3.htm. 15 October, 2010.

Poldesnova (2010). *Standing Baby is Held by its Mother.* (Online). Available: http://www.123rf.com/photo_4802309_standing-baby-is-held-by-her-mother.html. 14 November, 2010.

Ponnay, B. (2007). *A Catch Up Post.* (Online). Available: http://secret-agent-josephine.com/blog/2007/02/12/a-catch-up-post/. 14 November, 2010.

Weiss, J. (2006). *Lactation Nation.* (Online). Available: http://www.boston.com/news/globe/ideas/articles/2006/02/19/lactation_nation/. 13 November, 2010.

Appendix 5: Ethics

5.1. Proposal Approval

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA · UNIVERSITEIT VAN KAAPSTAD

FACULTY OF HEALTH SCIENCES
Human Research Ethics Committee

Amendment Form

Date	14 October 2010
HREC REF Number	266/2010
Protocol number (if applicable) & Protocol title	A comparison of treatment protocols for infants with motor delay: standard versus intense therapy
Principal Investigator	Odette Olivier
Department / Office Internal Mail Address	F45 School of Health and Rehabilitation Sciences Division of Physiotherapy

List of Proposed Amendments with Revised Version Numbers and Dates

1. In the initial submission of the proposal to the Ethics Committee, the concern was raised about the possibility of not reaching the required sample size if infants who are born prematurely and/or with a low birth weight were to be excluded from the study. After analyzing the data collected from the 2nd year MBCHB SSM project investigating the prevalence and history of motor delay amongst well-clinic attendees it was found that there were not as many infants who presented with motor delay due to environmental/psychosocial/unexplained factors and I would like to now remove the exclusion criteria stating that infants who were born prematurely and/or with a low birth weight will be excluded. (See attached letter)

2. Adding an additional period of recruitment in January 2011 followed by an intervention period for these participants executed in the exact same manner as the 1st part of the project in 2010.

HREC office use only (FWA00001637; IRB00001938)			
☒ Approved	☐ Type of review: Expedited	☐ Full committee	
This serves as notification that all changes and documentation described above are approved.			
Signature Chairperson of the HREC	signature removed	Date	18/10/2010

5.2. Proposal Approval for amended version

UNIVERSITY OF CAPE TOWN

Health Sciences Faculty
Research Ethics Committee
Room E52-24 Groote Schuur Hospital Old Main Building
Observatory 7925
Telephone [021] 406 6626 • **Facsimile** [021] 406 6411
e-mail: shuretta.thomas@uct.ac.za

07 July 2010

HREC REF: 266/2010

Ms O Olivier
c/o Ms G Ferguson
Physiotherapy
Health & Rehab

Dear Ms Olivier

PROJECT TITLE: A COMPARISON OF TREATMENT PROTOCOLS FOR INFANTS WITH MOTOR DELAY: STANDARD VERSUS INTENSE TREATMENT.

Thank you for addressing the issues raised by the Faculty of Health Sciences Human Research Ethics Committee.

It is a pleasure to inform you that the Ethics Committee has **formally approved** the above-mentioned study.

Approval is granted for one year till the 15th July 2011.

Please submit an annual progress report if the research continues beyond the expiry date. Please submit a brief summary of findings if you complete the study within the approval period so that we can close our file.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the REC. REF in all your correspondence.

Yours sincerely

signature removed

PROFESSOR M BLOCKMAN
CHAIRPERSON, HSF HUMAN ETHICS
Federal Wide Assurance Number: FWA00001637.

S Thomas

Institutional Review Board (IRB) number: IRB00001938

This serves to confirm that the University of Cape Town Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP) and Declaration of Helsinki guidelines.

The Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

5.3. District Health permission to screen at clinics

DEPARTMENT of HEALTH
Provincial Government of the Western Cape

COMPONENT

claudabr@pgwc.gov.za
tel: +27 21 483 9907; fax: +27 21 483 9895
1st Floor, Southern Life Centre, 8 Riebeek Street, Cape Town, 8001
www.capegateway.gov.za

REFERENCE: 18/19/RP92/2010
ENQUIRIES: Dr N Peer

Odette Olivier
61a Queen Victoria Road
Claremont
7400

Fax: (053) 6210 381

For attention: Odette Olivier

A COMPARISON OF TREATMENT PROTOCOLS FOR INFANTS WITH MOTOR DELAY: STANDARD VERSUS INTENSE THERAPY

Thank you for submitting your proposal to undertake the above-mentioned study. We are pleased to inform you that the department has granted you approval for your research. Please contact the following members of staff to assist you with access to the facilities:

Heideveld	Sr A Eksteen	(021) 637 8054
Guguletu CHC	Ms Mabusela	(021) 633 0020

Kindly ensure that the following are adhered to:

1. Arrangements can be made with managers, providing that normal activities at requested facilities are not interrupted.
2. Researchers, in accessing provincial health facilities, are expressing consent to provide the department with an electronic copy of the final report within six months of completion of research. This can be submitted to the provincial Research Co-ordinator (healthres@pgwc.gov.za).
3. The reference number above should be quoted in all future correspondence.

We look forward to hearing from you.

Yours sincerely

signature removed

DR J CUPIDO
DEPUTY-DIRECTOR GENERAL

The Afrikaans or Xhosa version of this document is available on request.

DISTRICT HEALTH SERVICES AND PROGRAMMES
DATE: 26/10/10

CC: DR J CLAASSEN DIRECTOR: KLIPFONTEIN/MITCHELL'S PLAIN SUB-STRUCTURE

5.4. City Health Permission to screen in clinics

CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

Civic Centre
12 Hertzog Boulevard
Cape Town 8001
P O Box 2815, Cape Town 8000
Ask for: Dr G H Visser
Tel: 021 400-3981
Cell: 083 298 8718
Fax: 021 421-4894

IzikoloLuntu
12 Hertzog Boulevard
Cape Town 8001
P O Box 2815, Cape Town 8000
Cela: Qrh G H Visser
Umnxeba: 021 400-3981
Cell: 083 298 8718
Ifeksi: 021 421-4894

Burgersentrum
Hertzog-boulevard 12
Kaapstad 8001
Posbus 2815, Kaapstad 8000
Vravir: Dr G H Visser
Tel: 021 400-3981
Sel: 083 298 8718
Faks: 021 421-4894

E-mail: helene.visser@capetown.gov.za
Website: http://www.capetown.gov.za
Ref:
Filename: http://citymysites.capetown.gov.za/personal/kjennings/Personal Documents/My Documents/City General/Research/Odette Olivier extension.docx

CITY HEALTH — Specialised Health

2010-11-03

Dear Ms Olivier

re: Research Proposal: A comparison of Treatment Protocols for Infants with Motor Delay: Standard vs Internal Therapy (ID 10195a) – extension (Odette Olivier, UCT)

Permission has been granted for you to extend the period of your research as per your protocol at Bishop Lavis Clinic in Tygerberg Sub District and Gugulethu Clinic in Klipfontein Sub District and to include an additional, new site being Heideveld Clinic, also in the Klipfontein Sub District.

1.	**Tygerberg Sub District:** Contact People	Bishop Lavis Clinic Mrs M Alexander (Sub District Manager) Tel: (021) 938-8279/ 084 222 1471 Mrs D Titus (Head: PHC & Programmes) Tel: (021) 938-8281/ 084 308 0596
2.	**Klipfontein Sub District:** Contact People	Gugulethu and Heideveld Clinics Mr K Nkoko (Sub District Manager) Tel: (021) 630-1667/ 082 433 1332 Mrs T Nojaholo (Head: PHC & Programmes) Tel: (021) 630-1626/ 084 220 0133

Please note the following:

1. All individual patient information obtained must be kept confidential.
2. Access to clinics must be arranged with the relevant Manager such that normal activities are not disrupted.
3. A copy of the final report must be sent to City Health Head Office (P. O. Box 2815, Cape Town 8001) within 3 months of its completion and feedback must also be given to the clinic involved.
4. Your project has been given an ID number (10195a). Please use this in any future correspondence with us.

Thank you for your cooperation and please contact me if you require further information or assistance.

Yours sincerely

signature removed

pp Dr Visser

DR G H VISSER
MANAGER: SPECIALISED HEALTH

cc. Mrs M Alexander & Mrs D Titus
Mr K Nkoko & Mrs T Nojaholo

Appendix 6: Other

6.1. Well Baby Clinic screening tool

CITY HEALTH

Clinic Stamp / Address

DEVELOPMENTAL SCREENING TOOL:
0 – 6 WEEKS

(See guidelines for disclaimer)

Name of child .... D.O.B. ....

(D) Indicates a possible developmental problem. Refer for developmental assessment

PHYSICAL EXAMINATION			
1	Adequate weight gain	Yes	No
2	Head circumference normal (relative to weight)	Yes	No (D)
3	Fontanelle normal **If abnormal, may be medical emergency**	Yes	No
4	General appearance normal	Yes	No (D)
5	Skin and eyes normal	Yes	No
6	Mouth and palate normal	Yes	No
	Sucking normal	Yes	No (D)
7	Genitalia normal	Yes	No
	Testes descended in boys	Yes	No
8	Hips normal	Yes	No
9	Feet normal	Yes	No

QUESTIONNAIRE AND EXAMINATION

GROSS AND FINE MOTOR				
10	Limb movements normal		Yes	No (D)
11	Posture normal		Yes	No (D)
12	Tone Normal:	Neck: Pull to sit	Yes	No (D)
		Trunk: Ventral suspension	Yes	No (D)
		Limbs: Limb flexion/extension	Yes	No (D)
13	Moro reflex normal		Yes	No (D)
LANGUAGE AND HEARING				
14	Ask:	Were both parents of the child born with normal hearing?	Yes	No (D)
15	Ask:	Does the child startle to sound?	Yes	No (D)
VISION				
16	Fixes (birth) and follows (6 weeks)		Yes	No (D)
PSYCHO-SOCIAL				
17	Ask:	Does the child smile at the caregiver?	Yes	No
18	Observe:	Caregiver interacts well with child	Yes	No
MENTAL HEALTH				
19	Ask:	Is the caregiver coping?	Yes	No

Comment / referral: ....

....

....

....

Name (Print) .... Signature Date: CT/CH 3/05

CITY HEALTH

clinic stamp/address

DEVELOPMENTAL SCREENING TOOL: 9 MONTHS

(See guidelines for disclaimer)

Name of child: .... D.O.B. ....

(D) indicates a possible Developmental problem.
Refer for developmental assessment.

PHYSICAL EXAMINATION			
1.	Adequate weight gain	Yes	No
2.	Head circumference normal (relative to weight)	Yes	No (D)
3.	General appearance normal	Yes	No (D)
QUESTIONAIRE AND EXAMINATION GROSS AND FINE MOTOR			
4.	Ask: Does the child sit without support?	Yes	No (D)
5.	Ask: Does the child move all his/her limbs equally?	Yes	No (D)
6	Ask: Do the child's arms and legs feel normal to you, with no stiffness or weakness?	Yes	No (D)
7.	Ask: Does the child feed him/herself with a piece of bread?	Yes	No (D)
LANGUAGE AND HEARING			
8.	Ask: Does the child make speech sounds(eg. Ma-ma-ma, da-da) or try to copy your sounds?	Yes	No (D)
9.	Ask: Does the child turn towards you when you call his/her name?	Yes	No (D)
VISION			
10.	Ask: Does the child watch a moving object?	Yes	No (D)
11.	Ask: Do the child's eyes move well without squinting?	Yes	No (D)
PSYCHO-SOCIAL			
12.	Ask: Does the child prefer to go to familiar people than to strangers?	Yes	No
13.	Observe: Caregiver interacts well with child.	Yes	No
MENTAL HEALTH			
14.	Caregiver is coping. (Ask: How are you?)	Yes	No

Comment / referral: ....
....
....
....

Name (Print) .... Signature .... Date: ....

CITY HEALTH

clinic stamp/address

DEVELOPMENTAL SCREENING TOOL: 18 MONTHS

(See guidelines for disclaimer)

Name of child: .... D.O.B. ....

(D) indicates a possible Developmental problem.
Refer for developmental assessment.

PHYSICAL EXAMINATION			
1.	Adequate weight gain	Yes	No
2.	Head circumference normal (relative to weight)	Yes	No (D)
3.	General appearance normal	Yes	No (D)
QUESTIONAIRE AND EXAMINATION **GROSS AND FINE MOTOR**			
4.	Ask: Does the child walk unaided?	Yes	No (D)
5.	Ask: Does the child move all his/her limbs equally?	Yes	No (D)
6.	Ask: Do the child's arms and legs feel normal to you? (With no stiffness or weakness)	Yes	No (D)
7.	Ask: Does the child grasp a bean-sized object with pincer grip?	Yes	No
8.	Ask: Does the child drink out of a cup unaided?	Yes	No (D)
LANGUAGE AND HEARING			
9.	Ask: Does the child respond to simple commands or questions? (Eg. Show me you foot/nose; where is mommy?)	Yes	No (D)
10.	Ask: Does the child use three recognisable words?	Yes	No (D)
11.	Ask: Does the child turn towards you when you call his/her name?	Yes	No (D)
VISION			
12.	Ask: Does the child watch a moving object?	Yes	No (D)
13.	Ask: Do the child's eyes move well without squinting?	Yes	No (D)
PSYCHO-SOCIAL			
14.	Ask: Does the child play alone in your presence?	Yes	No
15.	Ask: Does the child come to you when needing assistance?	Yes	No
16.	Observe: Caregiver interacts well with child.	Yes	No
MENTAL HEALTH			
17.	Caregiver is coping. (Ask: How are you?)	Yes	No
18.	Observe: Child's emotions and behaviour appear normal.	Yes	No

Comment / referral: ....
....
....
....
....

Name (Print) .... Signature .... Date: ....