INVISIBLE PREMATURITY:
IDENTIFYING AND SUPPORTING THE LEARNING AND DEVELOPMENT OF PRESCHOOL CHILDREN BORN PREMATURELY NOT IDENTIFIED AS NEEDING EARLY INTERVENTION

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Abstract

Children born prematurely are at higher risk for medical, learning and developmental concerns than children born full term. This study analysed the files of 73 pre-term children who completed an Assessment and Monitoring programme in New Zealand between 1998 and 2007. The participants were 39 boys and 34 girls with gestational ages ranging from 23 weeks to 32 weeks at birth and who attended the programme until they were 4 years chronological age. Analysis of the reports sent to paediatricians following the children's monitoring visits at 8 months, 12 months, 18 months, 24 months and 36 months (corrected age) and at 48 months (chronological age) indicated delays in achieving the expected developmental milestones in expressive language, cognition and gross motor skills for up to half of the cohort. Moreover, the findings further suggest that a 'sleeper effect' or 'invisible prematurity' emerged for up to half of the cohort at age 36 months. This 'invisible prematurity' and the developmental delay in cognition, expressive language and gross motor skills have implications for early childhood teachers as teachers need to develop an awareness of, and skills to identify and work effectively with these young children and their families. Practical teaching and learning strategies are presented for teachers.

Glossary

Assessment and Monitoring (A&M) programme: Regular appointments for parents and preterm babies from birth-four years (corrected age) when a range of assessments are completed for children born prematurely who are considered to be 'at risk' developmentally.

Born prematurely/preterm: Infants born less than 37 weeks gestation.

Corrected age: the age a child would have been if they had not been born prematurely.

Developmental challenges: aspects of human growth and change (physical, psychological and social) which require additional support for preterm children to achieve at the same level as their peers.

Early childhood centre: a licensed and chartered premises used for the education or care of 3 or more children under 6 years (being children not belonging to the provider of the education or care).

Early childhood educational success: achievement enabling children to take part in all aspects of social and intellectual experiences appropriate to the preschool (0-5 years of age) setting.

Early childhood teachers: qualified and registered teachers working in licensed early childhood centres.

Early intervention (EI): A professional service which identifies and helps babies and young children reach their full potential if they are significantly delayed or at risk of delay in their development.

Extremely low birth weight (ELBW): infants with a birth weight under 1000 grams.

Gestational age (GA): Amount of weeks a foetus lives in the mother's womb (normal gestation is 40 weeks).

Invisible prematurity: Infants born prematurely who require little or no early intervention in their first five years.

Low birth weight (LBW): infants with a birth weight under 2500 grams.

Self-regulation: ability to keep oneself calm enough to work or play, and the management of brain and body arousal systems.

Very low birth weight (VLBW): infants with a birth weight under 1500 grams.

Working memory: the ability to hold task relevant information in the mind for brief intervals so the information can be used to guide future actions.

Chapter 1

Introduction and Review of the Literature

Preterm birth has profound educational and health consequences for children in New Zealand and worldwide (Litt, Taylor, Klein, & Hack, 2005; Woodward, Edgin, Thompson, & Inder, 2005). Babies born prematurely are at higher risk than babies born full term for medical and developmental complications which can affect the growing baby and family well into childhood. Prematurity and its concomitant low birthweight are associated with neonatal mortality and morbidity, inhibited growth and delayed cognitive development (World Health Organisation & United Nations Children's Fund, 2004).

Prevalence and definitions of prematurity

International studies suggest that infants born before 32 weeks gestation now represent more than 2% of all live births and their survival rates exceed 85% (Horbar et al., 2002; Melnyk, Feinstein, & Fairbanks, 2002). In New Zealand, the incidence of preterm birth still appears to be rising (Ministry of Health Information Services, 2004) with infants born preterm (less than 37 weeks gestation) in 2004 representing 7.1% of all live births in New Zealand; and infants born very premature (less than 32 weeks) now representing around 1.3% of all live births. In 2004, 660 infants (1.1%) were born very preterm in New Zealand and 250 (0.4%) were born extremely preterm (less than 28 weeks) (Ministry of Health Information Services, 2004). A report produced by Otago University's Christchurch School of Medicine states that "with current sophisticated technological advances, and greater understanding, over 90% of very preterm babies (less than 32 weeks) now survive" (University of Otago Christchurch School of Medicine, 2001).

Children born prematurely are often described by gestational age and by birth weight. In terms of gestational age, a child is considered premature if (s)he is born before 37 weeks of gestation, with 40 weeks being considered 'full term'. If a child is born before 32 weeks gestation, the child is considered very premature and those born < 28 weeks gestation are referred to as extremely preterm. In terms of birthweight, children born weighing < 1500 grams are considered very low birthweight (VLBW) and those born weighing < 1000 grams are considered extremely low birthweight (ELBW). There is considerable discussion about which measure, gestational age or birthweight, is the most critical. Typically, gestational age and birth weight are positively correlated (Luciana, 2003). However, Woodward et al. (2005) have showed that gestational age is independently associated with long-term outcomes, where lower gestational age correlates with poorer outcomes for children born prematurely.

In this thesis the focus is on gestational age, as the major objective was to analyse the development of infants in a monitoring programme based on gestational age. However, the literature on prematurity uses both gestational age and birthweight as indicators of prematurity and both will be referred to in the literature reviewed here. In line with this literature, all references to age will indicate whether corrected or uncorrected (or chronological) age is being used. The 'corrected age' refers to the age the child would have been if they had not been born prematurely. For example, a ten- month-old born two months premature is eight months corrected age.

A child born prematurely spends the first days or weeks in a noisy neonatal intensive care unit (NICU) environment of incubator, cardio-respiratory monitor and ventilator. The preterm infant is likely to experience irregular respiration, temperature instability and numerous medical interventions such as blood transfusions, oxygen

therapy and, for some, tube feeding and surgery. The on-going impact of such a traumatic start to life is significant and cannot be overlooked when considering the experience of children born prematurely in early childhood education.

The aim of the literature review was to establish the impact of prematurity on children's leaning and development. Several areas of development and learning were identified as likely to be impacted when a child was born prematurely. This included children born prematurely who required early intervention as well as children born prematurely who did not require early intervention. The suggestion of a sleeper effect was identified and the possibility of a delayed impact of prematurity established. The different needs which children born prematurely may have and how this might impact on the early childhood teacher's care at the centre was investigated.

The studies reviewed in this report were selected from searches of the following databases: PsycINFO, Science Direct, MasterFILE Premier, ProQuest Education and EBSCOhost. Descriptor terms used were preterm infant and development, preterm infant and education and premature birth. This accessed 67 reports from 2003-2008. A search by author name was also undertaken and found 3 additional studies. A manual search of current issues of appropriate journals was conducted and found 12 further articles. An ancestor search of the reference lists of relevant reports found 6 further studies. Studies were included in the review if they met the following criteria:

1. Made links between premature birth and an area of development or learning in early childhood or
2. Included a follow up assessment between 1-5 years of age of the cohort or
3. Included a control group of full term children in the study.

Sixteen studies were found which met these criteria. These studies focussed on the developmental difficulties faced by children born prematurely and the impact of these difficulties in relation to their education. Implications for preschool teachers were referred to in the discussion within several articles found and will be included in this report.

Educational impact of prematurity

Children born prematurely clearly form part of the cohort attending early childhood centres; and the impact of preschool education on children's learning and development is acknowledged as significant (Kilbride, Thorstad, & Daily, 2004). The number of children attending preschool education in New Zealand has continued to increase in recent years (49.5% from July 1990-July 2005) with a 5.8% increase of enrolments in licensed and chartered early childhood services from 1 July 2002-1 July 2006 (Ministry of Education, 2006). Children are also attending preschool education from an earlier age, with the largest increase in enrolments in the 1 July 2002-1 July 2006 period recorded for children under 3 years of age (Ministry of Education, 2006). The combined incidence of attendance at early childhood centres and prematurity suggests that every early childhood classroom is likely to have at least one child born prematurely.

Children born preterm (before 37 weeks gestation) and of very low birth weight are at increased risk of learning difficulties and educational under-achievement (Rose, Feldman, Jankowski, & Van Rossem, 2005). Follow-up studies of children who were born preterm have revealed high rates of neurodevelopmental disability with 5 to 15% developing cerebral palsy and/or severe neurosensory impairment, and a further 25 to 50%, while appearing to be free of such obvious disabilities, having long-term learning difficulties with language, reading, mathematics, thinking skills,

memory, social adjustment, behaviour and perceptual and organisational skills (Hack & Fanaroff, 2000; Litt et al., 2005; Salt & Redshaw, 2006; Schneider, Wolke, Schlagmuller, & Meyer, 2004). An implication of these studies is that school progress is likely to be impeded and extra educational support may be required (Anderson & Doyle, 2004; Taylor, Klein, Minich, & Hack, 2000). Additionally, studies suggest that the lower the gestational age or birth weight is, the more severely a child's school achievement will be affected (Schneider et al., 2004; Taylor et al., 2000).

Research into the on-going effects of premature birth focuses mainly on specific aspects of disability which are impacting on children born prematurely (Kilbride et al., 2004; Oberklaid, Sewell, Sanson, & Prior, 1991; Rose et al., 2005). Research based in New Zealand or Australia found by this researcher also identifies the greater difficulty preterm children have in areas of social, physical and cognitive development (Silva, McGee, & Williams, 1984; Woodward et al., 2005; Xu & Filler, 2005). Anderson, Doyle and the Victoria Infant Collaborative Group (2003) completed a longitudinal study of a representative cohort of children born extremely preterm (< 28 weeks' gestation) during 1991-1992 in Victoria, Australia. A group of 278 extremely preterm children and 265 children born full term were followed up to the age of 8 years. Their findings indicated that extremely preterm children did not progress as well as the children born full term in many areas. This included measures of cognitive ability and academic progress (including reading, spelling and maths) as well as reports from teachers stating that verbal thinking, speech, reading, writing, maths and general knowledge were achieved to a lower degree than the full term children. Higher rates of behavioural difficulties were also identified in the extremely preterm group.

Woodward et al., (2005) showed the greater difficulty preterm children had encoding new information in their working memory compared to full term control children. This was a longitudinal study based on a cohort of 92 preterm children and 103 full-term children. MRI measures of cerebral injury and structural brain development and individual children's performance on tasks linked to object working memory were analysed at 2 years of age. These researchers concluded that "children born preterm and of very low birth weight are at increased risk of learning difficulties and educational under achievement" (p. 2578). Preterm children had greater difficulty encoding new information in working memory than the full term children. Working memory is an important tool for intellectual and academic success as it allows a child to retain relevant task information and apply this in future situations. This study also reported a trend for gestational age to be independently associated with long-term outcome and reflects the findings of other research results on several aspects of development (McCormick et al., 2006; Taylor, Klein, Schatschneider, & Hack, 1998).

In a recent study by Foster-Cohen, Edgin, Champion, & Woodward (2007) the effects of being born very preterm on children's early language development was examined. They followed up, at age 2 years, a regional sample of 90 children born very preterm, weighing < 1500 grams and/or with a gestational age of < 33 weeks, and compared them with a sample of 102 children born full term, with a gestational age of 38-41 weeks. Results showed that there was a clear linear relationship between gestational age at birth and later language outcomes. Their findings highlighted the importance of gestational age in predicting later risk of language difficulties in similar populations of children born prematurely.

Nadeau, Boivin, Tessier, Lefebvre and Robaey (2001) conducted a longitudinal study looking at the longer-term impact of premature birth when children

reach school entry age. They followed up at age 7 years a cohort of extremely preterm VLBW children. Results showed that a clear link was found between birth status and intellectual and neuromotor development problems at 5 years 9 months. Generally, the extremely premature VLBW children had more developmental delays than children born at full term. These researchers also found that these delays accounted for a predictive relationship between premature birth and distinct behaviour problems such as inattention and hyperactivity. From this study, teachers reported that premature children had difficulty in concentration, in maintaining auditory information in their working memory and reusing it in an orderly fashion. Teachers felt this led to a 'cognitive handicap'.

An earlier study by Taylor et al., (2000) identified a similar pattern of findings in middle school age children (11 year olds). They followed up a sample of 60 preterm children with VLBW and a comparison group of 49 children born at full term who had also been assessed at early school age (at age 7 years). The researchers found that the VLBW group did less well at middle school assessment than the full term group on measures of cognitive function, achievement, behaviour and academic performance. It was felt the VLBW group was at risk for long-term developmental problems and increasing behaviour and attention problems should be addressed by special education support.

An earlier study by Burns, Ensbey, and O'Callaghan (1999) examined the link between motor development problems and premature birth. They investigated the types of minor motor problems evident in children who were less than 1000 g at birth and were now 8 -10 years old. Their participants were 29 ELBW children who had no sensory, cognitive or motor impairment and a control group of 12 normal birthweight eight year old children. The results showed a significant difference in tests of

preferred hand position sense, single leg stance, alternate hand ball bounce and an alphabet writing task. The ELBW children were more likely to demonstrate mild motor problems in gross and fine motor performance and postural stability and balance.

Burns, O'Callaghan, McDonell and Rogers (2004) later researched the relationship between motor ability and cognitive performance. The researchers followed up 132 children born between 1993 and 1996 with a birthweight < 1000g and completed a physiotherapy assessment and an intellectual assessment at 12 months and at 4 years (corrected ages) on the participants. The gestational age range for the children was 24-34 weeks. Their findings indicated that the detailed testing of motor development of the ELBW children at 12 months did have a strong association with later cognitive and academic performance at 4 years. The importance of early motor assessment for ELBW children which could enable appropriate early intervention and on going monitoring was emphasised by the researchers.

Overall, the findings suggest that children born preterm experience difficulties with their social, physical and cognitive skills, therefore extra assistance may be required once they attend an early childhood centre or school.

Invisible prematurity and the sleeper effect

Luciana (2003) investigated the cognitive development of children born preterm. She conducted a major review of many studies on preterm birth and links to developmental delays. Her significant conclusion was that a "normal" classification in infancy was a relatively poor predictor of later functioning because minor neurological abnormalities became increasingly evident as preterm children approached school age. In support of Luciana's (2003) finding Schneider et al., (2004) found that, because prematurity impacts the core capacities for learning (such as

working memory, self-regulation and executive functioning) academic problems accumulate with increasing age. This type of late-emerging cognitive dysfunction has been termed a 'sleeper effect' (Luciana, 2003), where preterm children show increased evidence of minor neurological abnormalities as they approach school age.

McGrath, Sullivan, Lester and Oh (2000) completed a longitudinal study which followed 188 children (39 healthy full term and 149 preterm infants) from birth to age 8 years. The cohort was divided into five groups with one group of infants born full term and healthy and four groups of infants born prematurely with varying degrees of neurological impact (based on their neonatal clinical diagnosis). Their findings showed that neonatal medical status was a significant predictor of school performance and later developmental outcomes, with their group of neurologically severely compromised children having the highest need for academic support. The full term group had significantly higher cognitive scores than did all the preterm groups. The researchers concluded that normal infant development was poorly predictive of continued normal development for children born prematurely and emphasised the need for continued neurodevelopmental follow-up of these preterm children. McGrath et al. found that "children born prematurely are at risk for the emergence of sleeper effects at later ages" (p.1403).

In this thesis, I suggest these premature infants can be seen as being 'invisible' in their prematurity. Such children arrive at early childhood centres with no readily identifiable disability or developmental delay. However, the impact of their preterm birth on their development may become increasingly evident as they approach school age. Unless early childhood teachers and other adults involved with these children can identify that a child was born prematurely and understand the impact that prematurity may have on a child's development, many children will continue through the

education system experiencing increasing difficulty without extra support which could have been available much earlier.

Many of the learning difficulties associated with preterm birth are not identified prior to children entering school. These learning difficulties may impact significantly on their academic success, because prematurity impacts the very capacities for learning (memory, self-regulation, executive function), "academic problems accumulate with increasing age" (Schneider et al., 2004, p. 386). In order to address and meet the educational needs of children born prematurely, common areas of delay which could be supported by qualified and registered teachers in early childhood services need to be identified.

While research appears to focus on specific aspects of disability impacting on children born prematurely (Anderson & Doyle, 2004; Berzen et al., 1995; Gardner, 2005),there appears to be limited research which targets the "invisibly premature" children who do not meet requirements for multi-disciplinary early intervention programmes as infants, but who either have less obvious difficulties or who grow into their difficulties during early childhood. As Luciana suggests, "between infancy and school age, children are more likely to grow into, than to grow out of, deficits following premature birth" (Luciana, 2003, p.1027). A number of such children are included in the studies referenced above, but there are, as far as this researcher could ascertain, no studies reported in Aotearoa New Zealand focussing on this group alone.

Early childhood teachers need to be aware of the risks to educational success posed by prematurity in order to help young children who were born prematurely overcome factors which could limit their educational achievement.

"Invisibly premature" children and the early childhood teacher

The significance of establishing a developmentally appropriate environment in which to learn is equally true for premature children (Xu & Filler, 2005) and for preschool children born at full term (Cole & Cole, 2001). Viewing the child holistically is in line with Te Whāriki: He whāriki mātauranga mo ngā mokopuna o Aotearoa (Te Whāriki), the New Zealand early childhood curriculum. (Ministry of Education, 1996). The curriculum is about the individual development and learning of the child. It starts with the learner and all that children bring to their experiences. However Te Whāriki also acknowledges the importance of the home setting and the community to which the child belongs. In early childhood education, the physical, intellectual, emotional, social and spiritual dimensions of a child are acknowledged and are interwoven when considering the development of the child.

One of the four principles of Te Whāriki reflects the holistic way children learn and grow. The influence of Bronfenbrenner's ecological systems theory (Berk, 2003) is evident in the design of the early childhood approach to providing quality care and education to infants, toddlers and young children. The ecological approach sees children in the context of all the various settings they inhabit on a daily basis (Cole & Cole, 2001). Bronfenbrenner uses the image of nested layers to describe the microsystem of the home or early childhood centre and of the benefits of connecting links between them and with the wider social worlds in the exosystem (parents' work, support network of family and friends) and macrosystem (beliefs and value systems of society) (Cole & Cole, 2001).

Nested layers of the environment are seen as major influences on children's well-being and include settings such as preschools and early intervention centres. Sharing information between key personnel in these settings for young children, their

families and whānau can assist in providing for a child's optimum development (Ackerman, 2005). Research reviewing the factors that influence the effectiveness of quality early education for all children emphasises the importance of the inclusion of parents and other family members (Ackerman, 2005; Melnyk et al., 2002). Early childhood teachers are significant facilitators in establishing the link for sharing information (Ackerman, 2005; Greenman & Stonehouse, 1997; Ministry of Education, 1998). Therefore it is important that early childhood teachers are able to respond effectively and appropriately to all children and their families – to preterm children as well as full term children.

The research study

Extra educational support for children with high and complex needs is provided between birth and school age by early intervention services. Children born prematurely who do not meet criteria for these services, however, still need to be monitored so that health and education services can respond effectively if any child fails to develop appropriately. In Christchurch these needs are met by Assessment and Monitoring services funded by the Ministry of Health.

The fact that several researchers have found a clear association between preterm birth and later cognitive and neurodevelopmental difficulties in school age children raises questions about the pattern of development of these difficulties and whether they could be identified at an earlier age. This has implications for the way in which preterm children likely to be at risk are supported in early childhood centres. In light of the increasing number of children attending New Zealand early childhood centres, and within these numbers, a likelihood of children attending who represent the "invisibly preterm" child, this researcher is interested in the following research questions.

Research Question(s)

1. What is significant about the developmental progress in children born prematurely who are not referred for early intervention?

2. What recurring issues are most likely to impact on early childhood educational success?

3. How could early childhood teachers respond effectively to these children (in the group termed ‘invisibly premature’)?

Children who are born prematurely and who do not meet the criteria for early intervention services are likely to be part of every early childhood centre in New Zealand. The importance of identifying their ‘invisibly preterm’ needs early has been outlined. Ways to provide support as these children move through the centre and on to formal education need to be identified and strategies given to the early childhood teachers.

Chapter 2

Methodology

Introduction

This chapter presents the research design and methods used for this thesis and addresses the ethical issues it presented. It also provides the rationale for situating this research in a biopsychosocial approach, justifying the use of the biopsychosocial approach in the context of the sociocultural approach prevalent in early childhood studies.

Establishing an appropriate approach

Early childhood education in New Zealand is currently underpinned by sociocultural theory whereby the child is always viewed with the knowledge that "a child's learning environment extends far beyond the immediate setting of the home or early childhood programmes outside the home" (Ministry of Education, 1996, p.19). The sociocultural approach views the individual child as a competent and confident learner situated in a context which is important to learning and development (Ministry of Education, 1996). It takes a holistic view of the child's development, rather than examining any one part of development separate from the whole child. The emphasis is on what the individual is achieving rather than on what is not yet achieved, and the approach emphasises the "critical role of socially and culturally mediated learning and of reciprocal and responsive relationships for children with people, places and things" (Ministry of Education, 1996, p.9). Cullen (2003) described the sociocultural approach as "A holistic approach [which] acknowledges that the whole is greater than the sum of its parts; it does not mean that there are no parts, or, that we cannot identify component skills that would help the child achieve their interest-based goals"

(p.282). The sociocultural model is a credit or strengths-based model that underpins Te Whāriki: He whāriki mātauranga mo ngā mokopuna o Aotearoa (Te Whāriki), the New Zealand early childhood curriculum. (Ministry of Education, 1996) and Kei Tua o te Pae/ Assessment for Learning: Early Childhood Exemplars (Ministry of Education, 2004) used by those involved in early childhood teaching in New Zealand.

The sociocultural approach has been found to allow children to develop according to their own schedules and interests and works well for children in a wide range of contexts. For children such as those born prematurely, however, it does not acknowledge sufficiently the biological aspects of their early experiences. These are children who have been 'medicalised' throughout their first months, and whose development has had to be directly encouraged and at times led by adults who know how to help children move beyond what they might do 'naturally'. That is the goal of early intervention:

> Early Intervention means professionals working in partnership with parents of children with special needs to help their children develop their knowledge and skills to reach their potential. It builds upon the strengths found in all children and families. Research and practice have proven that Early Intervention produces immediate and long term benefits for children with disabilities, their families, and society (Carpenter, 2001, p.4).

In order to acknowledge the needs of children born prematurely in the context of this research, it was decided to broaden the sociocultural approach to encompass a biopsychosocial approach of a kind that matches the therapeutic goals of the Champion Centre where the research was carried out. Ironically, the biopsychosocial approach itself grew out of a movement in the opposite direction; namely to address the shortcomings of a medical approach that did not take the sociocultural perspective

sufficiently into account, and which was often seen as a 'deficit' model with a focus on what a child cannot do, rather than on what they can do (Engel, 2003a, p.1). This approach subsequently incorporated the person-centered approach of Carl Rogers, which recognised the importance of genuine, unconditional, positive regard as the basis of a therapeutic relationship (Suchman, Beckman, McDaniel, & Deci, 2003). It has been suggested by (Engel, 2003b, p.285) that the biopsychosocial approach provides a "blueprint for research, a framework for teaching, and a design for action in the real world of health care". To that I would add that it sheds important light not only in the world of healthcare, but also in the world of education.

The biopsychosocial approach acknowledges the multi-faceted nature of children's learning and development: physical, cognitive, emotional and social. To understand the relationships central to these children born prematurely and important to their families, the biopsychosocial approach provides a helpful model which bridges the clinical medical world and the social, culturally personal context seen as important in early childhood centres. Thus the value of the biopsychosocial approach to human development in the context of this study is that it allows for a balance between the sociocultural approach prevalent in early childhood studies and the medical approach taken by the systems into which premature children are born.

The Assessment and Monitoring programme at the Champion Centre in Christchurch, which provided the data for this research study, focuses on assisting children to achieve goals which arise from their assessment and which are identified as significant for each child to achieve. These may be linked to the child's interests but may lie outside the child's immediate interest when appropriate. Thus, in order to help children move along the natural continuum of holistic child development, the

approach cannot be entirely child-led. Rather, the monitoring approach must also engage the goals of intervention if it is to help children achieve the optimal development which they are capable of. The approach calls for,

> explicit and constant attention to the whole child in his/her primary familial contexts, rather than to individual aspects of that child in a discipline specific intervention setting. The long-term aim of the therapists is to work in partnership with the parents to prepare their child for inclusion in their community early childhood centre and primary school (from the Champion Centre mission statement) (The Champion Centre, 2005, p.2).

The therapists' approach at the Champion Centre reflects the biopsychosocial model in that they view children as part of a family and acknowledge each aspect of premature birth and its impact on all concerned. In doing this, the therapists must interpret the medical data received and, as part of the partnership they maintain with the medical professionals in these children's lives, must report regularly to the paediatricians who referred them for assessment and monitoring of their development.

Taking a biopsychosocial approach in work with children who are 'invisibly premature' is equally important from an educational point of view because it encourages early childhood teachers to pay attention to the role that <u>each</u> of the components of the biopsychosocial approach - the biological, the psychological and the sociocultural - plays and has played in the lives of the premature children in their centres. If all of these areas are not attended to, they may not be factored into the way teachers support each child's learning and development. Effective support of these "invisibly preterm" children necessitates the use of both medical and sociocultural approaches, respecting the journey children and families have taken before they reach their early childhood centres.

Research design

The study presented here uses a mixed-method design that is both quantitative and qualitative. As is clear from the literature, "quantitative and qualitative approaches should be thought of as complementary methods that, when taken together, provide broader options for investigating a wide range of important educational topics than either one alone" (Gay & Airasian, 2000, p.24). The qualitative aspect of the research involved analysing the reports written on children attending the Champion Centre Assessment and Monitoring Services, focussing on those reports designed for the referring paediatricians by the therapy team. The quantitative aspect involved summarising quantifiable data to reveal trends within them (Silverman, 2001, p.35).

This study used 'grounded theory' based on data collected over an extended period of time and reflects a multicase study since multiple preterm children's files were available for analysis (see Gay, 1996). The constant comparative method was used in which the data was simultaneously coded and analysed in order to generate concepts to develop further (Gay, 2000). By comparing specific incidents in the data, concepts could be refined and the relationships between them explored. The goal of integrating these into a coherent whole of use to a wider early childhood audience provided the motivation for the study. This reflects the goal that "the researcher using grounded theory will not seek to prove such theories but merely to demonstrate plausible support for them" (Taylor & Bogdan, 1994, p. 126). The details of the research methods are provided below.

Nisbet and Watt (as cited in Cohen, Manion and Morrison, 2000) state that the strengths of the case study approach include results which are more easily understood by a wider audience, are strong on reality and can provide insights into other, similar

cases and situations. The case study design therefore aligned well with the goal of increasing the awareness of early childhood teachers of the possible impact of prematurity on children attending early childhood settings. (A rough calculation suggests that every classroom in New Zealand will have at least one child born prematurely.) I would argue that the collection of individual case studies from the multiple perspectives of the therapists involved can assist in generating useful implications for preschool teachers to consider when working with "invisibly preterm" children in their centres.

Setting

Qualitative research seeks to understand the way things are in their natural context and involves purposive sampling, meaning that the sample is selected "precisely because it is believed to be a rich source of the data of interest" (Gay, 1996, p. 24). In Christchurch, there are two organisations funded by the Ministry of Health to provide assessment and monitoring programmes to children born prematurely who do not need multidisciplinary early intervention. The Christchurch Early Intervention Trust which operates the Champion Centre is the larger of the two, providing services to approximately 60 children each year. This service has been archiving data on the programme in the form of client files since its inception in 1999, but had not, before this study, engaged in systematic analysis of this data. The full complement of 142 Assessment and Monitoring client files held by the Champion Centre formed the initial pool from which the sample to be analysed and discussed here were selected.

Access to the children's files was obtained prior to starting this research from both the University of Canterbury's Ethical Clearance Committee and the research committee of the board of trustees of the Christchurch Early Intervention Trust (The

Champion Centre). The conditions governing the latter are contained in the letter in Appendix 1. The conditions governing the former are contained in Appendix 2.

Participants

The files selected were those that were closed (i.e., the children had finished their attendance in the Assessment and Monitoring programme) as of 1 October 2007 and that represented children that had attended at least 4 of the six visits scheduled as part of the programme. Of the 142 files, 85 met this criterion. However, a further 12 files were eliminated as the children had not continued in the programme for more than 12 months, due to the family moving away from the area or the children being referred on to early intervention for the long term. The remaining 73 files constituted the sample used in this study. These 73 represented children receiving a service from release from the Neonatal Intensive Care Unit (NICU) at between 35 and 134 days old to their final assessment at 4 years, chronological age. The sample consisted of 39 boys and 34 girls with gestational ages ranging from 23 weeks to 32 weeks at birth.

Procedures

Analysis of the files of children attending the Assessment & Monitoring Programme involved a content analysis of the texts they contained (Davidson & Tolich, 2001). Each client file contains data recorded from a range of personnel including therapists, early childhood teachers, parents, paediatricians and social workers. It also includes neonatal reports, assessments, monitoring reports and comments from the personnel involved. Reports prepared for parents include a strengths-based narrative indicating the achievements of their child as well as the areas to focus on further, together with ideas and suggestions to extend their child's development. While there are a large number of reports and observations in each

child's file, this study focused on three documents, with the main focus on the third of these. These were:

1) The hospital referral form giving details of date of birth, birth weight, gestational age, gender, medical history while in NICU and release date and weight,
2) The clinical record of appointments with the Assessment & Monitoring therapists
3) The report sent to paediatricians completed at each of the monitoring visits at 8 months, 12 months, 18 months, 24 months, and 36 months corrected and at 48 months chronological age. Corrected age is the age adjusted for the degree of prematurity. Thus a child who was born two months early is "8 months corrected" at the age of 10 months. The final visit is scheduled at children's chronological age because the school system which children will enter does not correct for prematurity.

Analysis of the information in these documents identified relevant data linked to the initial research questions while still allowing the emergence of new themes and concepts as analysis progressed (Davidson & Tolich, 2001). The advantage of using the (document only) client files as data was that, as Gay (1996) has argued, "it is data that is 'unobtrusive', i.e. not affected by the presence of the researcher" (p. 222). The written material exists and cannot be altered. At the same time, one must acknowledge that a researcher's analysis may be selective, personal and subjective, limiting the generalizability of the results (Cohen et al., 2000).

Additional input to the content analysis of the written data came from time spent observing the Assessment and Monitoring programme in action with children not included in the study. This provided an opportunity to understand how reports of the

kind being analysed were generated. The team was made up of three professionally trained therapists who work together as each child is assessed: a speech language therapist, a physiotherapist and an early intervention teacher. The whole team was present throughout each child's monitoring appointment. The appointment was a play-based period of up to 60 minutes when the child was engaged by the early intervention teacher or one of the other therapists in a range of tasks. Each task was part of a play sequence with many opportunities given to allow the child to demonstrate they could complete what was required. The early intervention teacher repeated how a task was to be done and gave prompts where appropriate before repeating this for the child to complete independently. Tasks were sometimes modelled by the therapist, for example, jumping into a hoop laid on the floor and backwards out of it, before expecting the child to do the same.

At the conclusion of each monitoring appointment, the team of therapists withdrew to a separate area allowing the parent and child an opportunity to enjoy free play with the equipment and toys available. The team discussed its findings and then returned to discuss them and the next steps with the family. Each therapist described the areas of development she focussed on, gave a report on the child's progress and allowed time for any questions to be answered. Following this discussion and verbal feedback session, the therapists wrote up their findings in a report for the paediatrician and a report for the parents, adding suggestions of activities to promote emerging skills.

Monitoring visits were scheduled at the corrected ages of 8 months, 12 months, 18 months, 24 months, and 36 months and finally at 48 months chronological age. These points reflected time periods correlated with significant milestones in child development. Achievement or failure to achieve the key milestones at each of these

ages gives a clear picture of the child's developmental progress. These spaced visits also align closely with regularly scheduled appointments which families have with their paediatrician. The milestones anticipated can be seen from the monitoring schedules presented in appendix 3 and are discussed below.

The Assessment and Monitoring programme at the Champion Centre actually begins earlier than the data selected for this research. Shortly after the child's release from NICU, the children and parents begin attending the A&M programme's weekly sessions until the infants are four months corrected age. The emphasis in these initial sessions, as well as subsequent ones, is on how the parents can "support and scaffold their infant's physical, emotional, sensory and linguistic pathways in order to engage with their developing infant"(The Champion Centre, 2005). If the child's development is proceeding appropriately at four months old, the child remains on the assessment and monitoring schedule identified above. (If they do not, they may be referred for early intervention or remain on a weekly schedule for a further period of time.)

In this study, the data from 8 months onwards was selected for two reasons. Firstly, the initial four months was a time of relationships developing between the child, family and therapists with a range of actual involvement time for any one child depending on the length of their stay in the NICU. Secondly, in examining the files, there was sometimes confusion initially as to whether the child had been referred for early intervention or to the assessment and monitoring programme – especially in the early days of the programme. By the 8 month appointment, however, the child's participation in the Assessment and Monitoring Programme was clear, providing an appropriate start point for the data sampling.

Milestone sheets (Appendix 3) are used at each appointment to guide the team in their assessment. These sheets have been compiled from a range of established assessments, including Schafer & Moersch's "Developmental Programming for Infants and Young Children'" (Schafer & Moersch, 1981), the "Carolina Curriculum for Handicapped Infants and Infants at Risk" (Johnson-Martin, Attermeier, & Hacker, 1990) and the N.S.M.D.A. "Physiotherapy Assessment for Infants and Young Children" (Burns, 1992). The actual milestone sheets used have evolved over time through the extensive clinical experience of the team members.

A week before each appointment, the speech and language therapist sends the child's family an infant/toddler checklist of social and emotional skills for the appropriate age (at the 8, 12, 18, and 24 month appointments) and an infant/toddler speech and language sample survey (at 18 and 24 months). Parents of children at 36 months were sent the Infant-Toddler Social and Emotional Assessment [ITSEA] scale (Briggs-Gowan & Carter, 2001) three weeks prior to the assessment visit (as it is a long form to fill out) together with a self-addressed envelope for return to the Centre. Prior to the four-year-old appointment, parents were asked if they gave approval for the early childhood centre their child attends to fill in a social-emotional checklist (see Appendix 4).

The areas of development which the Assessment & Monitoring therapists report on in their 'Report to Paediatricians' are as follows (See Appendix 5 for a copy of the template):

1) Gross motor development

Gross motor skills involve using large muscle skills such as crawling, standing, walking, running and jumping to explore the environment. Moving one's arms and legs all involve gross motor movements. These skills are developed over time and are

assessed based on accepted developmental sequences. Examples of skills assessed at 8 months include ways in which a child rolls over, sits, crawls or pulls to stand. By 3 years, walking backward or up stairs with alternating feet will be assessed. Turning a sharp corner while running could be expected at 3-4 years. The quality of motor movement is assessed by the physiotherapist with modelling being used as appropriate. It is important that a child be able to imitate a new skill and demonstrate the ability to learn this way. (This is the essence of 'dynamic assessment'.)

2) Fine motor development

Fine motor skills involve using the smaller muscles in the hand, fingers and arm as the child joins in activities presented by the therapists. Hand-eye coordination and the manipulation of small objects are assessed in this area. Examples of skills assessed include a mature pincer grip at 8 months and building towers with at least 6 small blocks by 24 months. Cutting along straight and curved lines can be assessed at 4 years; whereas simply holding the scissors and cutting across a narrow strip of paper is expected at 3 years. These activities are woven into the period of play during a child's visit. Again, modelling may be used to demonstrate what is expected and a child may have several turns before successfully demonstrating a new skill unaided.

3) Cognitive

Cognitive skills assessed range from imitating a gesture such as banging on the table at 8 months to searching successfully under 3 containers for an object they know is hidden at 24 months. At 4 years old, a child would be expected to count to 5 with one to one correspondence and demonstrate an ability to classify familiar objects into, for example, same or different groups.

4) *Oral motor*

Oral motor skills are those involved with feeding, sucking and swallowing. These skills often need to be explicitly learned by a child born very prematurely. Therapists will, for example, note whether the child can pick up a spoon, or drink from a cup without a spout at 8 months, and progress to drinking independently and feeding oneself with a spoon by 18 months. Attention is paid at each visit to details such as whether children use their lips to clasp the spout or bite on to the cup or spoon when feeding.

5) Expressive language

Expressive language is about communicating with others, both verbally and non-verbally. Examples of skills in this area include response to facial expressions, playing peek-a-boo or looking when their name is called at 8 months. Words are expected between one year and two years, and increasing use of words and an expanding vocabulary will be expected as children approach 4 years. A child's response to what, why, and how questions will be assessed from 3 years old. The ability to imitate sounds and words is assessed because certain aspects of language are learned through imitation.

6) Receptive language

Receptive language is demonstrated when a child shows that they understand the communication of others. This is expected to develop more quickly than expressive language (Foster-Cohen, 1999). An 8 month old can be expected to raise their hands to be picked up when invited to do so. A 12 month old can be expected to follow simple instructions such as 'give mum the cup'. By 24 months they should be able to identify actions and objects in a book or picture. Understanding more complex commands will develop as children approach 4 years. A different range of interactions

and activities appropriate to a child's age are presented in the play session to enable this area to be assessed.

7) Social-emotional development

This area looks at the attachment or close emotional bond that is formed between child and parent/caregiver. Secure attachment enables an older child to move confidently into widening social groups with their peers and other, less familiar adults. Sharing a hug with mum or dad, caring for a doll, and responding shyly towards strangers demonstrate developing socio-emotional skills, and these are assessed by observation at each visit.

8) Tactile defensiveness

Because of the immature sensory systems of children born prematurely, many children have difficulty tolerating different textures. Assessment of tactile defensiveness can be done by presenting the young child with a variety of textures such as shredded paper or playdough and encouraging their engagement with this material. It may be assessed by hiding a favourite toy in a container with shredded paper at 8 months or having a tea party with playdough at 18 months, complete with rolling, patting and pricking the dough into sausages or cakes.

9) Imitation

Imitation is used as an assessment tool in most of the areas of assessment. This is because it is a key to learning. Infants are equipped to respond to people in their world from birth, often seen in imitation of vocal and facial expression. When the initial capacity to relate to others is disrupted or delayed with the slowly developing sensory system of a child born prematurely, it impacts other systems. For example, communication engages the motor system, the socio-emotional system and the cognitive systems. Imitation can be assessed in any of these areas, whether imitating a

physical skill e.g. banging on the table or a language skill e.g. known sound such as ‘dad’ or ‘mum’. An independent evaluation of imitation is also sent to the paediatrician.

10) *Self-care*

Self- care is assessed from the age of 24 months. Toileting, dressing and completing routines such as brushing teeth and washing hands are included. Initially this is done by parental report as to how independently a child carries out any of the familiar self-care routines. By 4 years some skills will also be observed in either the clinic visit or by the preschool staff.

On the ‘Report to Paediatrician’ form, the team indicates in each area monitored whether the child’s skills indicate satisfactory achievement (a ‘tick’), are ‘emerging’, are ‘immature’ or exhibit a ‘delay’. Discussion with the team members revealed that they recorded a development as emerging when there was some evidence of achievement but not consistently. Immature was recorded when skills were seen to be just beginning to be demonstrated but at an immature level of skill. Only when no evidence of an expected skill was apparent was a delay recorded. In conducting the analysis, comments in the files which clarified each decision, whether they were directly on the report form sent to the paediatrician, on the notes sent to the parents or within the file as part of the Assessment & Monitoring summary notes for that clinic, were used. This expansion of examination beyond the paediatrician form itself was important to ensure that comments which could indicate some concern were all identified.

Data coding

Each child’s file was assigned a study number, and thereafter no reference was made to the identity of any of the children. The relevant data from each file were

recorded on a sheet that included the date of entry into the Assessment and Monitoring programme, date of birth, gestational age at birth, and attendance at each of the monitoring visits. A grid was used to show the results of each visit as recorded on the paediatrician report (see Appendix 6). To determine the patterns of development shown and whether there were recurring patterns the concerns reported to paediatricians were tallied (see next chapter).

Each comment indicating a concern, whether recorded as 'emerging', 'immature' or 'delayed', was coded as a concern for the purposes of this research. This was done even when there was a tick (indicating 'satisfactory') if it was followed by a comment suggesting some concern was still evident. For example Child 15 at 24 months received a 'tick' in the gross motor category followed by 'not yet jumping'. Similarly Child 152 at 36 months received a 'tick' in the fine motor category followed by 'not yet established tripod grip'. In such cases, this was noted as a concern in terms of the analysis.

The main aim of the analysis was to establish in which areas of development concerns occurred, and how these concerns were distributed between areas of development and the time frames assessed in the A&M programme. The degree of concern was not recorded. In other words, decisions were simply binary: presence or absence of concern. By including all concerns and not rating the level of concern a broad picture was possible which would give clear guidelines for teachers to take note of. Teachers are not trained therapists and cannot be expected to engage in fine-grained developmental analysis. They can, however, be expected to know and understand each of the areas of development listed in the report to the paediatrician, and to scaffold and support development in the context of the early childhood centre.

Reliability

To check the reliability of the coding system, a research assistant with approved access to the children's files checked a one in ten sample of the 73 files used. To train the assistant, I explained the system used for recording concerns on the form and used files that were no longer part of the final sample to practise recording on. We discussed the need to consider additional information when comments were placed alongside a 'tick' which could indicate a concern still existed. Results were compared and it was found that there was a 94 % agreement between the researcher and the research assistant.

Chapter 3

Data Analysis and Results

This chapter presents the findings of the data analysis of 73 client files from the Assessment and Monitoring programme at the Champion Centre. The results show the significant areas of developmental concern for children born prematurely at each of the visits to the programme across the entire sample. The changing patterns of concern across appointments from 8 months to four years for the 73 children are presented before turning to a more in-depth analysis of the 43 children born at 27, 28 and 29 weeks gestation.

Gestational age has been found to be a key indicator in the educational success of children (Luciana, 2003; Woodward et al., 2005), so the first step in the analysis was to explore the distribution of children from this perspective. Children are considered full-term at 40 weeks gestation.

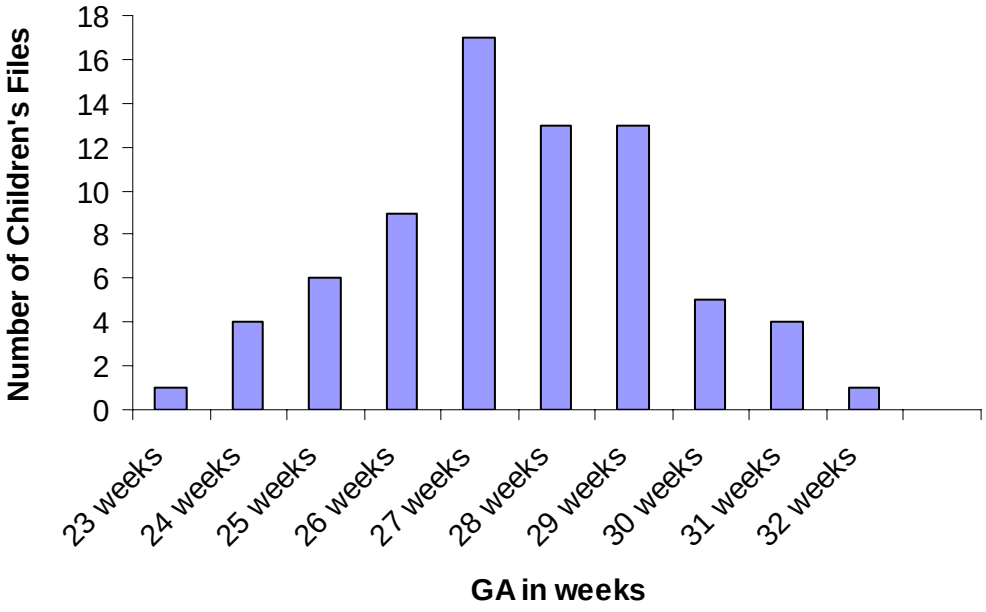

Figure 1: Composition of participants by gestational age (GA) of the 73 children who had completed the Assessment & Monitoring programme prior to 1 October 2007.

Figure 1 shows the distribution of children by gestational age. The mean gestational age was 27 weeks. As Figure 1 indicates, the greatest number of children in the Assessment and Monitoring Programme were born at 27 weeks (17 children) followed by those born at 28 and 29 weeks (13 at each week). Only one child in the sample was born at 23 weeks (the youngest age at which children are currently medically viable) and only one at 32 weeks. Small numbers of children were born at 24 and 31 weeks (four children each), with five at 30 weeks and six at 25 weeks. There were nine children born at 26 weeks gestational age. The numbers represented in the sample therefore form a normal distribution around the mean of 27 weeks. The tails at either end of the distribution reflect the fact that referrals to the programme are made by neonatal paediatricians who understand the need to consider severity of need for services. Those born at 23 and 24 weeks (17 and 16 weeks premature, respectively) are more likely to meet the criteria for early intervention either immediately upon discharge from NICU or within the first six months of life. At the other end of the distribution, those older than 30 weeks are unlikely to be considered in as great a need for these services as others born at a younger gestational age. Thus, while an early intervention service will serve children at a range of gestational ages (because children born at any age can be developmentally delayed or disordered), an Assessment and Monitoring programme will typically serve children in the gestational ages as shown in Figure 1.

Concerns identified for paediatricians

The reports to paediatricians from the regular six Assessment and Monitoring visits showed that some areas of development and learning were more strongly represented in the concerns noted across all 73 children in the study. Concerns recorded in the areas of gross motor development, cognitive development and

expressive language development were more frequent than in other areas assessed. In some areas, concerns appeared from the first Assessment and Monitoring visit while in others, the concerns were identified at a later age. Some patterns of concern remained consistent while others fluctuated over the period of Assessment and Monitoring visits. These trends and patterns will become clear in the course of this chapter.

In the graphs that follow the number of concerns in each of the areas monitored (identified in the previous chapter) at each of the visits to the programme are presented. This allows for a comparison across the age span and for the variations between ages to become more apparent.

Concerns expressed at 8 months corrected age.

Figure 2 shows the number of children for whom each of the areas assessed were a concern. It indicates that, at the first monitoring period examined, areas of greatest concern were gross motor skills, imitation, and expressive language. Oral motor development was also a noted concern.

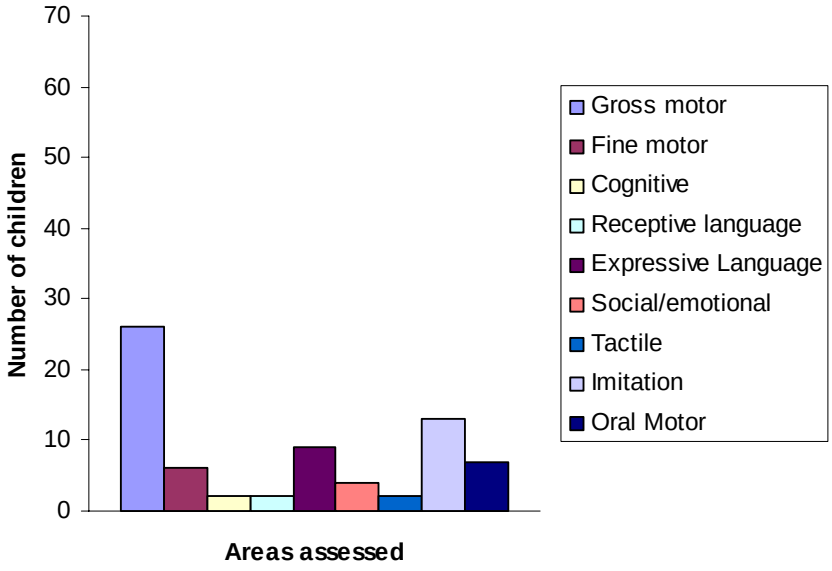

Figure 2: Number of children's files that indicated concerns at 8 months, corrected age, monitoring visit for all 73 children.

Gross motor concerns were the greatest with 26 children, over a third (35.6%) of the participants, identified with concerns in this area. The quality of a child's gross motor movement was carefully considered. Details such as maintaining the weight on one elbow when attempting to crawl and whether the child was crawling asymmetrically were noted. From the 8 month assessment, follow up visits with the physiotherapist were arranged on a weekly or monthly basis if there were gross motor concerns, as this could significantly impact on a child's mobility.

Concerns about a child's imitation skills were evident in 13 children (17.8%), approximately one in five of the participants. At 8 months, the expectation was that the child would imitate a rattle being shaken and an object being banged on a tray. Some children could not respond in turn by shaking the rattle or banging a metal ring on the tray. Imitation in expressive language was assessed as the therapist looked for a response to facial expressions, smiling at the 'baby' in the mirror and imitating a familiar sound.

Expressive language was assessed positively at this age when a child vocalised the need for attention or showed pleasure, babbled and/or used a variety of consonant vowel combinations such as 'dad, dad, dad' or 'mum, mum, mum'. It was seen in interactions such as peek-a-boo games or responding when their name was called. Nine children (or 12%) of the participants were causing concern at this early stage through a lack of these behaviours.

Oral motor difficulties can result from early medical interventions such as having tubes inserted down the throat leading to an aversion to anything touching their mouth. Seven children (9.6%) were identified with issues in feeding at this time. Because of the long-term impact if these issues are not resolved, where oral motor problems are evident, additional contact with the speech-language therapist was

arranged between regular visits. In the oral motor area how the child eats and drinks were assessed. For example, whether they could pick up a spoon and clamp their lips around it when being spoon fed. The types of food being attempted were also noted, as well as how the child chewed the food. At this age there was always note taken of a parent's reporting of the child's skills.

Concerns expressed at 12 months corrected age.

Four months later, at the second monitoring visit, the basic skills assessed at 8 months now need to be securely in place or they raise significant concerns for the therapy team. Figure 3 shows the number of concerns at each area at the 12 month monitoring visit.

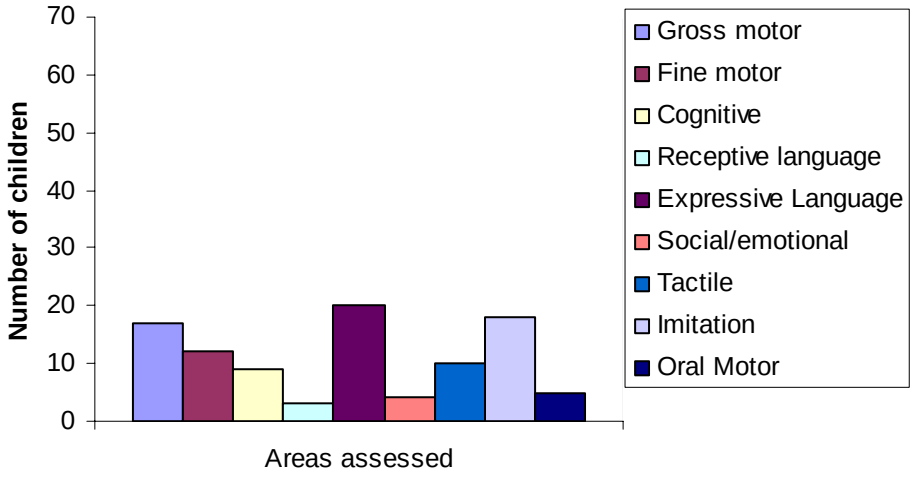

Figure 3: Number of children's files that indicated concerns at 12 months, corrected age, monitoring visit for all 73 children.

Figure 3 shows that the greatest number of concerns is in the areas of expressive language, imitation and gross motor skills. Twenty children (27.4%) raised concerns around expressive language. At this age children were expected to have three to four words such as "mama" or "dada" in their repertoire and imitate non-speech sounds such as animal noises. Their babble was expected to reflect the

inflections similar to adult speech and it was common to hear a child repeat things which get attention.

Concerns with imitation were identified for nearly a quarter (n = 18; 24.6%) of the sample. During the assessment session the therapist used distinct facial movements and gestures to see whether a child imitated these. The child was directed to imitate marks on paper with a crayon and another part of the play sequence involved hugging a doll.

Concerns with fine motor skills were evident in 12 children (16.4%), who showed difficulties during the assessment period with such things as their pincer grasp, using their index finger to poke at playdough, demonstrating voluntary release or building a 2 block tower.

There were nine children who raised concerns about their cognitive development (12.3%) at this time. These included concerns around object permanence (or constancy), assessed by locating toys hidden under covers, and around understanding of cause and effect, assessed by seeing if the child could bring a toy closer by pulling on the string or making a toy respond by touching a button.

In the gross motor area, a child's progress in standing supported or unsupported and whether steps were being taken along a structure or independently was observed. The physiotherapist assessed the child's crawl also to see if a reciprocal crawling motion was established. Sixteen children (23.3%) were identified with gross motor concerns.

Concerns expressed at 18 months corrected age.

Figure 4 indicates the concerns cited six months later at the 18-month monitoring visit.

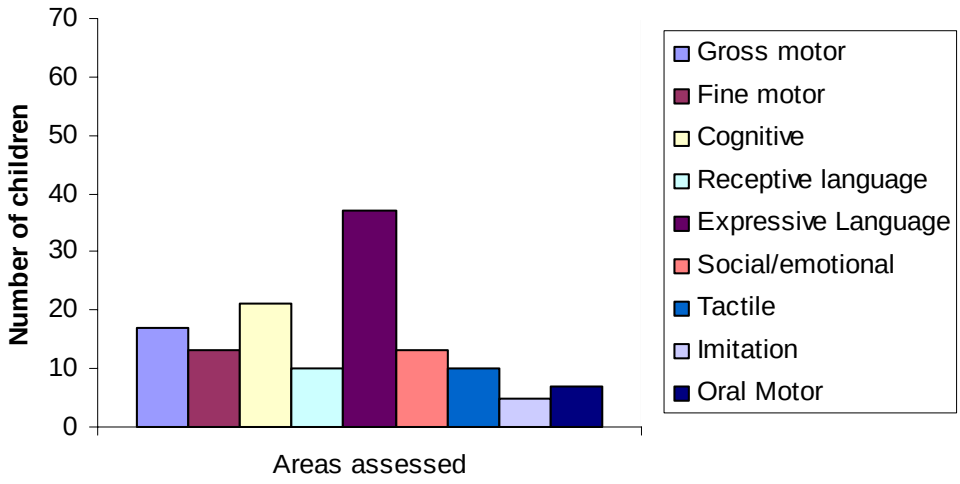

Figure 4: Number of children's files that indicated concerns at 18 months, corrected age, monitoring visit for all 73 children.

At this age there were 37 children (50.7%) in the sample for whom concerns in the expressive language area were identified. Assessment of expressive language at 18 months was based on an infant/toddler speech and language sample survey completed by the family within the week prior to the appointment as well as observations by the speech-language therapist during the visit. Communication at 18 months was expected to involve gestures such as waving goodbye, saying 'bye-bye' and 'thank you', imitating word sequences and asking for 'more'.

Concerns in the cognitive area were identified for 21 children (28.7%), more than a quarter of the sample. Object constancy was expected as was the ability to understand basic cause and effect.

Gross motor concerns were identified for 17 children (23.3%). The child's walking gait and balance were assessed as a check was made for muscle tone and asymmetry.

A number of concerns were also identified in fine motor (n = 13; 17.8%) and social emotional (n = 13; 17.8%) areas at this time. Children found finer movements

such as unscrewing the lid of a small jar to retrieve a little doll figure challenging. An established tripod grip on a pencil was also expected, and if not present was identified as a concern.

Concerns expressed at 24 months corrected age.

Figure 5 presents the areas of concern at 24 months corrected age.

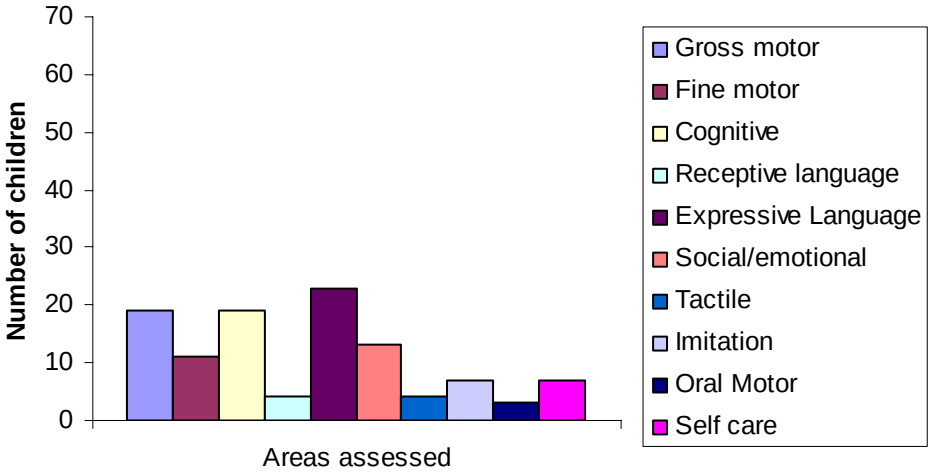

Figure 5: Number of children's files that indicated concerns at 24 months, corrected age, monitoring visit for all 73 children.

An additional area was assessed for the first time at this assessment and monitoring visit: self-help skills. This indicates the expectation for children of this age to begin to show independence in areas such as feeding, toileting and dressing themselves.

With 23 children (31.5%) identified with concerns in the area of expressive language, this was the area causing the greatest number of concerns. This assessment was based on the infant/toddler checklist of social and emotional skills as well as a speech and language sample survey which parents completed prior to attending this clinic. Expectations include clear gestural communication, shared social communication and the use of two-word sentences.

Nineteen children were identified as raising concerns in the gross motor and cognitive areas. Just over a quarter of the children (26%) raised concerns in both these areas. In gross motor development, the physiotherapist checked the child's walking and running skills as well as how they climbed up and down steps and what agility was evident in jumping. Balance can still be a difficulty for children born prematurely at this age. Cognitive skills expected included completion of simple puzzles, and assembling a set of four nested blocks. Imaginative play was expected to be emerging such as using a telephone in play and feeding the doll.

There were 13 children (17.8%) identified with concerns in the social emotional area. How a child related to their parent but also to strangers and to their peers was observed. The development of empathy was observed in play situations or within their family circle.

Fine motor skills raised concern for 11 children (15.1%) in the sample. By 24 months children were expected to achieve manipulation of such things as a screw on jar lid, building a tower with 6 small blocks and using a crayon to make vertical and horizontal marks.

Concerns expressed at 36 months corrected age.

Figure 6 presents the concerns expressed at 36 months corrected age. It shows that nearly half (n = 31; 45.7%) of the children were assessed with concerns in the cognitive area and a quarter to a third of the children were identified with concerns in each of the following areas: gross motor, expressive language, fine motor, receptive language and social/emotional, based on age appropriate tasks.

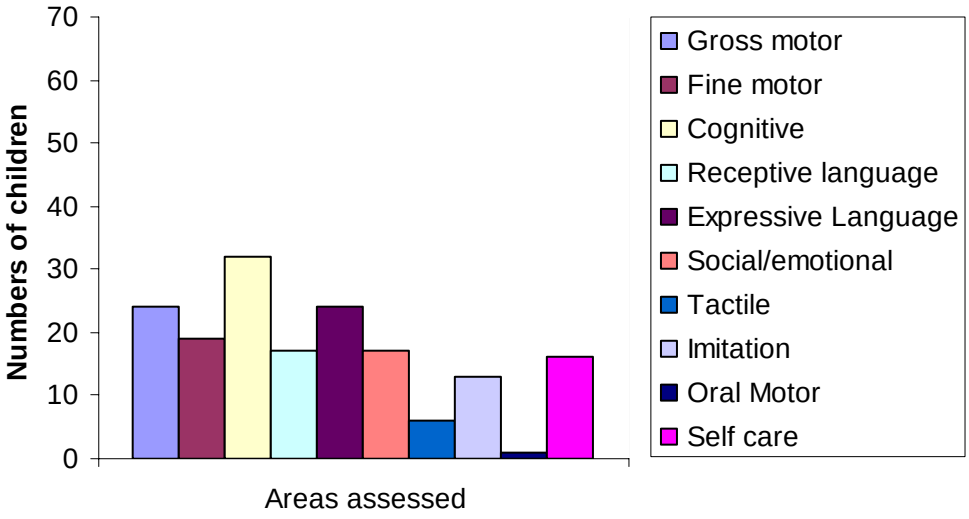

Figure 6: Number of children's files that indicated concerns at 36 months, corrected age, monitoring visit for all 73 children.

By the 36 month assessment, cognitive understanding was expected to have expanded to properties of objects eg. hard-soft, colours and relative size. The child was expected to identify the main body parts and respond to questions using 'what', 'where', 'why' and those with 'yes' or 'no' answers. Questions involving memory such as what the child had for breakfast (or lunch) and whether they could remember a missing object eg. Cup, spoon, scissors, crayon and their use in one game played were used. By this age, it was expected that children could seriate up to 6 cups, self correcting as they completed the 'puzzle'.

In the gross motor area, well balanced walking (forwards and backwards) as well as alternating feet as they climb stairs was expected. Jumping with both feet together and climbing on play equipment was part of the assessment. There were 24 children (32.8%) identified with concerns in this area.

In the expressive language area, three word phrases were expected and the correct use of common grammatical features such as simple plurals, adjectives and pronouns. The child's response to questions was again monitored as well as whether

they could recall information from the past e.g. What did you do at the birthday party? Concerns were evident in 24 children (32.9%). Concerns in receptive language were identified for fewer children than expressive language (n=17; 23.3%). In this area, more complex responses in terms of understanding were expected compared to younger ages. The child must follow a three-step command e.g. “Pick up the block, put it in the cup and take it to mummy”. Children were also asked to position an object in, out, under or around another fixed object.

Fine motor expectations included manipulative skills using a pencil and imitation of a + and 0 symbol. Building taller and more balanced structures with cubes as well as stringing beads and using scissors allowed the child to demonstrate greater hand eye coordination skills. Concerns in this area were identified for 19 children (26%).

In the social/emotional area, 17 children (23.3%) were identified with concerns. Part of this assessment includes the ITSEA survey completed by parents and assessed at this visit. Awareness of others and turn taking was expected. Making simple choices for themselves and knowing their own name, age and gender were part of the assessment at this age.

Concerns expressed at 48 months chronological age.

Figure 7 shows the number of concerns reported at 48 months chronological age. This is the final visit currently part of the Assessment and Monitoring programme. It occurs at their fourth birthday, their chronological age, and is not corrected for their premature birth. For this reason, it will have been only nine or ten months since the child’s last monitoring visit.

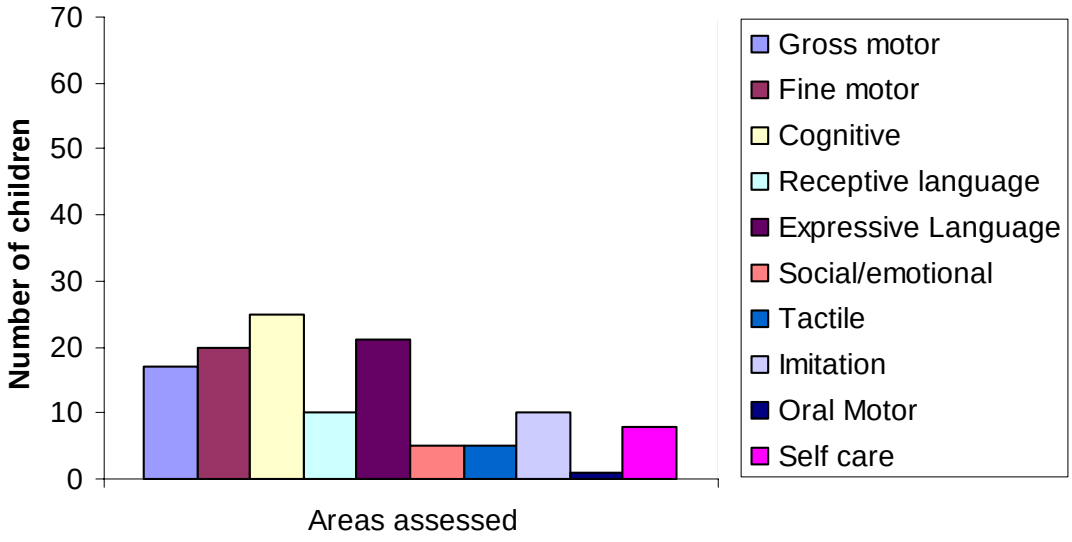

Figure 7: Number of children's files that indicated concerns at 48 months (Chronological Age) monitoring visit for all 73 children.

Expectations in the cognitive area now included classifying objects e.g. 'same' or 'different' and identifying a picture that didn't belong to a set. Answering correctly more complex questions was expected as well as the ability to seriate objects and pictures. Whether theory of mind was present was identified through the child's response to two different story 'problems'. The proportion of the total participants identified with cognitive concerns was high with 25 (34.2%) of the children identified with concerns.

There were 21 children (28.8%) identified with expressive language concerns. Spontaneous speech was encouraged and assessed to identify the range of syntactic forms being used and the child was asked to tell a story based on a set of pictures. A smaller number of children (n=10; 13.7%) were identified with receptive language concerns. Assessment of receptive language at this age included asking children to follow instructions during play sequences which involved a range of semantic functions including the use of negation, possession and modifiers about size or colour.

Concerns in the gross motor area were evident for 17 children (23.3%) when they were asked to jump from a small height, attempt to hop on one leg or balance on one foot. Children were also expected to demonstrate balance by walking across a low balance beam or along a tape line on the floor. Running at varying speeds and showing control by stopping on command was also checked.

At the age of 48 months hand–eye coordination was assessed at a higher level than at the previous visits, with children expected to draw more complex figures eg. a cross or a person, and to draw within fixed templates of shapes or pathways. Cutting following both straight and curved lines was assessed also. Manipulation of puzzle pieces involved six piece puzzles now. There were 20 children (27.4%) who were identified with concerns in the fine motor area.

Changes in concerns across the programme

It is clear from the preceding graphs that across the group of 73 children in this sample, concerns in each area fluctuated across the Assessment and Monitoring visits. An idea of the trends for the sample over time can be gained by viewing each developmental area across the programme individually. This is done in the next section for the areas with the greatest numbers of concerns, namely gross motor, cognitive and fine motor, and expressive and receptive language. As Figure 8 below shows (based on a subset of the sample born at 27, 28 and 29 weeks gestation), these were very clearly the areas most impacted.

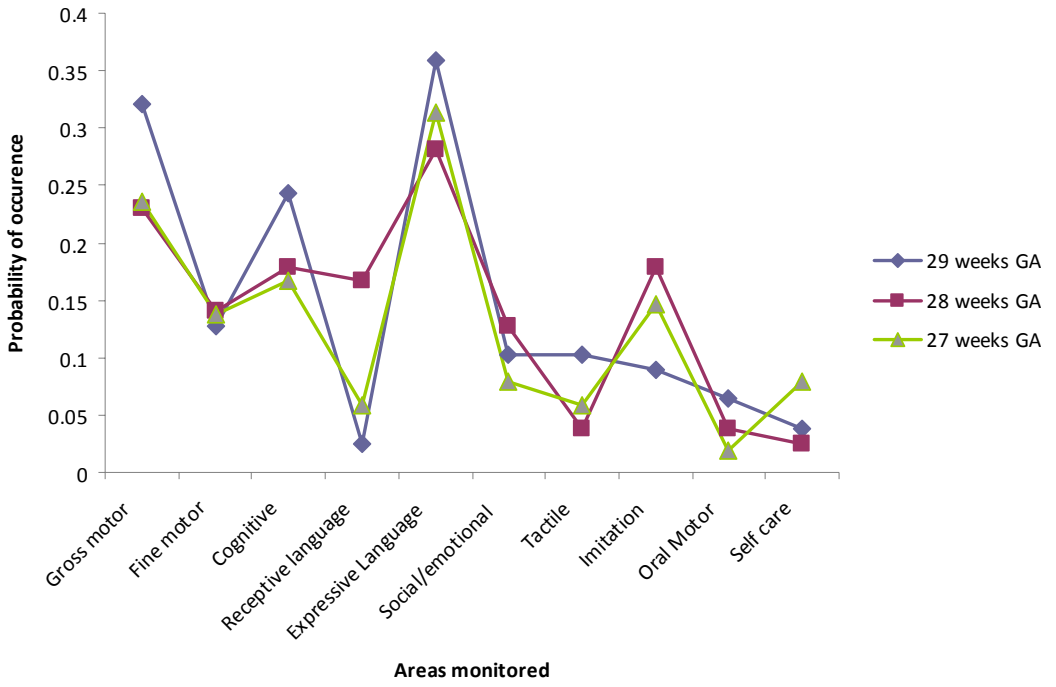

Figure 8: Probability of occurrence of a concern identified by areas monitored in Reports to Paediatricians for children born at 27, 28 or 29 weeks (GA)

In this subset of the sample, the probability of concerns being reported at some time within the assessment & monitoring appointments is greatest in the areas of expressive language, for any of the groups shown, regardless of gestational age. Similarly, the gross motor and cognitive developmental areas are those with the next most likely probability of occurring. Concerns in fine motor development are also identified regularly for children in these gestational age groups.

Gross motor concerns

Figure 9 shows the number of gross motor concerns across the age span from 8 months corrected to 48 month chronological.

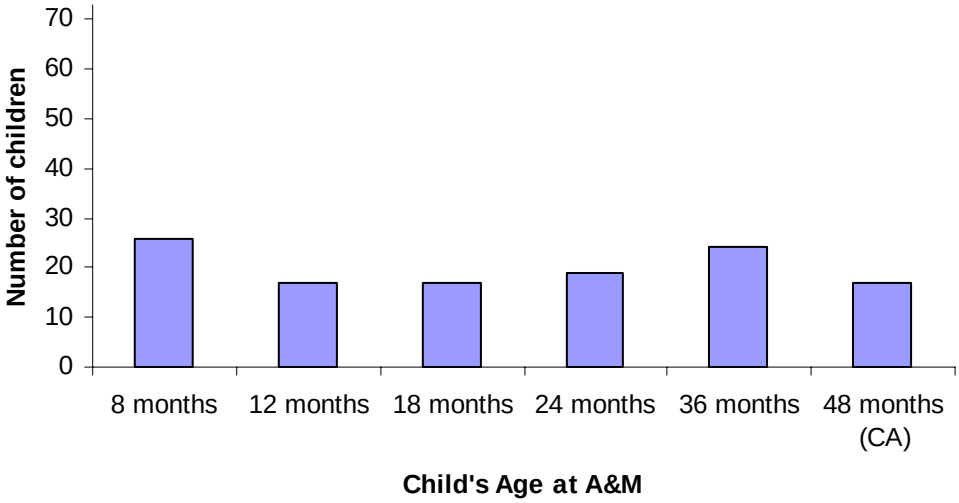

Figure 9: Number of children identified as having gross motor concerns at each of the monitoring periods for the participant sample of 73 children.

Figure 9 indicates that the number of children identified as having gross motor concerns from the first monitoring period until a final visit at 4 years (chronological age) shows some variability but remains consistently high. Over a third (n=26; 35.6%) of the sample of children born preterm was identified with concerns at 8 months. The number of children with concerns in gross motor areas remained constant at 12 and 18 months (n=17; 23.3%); increased slightly at 36 months (n=24), and decreased to 23.3% (n=17) at 48 months. An average of just over a quarter (27.4%) of the sample demonstrated immature gross motor skills throughout the Assessment and Monitoring visits.

Cognitive and fine motor concerns

As both cognitive and fine motor areas appeared to follow a similar pattern to each other of increasing concerns over the periods monitored, and because the tasks which were required to demonstrate achievement of these skills overlap, these two areas were considered together. The overlap was clear from the way therapists

discussed carefully why a child could not achieve these tasks, and considered whether it was the lack of fine motor agility that had made this impossible or whether there appeared to be a lack of cognitive understanding of what the task required.

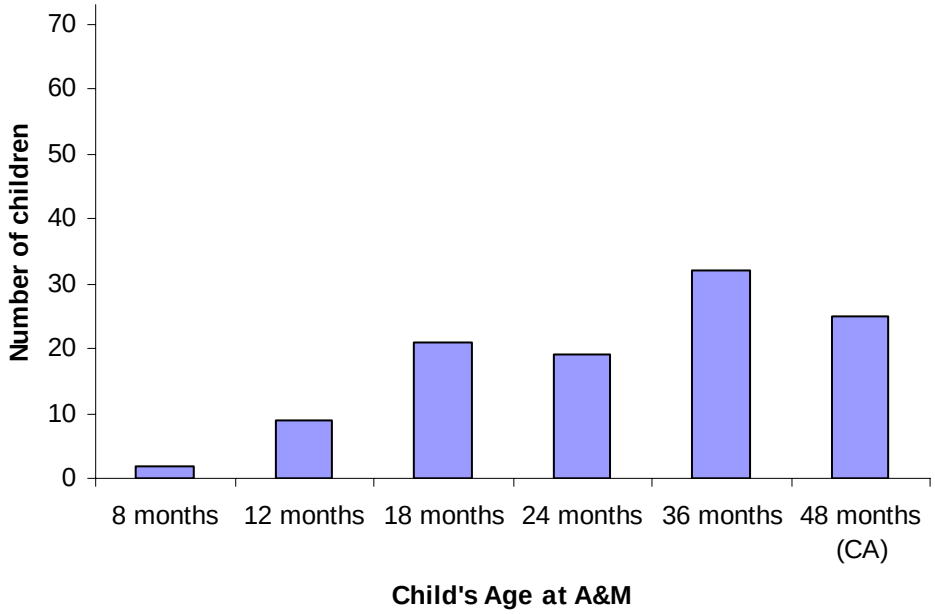

Figure 10: Number of children identified as having cognitive concerns at each of the monitoring periods for the participant sample of 73 children.

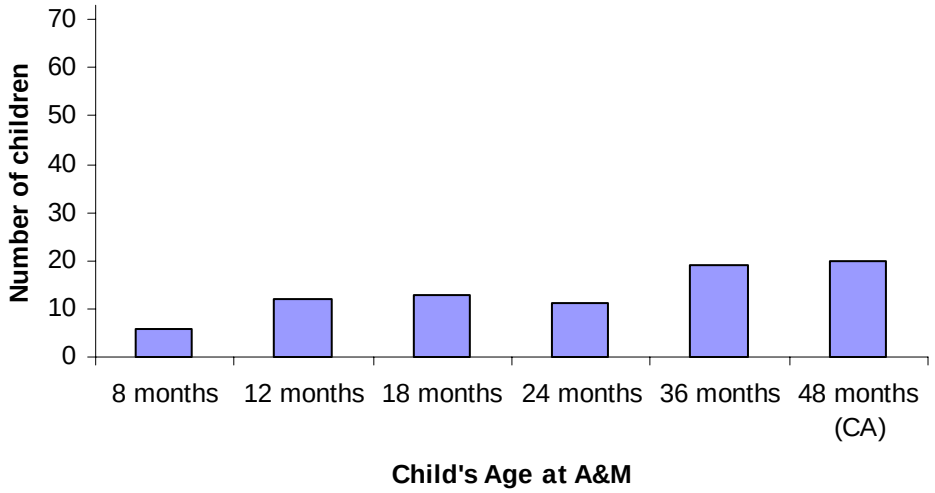

Figure 11: Number of children identified as having fine motor concerns at each of the monitoring periods for the participant sample of 73 children.

As Figures 10 and 11 show, both cognitive and fine motor areas appeared to raise increasing concerns as these children approached the end of the programme. Figure 10 indicates there were increasing concerns noted in the cognitive area with the number of children with concerns rising from 12.3% (n=9) at the 12 month visit to nearly half of the sample (n=31; 45.7%) at the 36 month visit. Less than a year later there were still over a third of the children (n=25; 34.2%) with concerns identified in this area.

Although the numbers are less, Figure 11 indicates there were also increasing concerns in the fine motor area noted during the Assessment and Monitoring visits. The number of children with concerns in fine motor areas remained similar at 12 months (n=12), 18 months (n=13) and 24 months (n=11). However, just over a quarter (n=19; 26%) of the 73 children in this sample were assessed as demonstrating some concerns with fine motor skills at their monitoring visits at 36 months, and at 48 months, chronological age, (n=20; 27.4%) with only one year remaining before school entry and the programme of visits completed.

Receptive and expressive language concerns

Given that receptive and expressive language are linked closely in terms of development, it is helpful to view them together to look for any relationship between how these areas were developing. Figure 12 shows the concerns in the receptive and expressive language over the four year period. As the figure shows, expressive language was consistently more concerning than receptive language.

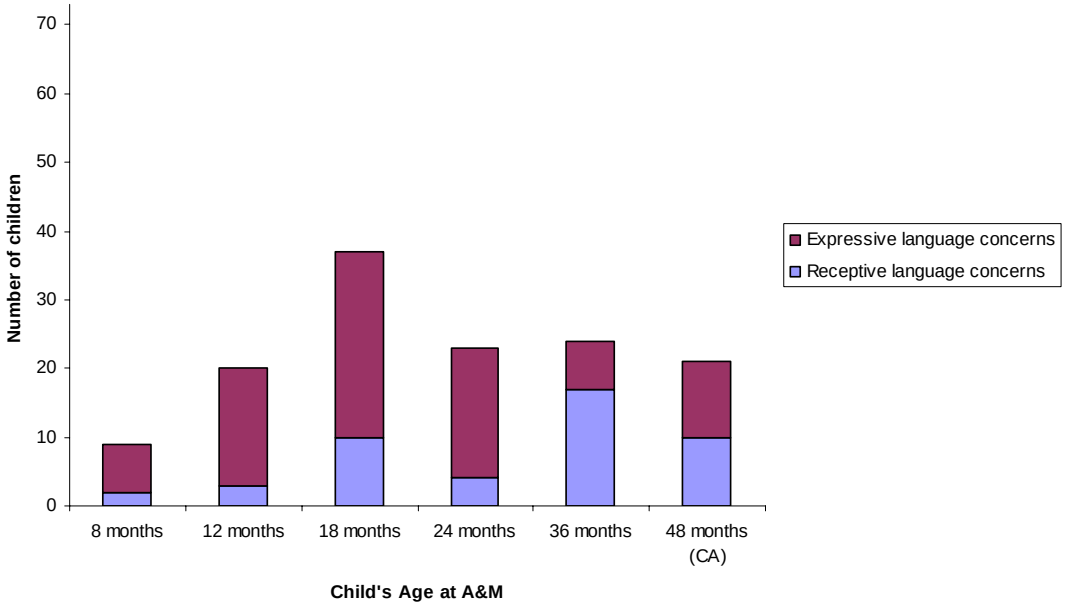

Figure 12: Number of children identified as having expressive and receptive language concerns at each of the monitoring periods for the participant sample of 73 children.

More than half (n = 37; 50.7%) of this sample of children born preterm were assessed as having difficulties with expressive language at 18 months. Of note is that close to one-third of the total sample of 73 children born preterm were still assessed as having difficulties with expressive language at 36 months (n=24; 32.9%), and again at 48 months (Chronological age), (n=21; 28.8%). Despite receiving targeted support from therapists in the Assessment and Monitoring programme as a result of concerns identified from 8 months (n=9; 12.3%) and 12 months (n=20; 27.4%) and having parents working with them to extend their child's development in this area, children appear to continue to struggle with this area of development. (Clearly the pattern for each child would need to be examined in further analysis.)

Fluctuations in total concerns

As indicated in the previous section, some areas of development registered more concerns than others, and these concerns appeared to increase or decrease at different times. In order to get a clearer view of the increases and decreases in

different developmental areas across the age span, it is useful to concentrate on the children who form the bulk of the gestational ages; namely the 43 children born at either 27, 28 or 29 weeks gestation. There were 17 children born at 27 weeks, 13 children born at 28 weeks and a further 13 children born at 29 weeks. Grouping the total number of concerns identified by gestational age in this smaller group revealed the patterns represented in Figure 13.

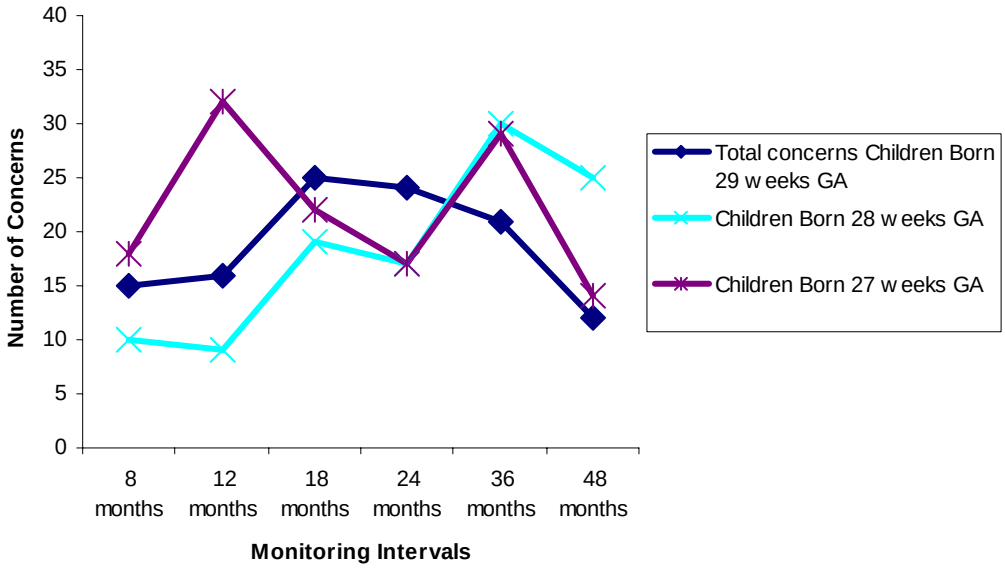

Figure 13: Total number of concerns for children by gestational age across all areas monitored as identified in Reports to Paediatricians.

Figure 13 indicates that as a group, children born at 27 weeks (GA) quickly showed a number of concerns emerging at 12 months, a reduction between 12 and 24 months and then a marked increase at 36 months. Children born at 28 weeks (GA) in this sample had a slower rise in the number of concerns expressed. However, at their 36 months assessment and monitoring appointments, a significant increase to a high of 30 in the number of concerns noted is evident, on a par with the children born at 27 weeks gestation. Finally, the children born at 29 weeks (GA) raised increasing

numbers of concern; first at 18 months, with the numbers of concerns steadily declining over the remaining monitoring periods. Despite the apparent steady decline for the children born at 29 weeks, 36 months appears to be a vulnerable time for all of these groups, a point that will be explored in the discussion chapter.

Summary

In this chapter I have identified some common areas of developmental concerns as assessed at the visits of the Assessment and Monitoring programme. Concerns increased in almost all areas of development: gross motor, fine motor, cognitive, receptive language, expressive language, social-emotional, imitation and self-care at the 36 months assessment. Overall, the numbers of children with gross motor, expressive language and cognitive concerns in this sample increased as children approached the end of the Assessment & Monitoring programme.

Chapter 4: Discussion

"Invisible Prematurity"?

The results of this study show that children attending the Assessment and Monitoring programme at the Champion Centre present with a range of developmental concerns throughout the period of their attendance. These concerns range from difficulties with fine motor skills, issues with balance and coordination in gross motor development to difficulties in communication - whether in self expression or understanding others and being understood by them. The extent and frequency of the concerns suggest when these children attend an early childhood centre, early childhood teachers need to be aware of these concerns and the impact they might have in terms of these children's learning needs.

The group of children in this project are ones who do not meet the criteria to receive early intervention. As such they do not come to early childhood centres with clear indications that they may have special needs. It is for this reason they have been referred to as "invisibly preterm" children, and it can be assumed that similar children attend early childhood centres in New Zealand. If children such as these are to confidently take their place alongside their peers, then these concerns need to be addressed by all who are part of their sociocultural context, including early childhood teachers.

As more formal schooling begins (commonly at age 5 years in New Zealand) the wish is that these children will be able to demonstrate their competence in all areas of school life – whether socially, academically or in school sports. With a view to encouraging this competence, I will examine the findings more fully, pointing out the implications of teaching such children in early childhood settings.

The Competent Child

Magda Gerber, a leading early childhood educationalist, has always stressed the competence of the preschool child (Gerber & Johnson, 1998). Early childhood teachers in New Zealand have accepted this in their move to assessment for learning reflected in Kei Tua o Te Pae (Ministry of Education, 2002). The emphasis of assessment is on what the child can now do and decisions are then made to support the child's learning to advance to the next stage. This study has identified three key areas of development in which children who are 'invisibly premature' require additional support to achieve successfully. These identified areas include expressive language, gross motor development and cognitive skills.

The key to understanding the development of the child born prematurely is to remind oneself that a child born prematurely is coping with a world for which (s)he is not ready. Under-developed sensory and regulatory systems are evident in premature children's difficulties with calming down, concentrating, achieving balance and coordination, as well as staying healthy and robust. As indicated in Chapter 1, as many as 50% of children born prematurely have difficulties with regulation of their physical systems (Anderson et al., 2003). They get easily overwhelmed; are often easily angry; often overreact to noise, or other stimuli; don't know how to calm down; and often eat and sleep poorly. (Schneider et al., 2004). As a result, their social, emotional and intellectual development is compromised. This can mean they find it difficult to concentrate, to form relationships with parents and peers, and have difficulty both with learning and with remembering what they learn.

The results of this study have indicated that the cohort of premature children studied here consistently show delayed development in three main areas of development. Regardless of gestational age, the greatest number of concerns

identified throughout the programme's monitoring period from 8 months corrected age to 4 years chronological age was associated with expressive language, gross motor development and cognitive skills. In addition, as detailed in the previous chapter, an increase in concerns identified at 3 years was evident in all these areas as well as in fine motor, receptive language, imitation and social emotional areas.

Expressive language

Half of the children born preterm in this study were assessed as having difficulties with expressive language at 18 months. Of note is that close to one-third (32.9%) of the total sample of 73 children born preterm were still assessed as having difficulties with expressive language at 36 months and 38.8% displayed concerns at 48 months (chronological age). This was in spite of receiving targeted support from therapists in the Assessment and Monitoring programme and having parents working with them to extend their child's development at home. Concerns were identified from 12 months and strategies were given. However, children born preterm appear to continue to struggle. There was also an increase evident in the number of concerns in the receptive language area at 18 months and 36 months in this cohort.

These findings are similar to the findings of Briscoe, Gathercole and Marlow (as cited in Foster-Cohen , Edgin, Champion and Woodward, 2007) who found a significant language delay at 3-4 years of age in approximately one-third of their very preterm (<32 weeks' gestation) cohort. Similar findings were reported by Taylor et al. (2000) and Wolke and Meyer (1999) who studied children in middle childhood and early school age born prematurely. There is commonly a strong period of language development between two and three years old and it is a concern that there remained a

significant percentage of children identified with both expressive and receptive language concerns at the age of 36 months.

The impact of a delay in expressive language can be experienced in several common curriculum experiences within early childhood centres in New Zealand. Interactions with the child can be limited with both teachers and peers at mat times or other group times as verbal interactions are frequent at these times. The importance of verbal responses (which may be challenging for these children) in such learning experiences can result in limited understanding of what is experienced and thus limit any potential cognitive gain. Even communicating basic needs around toileting, eating, resting and behavioural issues to a teacher may pose problems. When a young child cannot communicate clearly, their peers may simply play with those whom they feel more comfortable with. This can result in social isolation for a young child with limited expressive language. Teachers must be aware of difficulties and work to mediate the impact on the child with limited expressive language. This study has reinforced earlier findings that children born prematurely are at greater risk of delays in this area (Foster-Cohen et al., 2007).

The fact that receptive language is less impacted means that these children may understand more than is apparent. Teachers need to learn to pay attention to what these children understand, and not judge them by what they are not yet able to say. Paying attention to less mature forms of communication, such as gesture and facial expression is crucial, as is allowing children time to respond. Additional concerns may be that immature oral-facial muscle systems can lead to difficulties organising the speech mechanisms for expressive language.

Cognitive development

The results of this study showed that, from 18 months the children monitored had increasing concerns identified in their cognitive development. These concerns peaked with 45.7% of the children assessed with concerns at the 36 months assessment period and remained high at 34.2% of the children with concerns at the 48 month (chronological age) assessment. These assessments indicated that the identified concerns linked to distractibility, lack of perseverance, difficulty achieving tasks associated with memory such as following 2 or 3 part instructions and immature concept development with numbers or objects and their uses.

Nadeau et al. (2001) concluded, from their 7 year longitudinal study of a cohort of children born after 24 to 28 weeks gestation, that premature birth was associated with intellectual and neuromotor delays. In New Zealand, Woodward et al. (2005) reported, in their longitudinal study in Christchurch, significant cognitive delays in children born preterm. Children born extremely preterm were more likely to experience cognitive developmental delays than children born full term. The likelihood of the consequence of their prematurity appearing later in early childhood means that these children need to be closely monitored as they approach school entry age. Vicari, Caravale, Carlesimo, Casadei and Allemand (2004) studied children born prematurely without major neurological deficits and recommended that "early educational and rehabilitative programs may be necessary to avoid this outcome [of more severe cognitive and learning disabilities]" (p. 677).

The impact of cognitive developmental delays may impede children's progress in many areas of learning in an early childhood centre. Children born preterm show less focussed attention and more immature patterns of attention than children born full term (Rose, Feldman, & Jankowski, 2001). As this impacts on memory recall,

opportunities to encourage perseverance and focus need to be provided for. Understanding number and letter concepts, following instructions, playing board games and enjoying music and movement experiences may all be difficult for a child with invisible prematurity. Necessary pre-academic skills may also need to be encouraged to allow the best possible outcome for children as they enter the more formal education system.

Gross motor development

As children born prematurely are physically frail and may be small of stature, it is not surprising that gross motor concerns were common in this study. It is in week 28 of gestation that muscle tone improves, and many babies born prematurely have not reached this stage. It is not until week 33 of gestation that bones harden and coordination of sucking, swallowing and breathing begins for some, which is another developmental skill these children have had to develop following their early birth. This impacts on the ability of a child, even after 8 months in the world, to show the development expected by the therapists, although the expectations are adjusted for the corrected age of the child. An average of just over a quarter (27.4%) of the sample continued to demonstrate immature gross motor skills over all Assessment and Monitoring visits, while a third of the children (n=26) were identified with concerns in this area at 8 months.

At the 12 month visit, the results showed a decrease from 26 to 16 (23.3%) children identified with gross motor concerns. This decrease could be partly due to genetically steered physical maturation but could also link to the strategies to practice necessary skills given to parents after the earlier monitoring visit. Written comments from such a visit on the 'Ideas and Suggestions for Home' page include 'encourage rolling from left side by lifting right arm across body', or 'help her stretch by placing

toys in front slightly out of reach'. These strategies would have been demonstrated by the therapists to the parents at the monitoring visit.

The fine tuning of physical skills involved in gross and fine motor development is often achieved more slowly for children born prematurely. The frailty and smaller stature often associated with prematurity can result in instability in gross motor areas. This is seen with the child 'W' sitting to maintain balance and may result in an older child having difficulty balancing on one leg or hopping. Ongoing health issues and the fact these children are fragile medically makes it difficult for a child born prematurely to demonstrate all that they are capable of at times. At 36 months there was an increase in monitoring concerns with 32.8% (n=24) of the 73 children in this sample displaying concerns with gross motor skills. These results are similar to those found by several authors who have investigated links between motor and cognitive development of ELBW children (Burns et al., 2004; Jeyaseelan, O'Callaghan, Neulinger, Shum, & Burns, 2006; Marlow, Roberts, & Cooke, 1993). Such studies have found that even children with minimal movement problems demonstrated lower cognitive functioning. Burns et al. (2004, p. 27) reported an association between motor and cognitive development at 12 months and at 4 years of age and found that "motor development at 12 months was a relatively good predictor of later motor development". This finding appears to support the findings in this study of high numbers of gross motor concerns identified in this cohort, as well as its relationship with cognitive development.

As well as their frail start to life, children born prematurely are often less robust physically. Poor muscle tone, less skilful gross motor functions and less developed balance reactions make the child more awkward in any tasks requiring agility and well developed coordination. Preschool children use a great amount of

energy as they explore their world. As these invisibly premature children enrol in early childhood centres, their teachers should monitor the physical expectations on them. Physically active play in New Zealand's outdoor environment is a significant part of a child's day at preschool. Developing gross motor skills to a well-coordinated level is a focus seen often in the way in which the outside environment is set up and the active games that teachers and children play. Sometimes children born prematurely achieve developmental steps in a different order compared to their full term peers. Understanding the differences and limits preterm children experience and providing for rest periods during play will be important. Improving movement and balance skills as well as coordination of gross motor (and fine motor) skills will assist these children to take an active, competent part in this environment.

Fine motor development

Fine motor skills include the development of finger, hand, wrist and arm movements, control of these movements and development of hand-eye coordination. Children who are confident with these skills are able to physically manipulate objects and tools for exploring and interacting with their environment. There were increasing concerns in the fine motor skills noted during the Assessment and Monitoring visits for this cohort of children. Again, as children completed their Assessment & Monitoring visits at 36 months and 48 months, just over a quarter of the 73 children in this sample were assessed as demonstrating some concerns with fine motor skills. At 36 months a quarter of the cohort (n=19; 26%) had concerns identified by the therapists and at 48 months, chronological age, a total of 20 children (27.4%) were identified with concerns in this area (see Figure 11). In earlier visits from 12 months to 24 months, 15% (11 children) to 17.8% (13 children) had shown difficulties with fine motor skills. Burns et al. (1999) found evidence of mild motor problems in the

areas of gross and fine motor performance in their study of 29 ELBW children. Other studies have also reported problems of fine motor coordination in children born prematurely (Goyen, Lui, & Woods, 1998; Powls, Botting, Cooke, & Marlow, 1995). Systems for coping with sensory information (sound, movement, touch and sight) are immature in the children born prematurely and this slowly developing sensory system may be shown through poor fine motor coordination or an inability to cope with a variety of textures. Limited achievement in fine motor skill may lead to children avoiding certain areas of play involving working with blocks, balls, carpentry tools, puzzles and pencils, crayons or scissors and this may then impact on socialising opportunities and other areas of development.

Imitation

Imitation is fundamental to dynamic assessment which was the basis for the Assessment & Monitoring programme in this research. Infants are typically equipped to respond to people in their world from birth, and this is often seen in imitation of vocal and facial expression. Children born prematurely however struggle at times with imitation skills. When the initial capacity to relate to others is disrupted or delayed with the slowly developing sensory system of a child born prematurely, it impacts other systems. Communication engages the motor system, the socio-emotional system and the cognitive systems. Thus the links to gross motor, fine motor and expressive language development were evident as each of these areas reflected a significant number of concerns. Imitation is important in the development of language, socialisation and cognition. Experience and practice is important in developing connections for learning. Even young infants are seen to use imitation as part of this experience for learning a range of skills. When the development of imitation in any area is delayed, there is a corresponding delay in other skill development. De Haan,

Bauer, Georgieff and Nelson (as cited in Luciana, 2003) noted that the ability to perform imitation sequences correlated in healthy children with the development of language skills. As discussed earlier, children in this sample displayed delays in expressive language as well as in receptive language (to a lesser degree). Imitation concerns were also shown and link to the language development concerns. At 8 months & 12 months imitation concerns increased for the children born prematurely and rose again at 36 months and 48 months (chronological age).

Evidence for a 'sleeper effect'

Luciana (2003) and McGrath et al. (2000) identified what they termed a 'sleeper effect' in the cognitive development of children born prematurely. In line with their suggestion, the results of this study indicate an increase in the number of developmental concerns identified at 36 months for this cohort of children born prematurely, therefore suggesting a 'sleeper effect' may be identified across a wider range of developmental areas. In the areas of cognition, fine motor, receptive language and social-emotional development the number of concerns for the cohort of 73 children peaked at 36 months. In the remaining areas of gross motor, expressive language and imitation development the number of concerns still increased at 36 months after a time of lower concern levels. This finding suggests that children born prematurely are likely to "grow into" further concerns in several areas of development. The question of what makes this period more vulnerable in terms of development has no clear answer, but deserves closer attention. One possibility is that it is an artefact of the timing of the visits as there is a gap of twelve months between assessment and monitoring appointments. The question remains as to what the pattern of development would be if these children were assessed earlier or more often during

this twelve month period. What happens during this period should be investigated further.

Limitations

Although this study involved a sample size of 73 children born prematurely, this sample was not a national sample and may reflect characteristics unique to this region at this time. More advanced neonatal treatments are being developed as techniques for identifying neonatal issues improve and these results, while recent, may look different for preterm children in a few years time as technology and knowledge increases.

Working with archived written data has certain limitations as, although the content cannot be altered, the researcher's interpretation may be subjective. Having the current team of therapists available to assist this researcher's interpretation was invaluable. The majority of the files analysed had been created by therapists still working at the Champion Centre in the Assessment and Monitoring programme and this meant that they were available to explain the thinking behind their comments in the reports.

There was more information in each child's file than could be taken on board in a single study of the scope of the current one. Future research is needed to explore further the rich data they contain and to explore their relevance for the early childhood teacher when these children attend an early childhood centre.

Future Research

This study has raised questions about several aspects of the development of a child born prematurely. Further research needs to continue to investigate the impact of the assessment and monitoring programmes in New Zealand on children's

development and progress through our education system, from preschool to adolescence.

Investigating this same group of children now that they are at primary school would give us information about the issues they face. Furthermore, investigating how invisibly premature children manage while in early childhood centres and what is currently done to foster their development would give more insight into improving support from early childhood teachers. Identifying strategies which early childhood teachers could be trained to use effectively to further foster the development of invisibly preterm children is important as their needs are different to that of typically developing children. Likewise, studying the impact of such training of teachers should be carefully researched.

Identifying the difference such support makes on a child raises the greater question of who should have access to these assessment and monitoring programmes. Currently it would be unusual for children born prematurely between 30 weeks and 36 weeks (gestational ages) to be referred for assessment and monitoring. There is no evidence that identifies if such participation would improve learning and development outcomes for them. Current funding limits the availability of places for children born prematurely in these programmes.

What support is being provided by teachers in early childhood centres in New Zealand has not been investigated. The awareness of early childhood teachers about the impact of prematurity on a child has not been investigated formally. Several years of experience in both preschool education and an initial teacher training programme suggests to this researcher that there is a large gap of knowledge in this area. Whether increasing the awareness of teachers in both early childhood and primary schools can make a difference to 'invisibly preterm' children has not been part of this study. It is a

first step in this researcher's vision to improve support and thus increase eventual developmental outcomes for children born prematurely and who are not clearly identified as carrying the impact of preterm birth.

The continuing impact of the premature birth on the family is another area for future research.

Early Childhood Teachers: Supporting the 'Invisibly Preterm' Child

The results of this study indicate that it is important for early childhood teachers to have at least a basic understanding of the particular needs of preterm children. Teachers should take into account the fact that a child who is chronologically 6 months old is, in fact, only 4 months old if they were born 2 months early. The growth and development expectations of preterm children should be adjusted to meet the individual needs of these children.

For preterm children, achieving the same level of competence as their peers may take longer when a task involves both physical agility and higher level cognitive skills, the task becomes much more challenging for a preterm child already struggling to cope. Support of well informed adults in this situation can make a significant difference for a child born prematurely.

Implications for early childhood teachers

Early childhood teachers can best support these 'invisibly premature' children by increasing their awareness of the difficulties that are commonly experienced by such children and noting several strategies that can be effectively used. An increase in the complexity and amount of 'learning' expectations may trigger increased concerns in development. It appears likely that between one third and one half of all infants born prematurely and not in early intervention programmes will experience some kind of developmental concern before reaching school age. If they are subject to the

'sleeper' effect these difficulties may be 'invisible' until the child is three years or older. Teachers should be aware of the following factors:

- a child who is easily fatigued and whose health is fragile
- a child who has difficulties with coordination, movement and balance
- a child who has delays in fine and gross motor skills
- a child who has problems with expressive language and receptive language
- a child who has difficulty with social skills and self help skills
- a child who has slower processing in cognitive skills

Useful strategies to develop as an early childhood teacher to support these children begin at the time of first contact with the families. Collecting information upon enrolment about any premature birth should be encouraged. This information may help to explain a child's pattern of development and learning. Understanding the implications of the premature birth, and applying professionally the knowledge gained about possible implications will result in a better informed teacher, and one who is more able to respond appropriately as many parents do not know that some developmental problems are likely to appear after the first three years of their child's life. Children who have progressed with minimal support after their early birth will be seen as 'normal' in their development by the parents and any concerns identified at a later age may come as a surprise to them.

Communicating with any monitoring programme the child is involved with is essential. Sharing information either via the parents or more directly with the programme and applying teaching strategies identified by the therapists will enhance the skill base a trained early childhood teacher brings to this situation.

Some times children born prematurely may learn skills in a different order than their full term peers. Therefore it is important to observe a child's skill and

scaffold from there. A child born prematurely may need direction to focus on what requires attention e.g. the pictures in a book or the teacher leading a group time.

Memory games such as “Kei a wai?” or animal card matching which rely on the child remembering information and using it later will encourage development of the working memory. Repetition and prompts should be used to support the child to achieve the task. Modelling by a teacher or peer can also provide useful support.

Keeping to routines assists the child born prematurely as they know what to expect and when. The child is less likely to become stressed and therefore is more receptive to learning opportunities. Similarly, ensuring there is a peaceful space and quieter time gives a child time to calm and refocus during the heavy sensory overload of their busy day at an early childhood centre. This should be a space which the child can access freely whenever they feel the need.

In music activities, patterned, repetitive and rhythmic music is best as it gives the child the opportunity to join in and focus well. When using verbal prompts during any part of the day, give one or two instructions at a time. Keep any directions clear, short and simple. Visual reminders will help the child to remember what is required e.g. a picture of hand washing near the basin or pictures of the blocks and other equipment to indicate their storage area.

Physically, oral feeding may be difficult for the child born prematurely. Eating is hard work and small amounts more often will assist in maintaining energy levels at an even level. A very young child born prematurely cannot regulate their temperature, and has difficulty indicating their food and sleep requirements. Careful observation of an individual child and excellent communication with the parents is especially important to ensure you are meeting this child’s needs well.

Communication difficulties with expressive and receptive language are common. The child may show poor comprehension, difficulties with expressive language and delays in articulation and fluency of their speech. Fostering listening and participation in small groups is important for further development in this area. It is helpful to engage the child in shared conversations and experiences with a range of children and supportive adults. At the same time, teachers must remember to reduce the pressure on 'performing' in front of a large group where the child may lack confidence. Teachers should not under-estimate these children's comprehension skills as the children may understand more than is apparent. Paying attention to gesture and facial expression is crucial, as is allowing children time to respond.

It is important for teachers to appropriately challenge the child after careful observation of where a particular child is at in skill development in any area. Remembering to use simple, direct language and to model expected skills as well as repeating this regularly is important. Allowing the extra time that may be needed to process such information will encourage the child born prematurely to achieve skills most effectively.

Perhaps most important of all is close communication with the parents who know this child best of all. Appreciating what both the family and the child born prematurely have experienced and are experiencing is vital if teachers are to respond in the most effective way to all concerned.

Conclusion

This research sought to identify what was significant about the developmental progress of "invisibly premature" children who were part of the Assessment and Monitoring programme at the Champion Centre, whether recurring developmental

concerns were likely to impact on early childhood educational success and how early childhood teachers could respond effectively to invisibly premature children.

The evidence from the Champion Centre files demonstrated that, as a group, the 73 children in this study had an uneven pattern of development over the four years. Individual progress varied, however the skills expected in expressive language, gross motor development and cognitive areas were consistently those causing greatest concern across the group in terms of slow achievement.

As the children move into early childhood centres (and on through the New Zealand education system), such concerns will impact on their ability to confidently join their peers in many activities and learning experiences.

To respond effectively to these children, teachers should increase their awareness of the impact of prematurity on children's development. Early childhood teachers may require support to gain this knowledge. Of importance, and a key finding of this research, reinforces the concept of a 'sleeper effect'. This indicates that children born prematurely may not show their need for intervention services until later in childhood. This has led to prematurity being described in the research as a disability children "grow into" (Luciana, 2003). For this reason, carefully observing children's progress as they approach what appeared to be a vulnerable age of 36 months and up to school entry age is important. If children are progressing well in the three years prior to this, failure to achieve alongside their peers may go unnoticed and come as a surprise to both parents and teachers.

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Appendix 1

The Champion Centre
TAMARIKI TOIORA
Providing holistic early intervention to infants and young children with special needs

31 July 2007

Dot Capon
School of Education
University of Canterbury
Private Bag 4800
CHRISTCHURCH

Dear Dot

I write to inform you that the research subcommittee of the board of trustees of the Christchurch Early Intervention Trust (The Champion Centre) has approved your request to conduct research at the Centre, using Champion Centre files of children attending the Assessment and Monitoring Programme.

It is our understanding that you will not remove any file from the Centre for any reason, and that you will assign a study number to each file at the very beginning of your research, and then use only the study number in all analyses and reports thereafter. You are at liberty to use a pseudonym for each of the children used for your case studies. Provided they are used under the above conditions, it is our understanding that permission from the Champion Centre to access the appropriate files for your research is sufficient.

Also, as stated in our permission to conduct research form:

Intellectual property
All research undertaken at the Champion Centre, using Champion Centre children, expertise and/or resources constitutes intellectual property of the Centre. Arrangements for sharing all data and results must be agreed upon between the researcher and the Champion Centre (usually with the Director) prior to the commencement of the project.

Ethical consent
Each individual researcher is responsible for applying for, and gaining, permission from either the national ethics committee or another approved ethics committee (e.g., the University of Canterbury's) for their project. Evidence of that approval must be lodged with the Director of the Champion Centre.

I am delighted to be working with you on this project, and know that your work will provide useful data for both you and the Champion Centre.

Kind regards

Dr Susan Foster-Cohen
Director

Administered by: Christchurch Early Intervention Trust, C/- Burwood Hospital, Private Bag 4708, Christchurch, New Zealand
P: 0064-3- 383-6867 • F: 0064-3-383-6866 • E: office@championcentre.org.nz • www.championcentre.org.nz
Founder: Dr Patricia Champion MBE, PhD

Appendix 2

Human Ethics Committee

Secretary
Tel: +64 3 364 2241, Fax: +64 3 364 2856, Email: human-ethics@canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

HEC Ref: 2007/18/CoE

28 September 2007

Ms Dot Capon
School of Maori Social Cultural Studies in Education
College of Education
UNIVERSITY OF CANTERBURY

Dear Dot

The College of Education Ethical Clearance Committee is pleased to inform you that your research proposal "Invisible prematurity: identifying and supporting the learning and development of preschool children born prematurely not identified as needing early intervention" has been granted ethical clearance at their meeting on 26 September 2007.

This clearance is given on the premise that the project involves only further analysis or writing up of existing data for which ethical clearance/approval has previously been obtained.

The Committee note that the Champion Centre has used its appropriate due processes to approve your access to their files.

Should circumstances relevant to this current application change please note that you are required to reapply for clearance.

If you have any questions regarding this clearance please let me know. We wish you well for your research.

Yours sincerely

Associate Professor Janinka Greenwood
Chair
Ethical Clearance Committee

"Please note that Ethical Approval and/or Clearance relates only to the ethical elements of the relationship between the researcher, research participants and other stakeholders. The granting of approval or clearance by the Ethical Clearance Committee should not be interpreted as comment on the methodology, legality, value or any other matters relating to this research."

University of Canterbury Private Bag 4800, Christchurch 8140, New Zealand. www.canterbury.ac.nz

Appendix 3:

Monitoring Schedules: 8 months – 4 years

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 8 Months

CHILD'S NAME _____

DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

FINE MOTOR SKILLS		COMMENTS
Transfers objects hand to hand Rakes small objects Has complete thumb opposition on cube Inferior pincer grasp		
IMITATION		
Imitates known gestures e.g. bang object on table		
OBJECT CONSTANCY		
Tracks rolling ball momentarily screened Attains partially hidden object Uncovers face		
SPATIALITY		
Works for object out of reach Rotates bottle of drink – present at 90° angle		
CAUSALITY		
Takes 1 peg from pegboard Enjoys repeating newly learned activity		
TACTILE INTEGRATION		
Finds object partially hidden in texture material		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 8 Months

CHILD'S NAME _____ DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

UNDERSTANDING COMMUNICATION		**COMMENTS**
Responds to name i.e. stops activity & looks Looks briefly at a book Indicates anticipation – raises arms to be picked up Recognises visual signs for routines		
EXPRESSIVE		
Interaction – Participates in game of peek-a-boo Responds differently to strangers versus familiar people Responds to facial expressions Looks or vocalises when name is called		
Non-vocal – Explores adult facial features Smiles or makes approaches to the mirror Closes lips after enough food		
Vocal – Demands social attention by shouting/grizzling Vocalises attitudes of pleasure and displeasure - Laughs/giggles Imitates sounds already in repertoire Variety of consonant vowel combinations Babbles double consonants		
Feeding/Oro-Motor – Gums and swallows cracker Closes lips on spoon to remove food Drinks from a cup without spout,closes lips on cup with help, Picks up spoon Chews with lateral tongue movements – pushes food from side to side		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 12 Months

CHILD'S NAME _____ DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

FINE MOTOR SKILLS		COMMENTS
Neat pincer grasp Poke with index finger Bang two objects together Voluntary release into container Hold crayon adaptively (point down) Turn page of cardboard book Attempt 2 block tower		
IMITATION		
Attempt to imitate facial movement Imperfectly imitate new gesture Imitate mark on paper Imitate body action on a doll (hug)		
OBJECT CONSTANCY		
Find toy under 1 of 3 covers Find toy under 3 superimposed covers		
SPATIALITY		
Find object behind a screen React to novel features of a toy – turn over/explore parts Rotate bottle inverted 180º to drink		
CAUSALITY		
Pull toy on string Touch toy to restart activity		
TACTILE INTEGRATION		
Play with dough Enjoys playing with a variety of textures		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 12 Months

CHILD'S NAME _____ DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

UNDERSTANDING COMMUNICATION		**COMMENTS**
Follows simple instructions with gesture Responds to inhibitory words e.g. "No" Responds to familiar verbal cues Looks at familiar objects or persons when name e.g. "Where's Mummy?		
EXPRESSIVE SKILLS		
Three to four words including "mama dada" Babbles with inflection similar to adult speech Repeats performances that get attention Imitates non-speech sounds (including animal noises) and some sounds and words inexactly		
INTERACTION		
Vocalises or gestures spontaneously to indicate needs e.g. showing/pointing Initiates familiar game e.g. "Row your boat" Enjoys looking at pictures in books e.g. reaching out to pictures Enjoys rhymes and simple songs		
FEEDING/ORO-MOTOR		
Picks up and brings spoon to mouth Finger feeds small pieces Holds and drinks from spouted cup With biscuits – bites piece off, chews cracker/some jaw movement, lateral tongue movement, swallows with closed mouth Ceases drooling except for teething Eats mashed table food Licks food from spoon, lips or icecream		
ROUTINES		
Sleeps 12-14 hours - Naps 1-2 times a day Cooperates with dressing - extending arm/leg		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 18 Months

CHILD'S NAME _____ DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

FINE MOTOR SKILLS		COMMENTS
Finger tripod on pencil Makes tower of 3 cubes Tries to unscrew Uses spoon to feed		
IMITATION		
Imitates crayon stroke Imitates adult behaviour with props Imitates 2 actions on a doll		
OBJECT CONSTANCY		
Finds toy hidden under multiple covers Systematic search under 2 covers		
SPATIALITY		
Puts 6 pegs in pegboard Puts round form in formboard (3 forms present) Moves self around barrier to get toy Puts square form in formboard		
CAUSALITY		
Pulls cloth to reach object Tips small object out of narrow container		
TACTILE INTEGRATION		
Enjoys exploring new textures		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 18 Months

CHILD'S NAME _____ DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

UNDERSTANDING COMMUNICATION		COMMENTS
Indicates 2 out of 4 objects (game request) Recognises and points to 4 object pictures Answers questions "What's this?" Recognises names of many familiar objects Points to three body parts on self or doll Responds to requests for play actions Uses most common objects and toys appropriately Autosymbolic play e.g. child pretends to sleep Identifies self in mirror		
EXPRESSIVE SKILLS		
6-20 words (50% nouns) Many words made by phonetic reduplication Communicates by pulling person to show them object, person, situation Vocalises with gesture e.g. "bye bye" Imitates syllables or word sequences Asks for more and Says thank you (ta) Rising inflection for questioning Names objects spontaneously All gone – emerging negation		
INTERACTION		
Says "What's that?" to elicit adult attention Uses words to request information and desired objects and events Begins to vocalise immediately following the prior speaker's utterance (not necessarily contingent or related to prior utterances) Responds to questions e.g. shake head		
FEEDING/ORO-MOTOR		
Drinks from cup independently and spills little Eats with spoon to feed self the entire meal. Some foods cut up but spilling minimal Discriminates edibles (child uses mouth only for edibles)		
ROUTINES		
Sharp separation reaction, or noted previously Removes some clothes e.g. hats, mittens, shoes Attempts to put clothes on e.g. shoe, hat		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 24 Months

CHILD'S NAME _____ DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

FINE MOTOR SKILLS		COMMENTS
Build tower using 6 cubes Unscrew jar lid Hold crayon with finger and thumb		
IMITATION		
Imitate vertical and horizontal crayon stroke Align 2 or more cubes for train, in imitation Attempt to fold paper imitatively		
OBJECT CONSTANCY		
Systematic search under 3 covers Deduce location of hidden object – single displacement		
SPATIALITY		
Complete formboard (3 forms present) Assemble 4 nesting blocks Square pegs in square holes		
CAUSALITY		
Use rake to get objects out of reach Push button on torch		
TACTILE INTEGRATION		
Play with dough and/or clay		
MATCHING		
Sort a set of 3 objects		
IMAGINATIVE PLAY		
Plays appropriately with telephone (not in imitation) Feeds doll (not in imitation)		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 2 Years

CHILD'S NAME _____ DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

COMPREHENSION		COMMENTS
Identifies 4 object pictures Identifies action words in pictures Identifies 5 body parts Follows 1 step instruction (e.g. "Put the spoon on the book")		
EXPRESSION		
Names 3 objects or pictures Imitates new words immediately Uses two-word sentences Verbalises greetings and farewells Uses the sounds: p b m k g w h n t d Use semantic functions: action/location/possession/attribution		
SOCIAL/PRAGMATIC		
Communicates a need/wish/intention or feeling Shares spontaneously with peers Tries to comfort other in distress Recognises self in mirror (dot test) Represents daily experience in play		
FEEDING		
Can spoon feed self Cup drinking – no need to stabilise jaw by biting cup - uses tongue tip elevations for swallow Chewing – easily transfers food from side to side in mouth		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 36 Months

CHILD'S NAME _____
DOB: _____
DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

FINE MOTOR SKILLS		COMMENTS
Build 9/10 cube tower/block train/3 bridge (EF) Holds pencil with fingers Imitates + (EF) Copies O (EF) Screws/Unscrews – to get doll out (EF) Strings Small Beads Hammers Cuts with Scissors		
ATTENTION/MEMORY		
What did you eat for breakfast Name missing objects (4)		
SIZE/NUMBER		
Big/Little Just One Gives/Selects 2-3 All/None/Not Any		
GENERAL CONCEPTS		
Assemble a face (EF) Identify objects with their use (spoon, scissors, crayon, cup) Red – Blue – Yellow Soft/Hard – Long/Short In/Out On/Top Under/Through/Around		
SPACE/SERIATION		
Tactile recognition Nesting 6 cups – correct mistakes (EF)		
SYMBOLIC PLAY		
Tea Party (EF) Cook biscuits/sausages made with dough		
TIME		
Car Racing – "Who will win?" – Come first?		
PUZZLE		
Matching shapes ● ■ ▲ (Find when named) 4/5 interconnected – Body puzzle (EF) Name, Age, Sex		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Corrected Age 3 Years

CHILD'S NAME _____
DOB: _____
DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

COMPREHENSION		COMMENTS
Properties – in/on under/between around hard/soft, open/shut, long/short, colours (3) **Objects by Function** draw/cut/drink/wear **Identifies Body Parts** arm/leg/neck/chin/knee **Responds to Questions** what/where/why/yes/no **Related 3 Stage Command** Pick up the block, put it in the cup and take it to Mummy		
EXPRESSION		
Sentence with subject – action – object 3 word phrases **Grammatical Features** pronouns adjectives prep phrases future "ing" possessive plural past negative (can't; don't) **Questions** what where why yes/no **Relates Information from the Past** (e.g. What did you see at the Zoo?) **Imitates 4-5 Words** Do you want tea? **Phonology:** *(fairly intelligible sounds)* T d n(-1) s p b kg w(f-)		
SOCIAL/PRAGMATIC		
Gives Name/Age/Sex Play with Evolving Sequence Converses with Peers Expresses regret when Peer Hurt Takes Turn with Reminder Makes Simple Choices in Food/Clothing/Activities Gets Self a Drink including Pouring		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Age 4 Years

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

CHILD'S NAME _____
DOB: _____
DATE: _____

COMPREHENSION		COMMENTS
Follows instructions involving the following semantic functions: ▪ Modifiers – two, tall, smallest, empty, long, colours ▪ Possession – boy's, girl's ▪ Pronouns – she, he, they ▪ Negation – not, no more		
Bureau Auditory Comprehension Test		
Follows 2 step commands not involving sequence e.g. put the doll on the shelf and then bring me the ball		
Answers 'wh' questions (3 or more correct) e.g. ▪ **what** do you do when you are hungry? ▪ **where** can you get a drink of water? ▪ **how** do you brush your teeth? ▪ **who** brushed your teeth today? ▪ **when** do we go to sleep? ▪ **why** do we go to sleep?		
EXPRESSION		
Spontaneous speech with the following syntactic forms: ▪ statement – subject action object ▪ description – subject action attribute ▪ imperative – subject action object ▪ 'wh' questions – What, Where, Why, When, How, Who, Whose ▪ Modal questions – do, does, is, was, will, can, may ▪ Past tense – irregular/regular		
Tells a story by looking at the pictures - 'Oops"		
SOCIAL/PRAGMATIC		
Describes what is happening in a picture - 'Flower picking' story		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Age 4 Years

CHILD'S NAME _____
DOB: _____

DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

STAGE 1 – Badge Making		**COMMENTS**
Objectives Warm up Fine Motor Skills:-cut straight and curved line, draw person		
STAGE 2 – Dress Up and Plan Trip		
Objectives Social/Emotional reaction to funny hat Metacognitive Questions – What do we need to take? Why do we need money? How will we get there?		
STAGE 3 – Going to Supermarket		
Objectives – Gross Motor – steps, plank, beam, tape line Social/Emotional Questions – What will we do? How does she feel? If she was very hurt, where could we go?		

THE CHAMPION CENTRE
Tamariki Toiora

MONITORING ASSESSEMENT – Age 4 Years

CHILD'S NAME _____
DOB: _____
DATE: _____

Skill Observed	✓
Skill Reported	R
Skill Emerging	E
Skill Absent	X
Not Observed	-

COGNITION		COMMENTS
Classification:- Tells if pictures are the same or different cat/horse cow/cow ▲ ❑ Points to picture that does not belong Names things asked for by use Tells you 2 things that he/she eats/wears/builds with Names 2 things that are round "Tell me 2 things that are round."		
Number:- Cubes – How many are there? 1 then 2 → 5 Counts to 5 with 1 : 1 correspondence 5 cubes "Count how many." Number of halves in a whole "If I cut this (velcro tomato) in half, how many pieces will I have?"		
Seriation:- Seriates 5 rods in base Seriates 3 pictures (small, medium, large) Shape matching – 8 piece formboard		
Names colours of formboard pieces		
Theory of Mind:- Sally Ann problem Raisins in packet		
FINE MOTOR		
Completes a six piece puzzle Imitates building a six cube pyramid Isolates finger movements Uses dynamic tripod grasp to manipulate pencil Draws a person with three parts Copies a cross from a picture Imitates drawing a square Uses a template to draw a triangle Draws within horizontal and vertical paths Cuts following a straight line Cuts following a curved line		

Appendix 4

THE CHAMPION CENTRE
Tamariki Toiora

EARLY CHILDHOOD CENTRE SURVEY

CHILD'S NAME: _____ **DOB**: _____

ADDRESS: _____ **DATE**: _____

_____

CENTRE: _____

Could you please rank the above child on the following items by circling the appropriate number. If you are doubtful about an item or do not think it applicable in your centre please leave a blank.

KEY:-	
0	Never
1	Sometimes
2	Frequently

1.	Separates easily from parent/caregiver	**0**	**1**	**2**
2.	Performs new activities voluntarily	**0**	**1**	**2**
3.	Tries again if change/disappointment occurs if reassured	**0**	**1**	**2**
4.	Remains calm if change/disappointment occurs and there is no remedy	**0**	**1**	**2**
5.	Follows directions provided by teacher/supervisor	**0**	**1**	**2**
6.	Behaves according to desires of others	**0**	**1**	**2**
7.	Co-operates with another child during play	**0**	**1**	**2**
8.	Shows affection for a familiar person	**0**	**1**	**2**
9.	Plays with groups of 3 or more	**0**	**1**	**2**
10.	Shares equipment/toys with other children	**0**	**1**	**2**
11.	Verbalises feelings to another child prior to physical expression	**0**	**1**	**2**
12.	Tells (or gestures to) adult about danger or injury	**0**	**1**	**2**
13.	Passes object (e.g. cup, food) on request	**0**	**1**	**2**
14.	Works in a small group for 5 to 10 minutes	**0**	**1**	**2**
15.	Remains on task for 5 minutes with distractions present	**0**	**1**	**2**
16.	Completes 25 - 50% of an activity once begun with little attention or prompting	**0**	**1**	**2**
17.	Begins an activity with no reminder or prompting	**0**	**1**	**2**

Appendix 5

THE CHAMPION CENTRE
Tamariki Toiora

PAEDIATRICIAN REPORT

CHILD'S NAME: _____ **DATE:** _____

ADDRESS: _____ **D.O.B.:** _____

_____ **CORRECTED AGE:** _____

Attention Dr. _____ **N.H.I.:** _____

***Reason for Referral* – PREMATURITY AND ASSOCIATED RISK FACTORS**

The following areas of developmental function and learning context have been reviewed today. This review is based on a combination of qualitative and quantitative assessment.

GROSS MOTOR SKILLS	**COGNITIVE SKILLS**
FINE MOTOR SKILLS	**RECEPTIVE LANGUAGE**
ORAL MOTOR SKILLS	**EXPRESSIVE LANGUAGE**
SELF CARE	**PARENT/CHILD INTERACTION**
TACTILE DEFENSIVENESS	**SOCIAL/EMOTIONAL DEVELOPMENT**
Summary:	

_____ will be reviewed _____when he/she will be _____ months corrected age. You are invited to attend this assessment, please contact our office staff if you would like to do so.

Early Intervention Teacher Speech Language Therapist Physiotherapist

Appendix 6

6.1 *Data Grid for research: Concerns from Reports to Paediatrician*

FCU7/Child XX	Gross Motor	Fine Motor	Cognitive	Expressive language	Receptive language	Social/ emotional	Tactile/ Self care	Imitation	Oral Motor
8 months									
12 months									
18 months									
24 months									
36 months									
48 months									

6.2 *Data Collection Basic Information*

Child :
GA:
DOB:
BW: g
Gender:
History:
CLD CPAP D, O2 Nasal prongs D
Respiratory distress syndrome
Apnoea of prematurity
Anaemia of prematurity
Dx

Child :
GA:
DOB:
BW: g
Gender:
History:
CLD CPAP D, O2 Nasal prongs D
Respiratory distress syndrome
Apnoea of prematurity
Anaemia of prematurity
Dx