



Auckland University of Technology
CLINICAL RESEARCH PROTOCOL

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SPONSOR(S), NAME AND ADDRESS	Auckland University of Technology Faculty of Health and Environmental Sciences – Postgraduate Research Committee. 90 Akoranga Drive Northcote 0627 Auckland		
FUNDING ORGANIZATION	Auckland University of Technology, AUT Physiotherapy New Zealand- Special interest groups (Neurology & Auckland North Shore branch). Visiting Neurodevelopmental Therapy Association (NZ).		
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COORDINATING CENTER (if applicable)	Auckland University of Technology		
ETHICS APPROVAL	Northern A Health and Disability Ethics Committee Pending		
LOCALITY AGREEMENT	TBC after ethics		

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Research Protocol

1. Protocol title:

The NEOgrads playgroup study: Improving developmental motor outcomes through intensive Early Intervention in preterm infants: A feasibility study.

Lay title: The NEOgrads playgroup program- promoting early motor development for preterm babies.

2. Protocol Summary

Aim: to evaluate the feasibility of a novel very early Intervention programme (NEOgrads playgroup) provided at '3-months corrected age', to babies born between 32⁺⁰ to 36⁺⁶ weeks gestation.

Study design:

This is a pilot non-randomised experimental study.

Population: Healthy moderate to late preterm infants (>32 weeks gestation) aged 12-weeks corrected.

Participant Selection Criteria:

To be eligible for the study, participants will satisfy the following criteria:

- Be healthy preterm infants who have been born between 32⁺⁰ to 36⁺⁶ weeks post-menstrual age,
- Infant is younger than 12-weeks corrected age (based on estimated date of birth),
- Reside in the Auckland region who have English-speaking parents/ caregivers or can be supported by a translator (due to group class sessions being in English).

Potential participants will be excluded if they meet the following criteria:

- Infants born extremely preterm, i.e., < 32 weeks gestation,
- Infants with known genetic or neurological conditions that will affect gross motor development (i.e., Trisomy 21, arthrogryposis, Cerebral Palsy, Spina Bifida, etc),
- Parents/ caregivers who are unable to bring the infant in-person to the intervention classes and the two assessments,
- Infants who require oxygen support, nasal gastric tube feeding or are acutely unwell.

Method:

All participants will participate in a 12-week developmental Early Intervention program (NEOgrads playgroup), including a pre and post intervention assessment. The NEOgrads program will consist of a weekly, 30-minute developmental group class and a tailored home exercise program (daily practice for 20 minutes duration) for 12-weeks intervention period.

The Pre-Intervention (baseline) assessment will be completed at 12 weeks corrected age (age based estimated day of delivery), which will take 75 minutes to complete.

The assessments include:

- Hammersmith Infant Neurological Assessment (HINE)
- Precht's General Movement Assessment (GMs)
- Peabody Developmental Motor Scale (PDMS-2)

Post intervention (follow-up assessment) will be completed within 1 week of completion of the intervention period. The assessments should take 45 minutes to complete.

The assessments include:

- Hammersmith Infant Neurological Assessment (HINE)
- Peabody Developmental Motor Scale (PDMS-2)
- Parent-rated survey

Time frame: 14 weeks

3. Sponsor

- Auckland University of Technology (AUT)

4. Funder

- Physiotherapy New Zealand Special Interest groups; Auckland North Shore Branch special interest group and Neurology special interest group.
- Visiting Neurodevelopmental Therapy Association of New Zealand.

5. Research sites

- Auckland University of Technology, 90 Akoranga Drive, Northcote, Auckland.
- Auckland Children's Physiotherapy, 117 Kitchener Road, Milford, Auckland.
- Community centre e.g., hall, church, or community space (2 sites either in South Auckland, West Auckland or central Auckland).

6. Research Team members and affiliations

- Miss Louise Pearce- Masters student, Co-investigator, responsible for development of intervention protocol, delivering intervention, data processing and analysis - Auckland University of Technology, Auckland, New Zealand.
- Dr Nusratnaaz Shaikh- Co-investigator, responsible for project development, project supervision and mentor for LP - Auckland University of Technology, Auckland, New Zealand.
- Dr Sian Williams- Co-investigator, responsible for project development, GM scoring, and project supervision- Liggins Institute, University of Auckland, Auckland, New Zealand.
- Dr Jimmy Chong- Co-investigator, responsible for project development and project supervision- Paediatric Rehabilitation Service, Te Whatu Ora Te Toka Tumai Auckland, New Zealand.
- Associate Professor Richard Ellis - Co-investigator, project supervision and mentoring NS- Auckland University of Technology, Auckland, New Zealand.

7. Study Objectives

Background

Each year, approximately 5,000 babies are born preterm (less than 37 weeks gestation) in Aotearoa New Zealand[1]. These preterm infants often require an admission to Neonatal Intensive Care (NICU) or Special Care baby units (SCBU) for medical management until they are stable to graduate home. Preterm infants are at higher risk of adverse developmental outcomes across motor, cognitive, behavioural and academic domains [2-4]. These risks are inversely related to age of gestation, however studies have shown even moderate preterm (MP) (gestational age 32-33^{5/7} weeks) and late preterm (LP) (34-36^{5/7} weeks gestation) have long term effects associated with prematurity such as developmental delay and increased need for special education programs [5].

To help improve the detrimental effects of being born preterm, evidence shows Early Intervention (EI) that comprises of therapy intervention is beneficial for preterm infants [6-8].

Currently eligibility criteria for EI public services in Aotearoa New Zealand (AoNZ) are restricted to infants who fall under a 'high risk' of developmental delay [1]. Despite accounting for more than 80% of all preterm births[9], infants born moderate-to-late preterm (MLP) are often ineligible for EI services [1] until they present with significant delays. Consequently, referral into EI services for infants born MLP is often dependent on parental health literacy, access to appropriate information at birth and parental engagement with health care providers due to lack of routine screening [10, 11]. Therefore, this can create additional barriers in accessing this recommended and beneficial service [11].

To support infant development, effective EI is proposed to comprise of therapy based on key principles such as; fostering parental empowerment [12], parent- infant interaction, promote motor learning [6] through goal-directed, environmental enrichment, and functional task-based activities [8]. EI focuses on utilising the Neuroplastic potential of the developing brain, therefore timely EI delivery (i.e., within the first 1000 days whilst neural connections are forming at a rapid rate) should promote greater improvements in development [13, 14]. There is a growing body of research examining this principle of novel EI to a younger cohort of infants. Early delivery of a 3-week 'object exploration' intervention (15 minutes daily practice of EI over 3 weeks) delivered at 8 weeks post birth to healthy term infants was shown to improve motor development outcomes compared with the control group [15]. Specific practice was based on prescribed time duration e.g., two minutes practicing sitting rather than repetition and intensity of practice. The findings by Mobbs, Spittle and Johnston's 2022 [16] feasibility study indicated similar motor improvements following two different EI approaches in preterm infants, both programs delivered from two to 15 weeks corrected age. Whilst one group of infants in the study received a 'usual care' EI physiotherapy program (a home- based development program) that consisted of 2-3 developmental assessment appointments lasting 15 to 30 minutes in duration and provided with a "short" development home exercise program. The second group of infants completed the Preterm infant Early intervention for Movement and Participation program (PreEMPT), which focused on delivering a participation-focused early physiotherapy intervention utilising telehealth. Parents and infants within the PreEMPT group received regular weekly (face to face or telehealth) sessions supported with a developmental home program with a frequency dosage of 7 out of the 14 planned sessions completed. Both groups had low home exercise program practice (adherence to prescribed overall program practice) and therefore this data was not reported. Limited efficacy testing showed improvements in infants' motor outcomes across both groups, this was not statistically significant, nor was between group differences detected secondary to being under powered [16]. However, parents of the infants enrolled into the PreEMPT group

reported an improved parental sense of competence ($p= 0.21$, $ES =1.34$) at 4 months corrected age compared to parents of infants within the usual physiotherapy group. However, both groups did not examine the repetition nor frequency of practice for each individual exercise to determine its effect on repetition saturation and capacity to build muscle strength.

This will be the first study to our knowledge to evaluate the delivery of EI considering intensity that focuses on duration, repetition and frequency delivered at a very young age to be conducted in Aotearoa NZ population and is unique as it includes MLP infants. The aim of this study is to investigate the feasibility and acceptability of an intensively delivered 12-week EI (NEOgrads playgroup) to parents for MLP infants commenced at 3- months corrected age with a focus on repetition- dependent saturation of motor skills.

8. Primary Objective:

The primary objective of this pilot study is to understand how feasible and acceptable is implementing a novel Early Intervention program in New Zealand to moderate to late preterm infants.

Specific Research Objectives

1. Is the delivery of a 12-week Early Intervention program acceptable by parents or caregivers of moderate to late preterm infants?
2. Is the intervention able to be delivered as per set protocol?
3. Will parents/ caregivers adhere to the recommended prescribed home exercise program and attend the class group sessions?

Secondary Research Objective

4. Does NEOgrads Early Intervention program show positive changes in gross motor outcomes (meaningful change from baseline scores, 1 standard deviation in Gross Motor Quotient score for infants corrected age) [17] over a 12-week intervention period that would be greater than normal maturation development rate? (*limited efficacy testing*).

9. Study Enrolment Procedures

Identification of participants

Convenience sampling will be used to recruit a target of 15 infants into the single arm intervention group (NEOgrads playgroup). This will be completed by advertising to parents through the community group Little Miracles Trust and community midwives (public and private Auckland Midwives), Milk & Honey Paediatrics. Little Miracles Trust is an organisation that supports infants and their families who have graduated from NICU. Milk & Honey paediatrics is a multidisciplinary private paediatric healthcare service.

Recruitment

Simple study information (recruitment flyer) will be displayed within the organisations (parent rooms notice board) and on their social media platforms (e.g., LinkedIn, Instagram, Facebook). The contact details of Louise Pearce (Primary Researcher) will be on the flyer to guide interested parents/ guardians who may wish to know more about the study. We also plan to use snowball sampling with word of mouth. Interested participants will contact Louise Pearce following the above-mentioned recruitment strategies.

Consent

The research study will involve infants who are 12-weeks corrected age. Written Informed consent will be required by parents/ legal guardians of the infants. If both parents' of the infant are under the age of 16 years, written informed consent from their parents/ legal guardian will be gained in addition to the assent of the adolescent parent. Adolescent's and the adolescent's parent/ guardian will be provided with full information about the research and the rights of participants involved in the study. A copy of informed consent document will be given to the parents/ guardians for their record.

10. Subject Inclusion and Exclusion Criteria

To be eligible for the study, participants will satisfy the following criteria:

- Be healthy preterm infants who have been born between 32⁺⁰ to 36⁺⁶ weeks post-menstrual age,
- Infant is younger than 12-weeks corrected age (based on estimated date of birth),
- Reside in the Auckland region who have English-speaking parents/ caregivers or can be supported by a translator (due to group class sessions being in English).

Potential participants will be excluded if they meet the following criteria:

- Infants born extremely preterm, i.e., < 32 weeks gestation,
- Infants with known genetic or neurological conditions that will affect gross motor development (i.e., Trisomy 21, arthrogryposis, Cerebral Palsy, Spina Bifida, etc),
- Parents/ caregivers who are unable to bring the infant in-person to the intervention classes and the two assessments,
- Infants who require oxygen support, nasal gastric tube feeding or are acutely unwell.

11. Methodology

11.1 Study Design

This is a pilot non-randomised experimental study.

11.2 Study Procedure

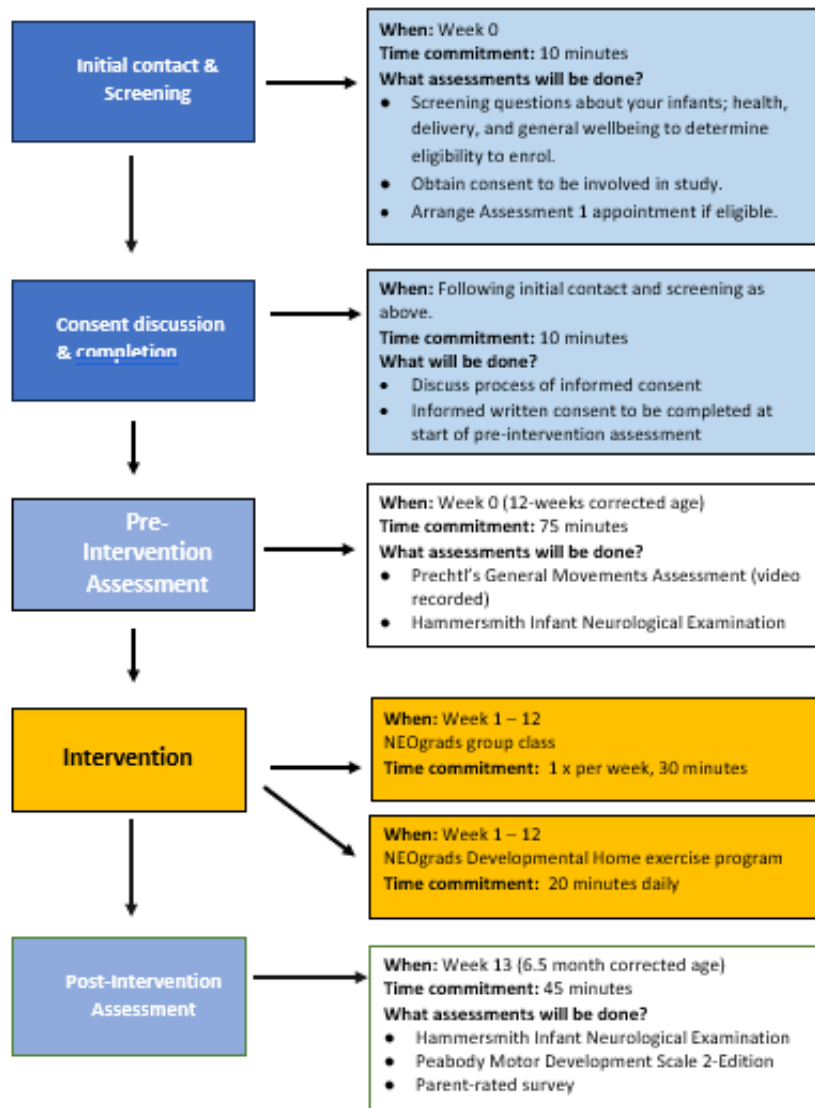
To determine eligibility, participants will undergo a brief screening assessment and complete a consent form before participating in the study. Pre-screening questions will include perinatal information collected from the parent/guardian including birthweight, gestation at birth, parental reported formalised assessments e.g., medical imaging and known medical diagnoses.

This study has three parts:

1. Consented participants will complete a Pre-intervention assessment (12 weeks corrected age).
2. 12-week intervention: infants will be allocated to attend the NEOgrads playgroup program to start at 12.5 to 13 weeks corrected age. Infants will be assigned to a set class time per week (1 x 30-minute class per week) and be provided with a developmental home exercise program to be completed (daily practice for 20 minutes).
3. Post – intervention assessment at 6 ½ months corrected age (immediately following the 12-week intervention period) to be completed by all participants.

Commented [lh1]: New flow chart to include consent process

Flow chart of the study protocol can be found below:



Assessment set-up

The assessment will be completed at either Auckland University of Technology lab room, Auckland Children's Physiotherapy clinic, or participants home depending on availability of the family to travel and clinic/ lab availability. All assessments are designed to be applied in variable settings e.g., Hospital, home and community centres. The assessment space only requires a small area to accommodate a mat, table, chair, family and therapist.

Pre-Intervention Assessments (A1)- 75 minutes duration

- Infant characteristics will be collected including self-reported ethnicity based on New Zealand Census titles (prioritised approach will be used for reporting), infants preferred positions of play and sleep.
- Standardised assessments:
 - Peabody Developmental Motor Scale – second edition (PDMS-2) (outlined below in further detail)
 - The Prechtl's Qualitative Assessment of General Movements (GMs)
 - Hammersmith Infant Neurological Examination (HINE).

Post-intervention Assessment (A2) – 45 minutes

- Standardised assessments:
 - Peabody Developmental Motor Scale – second edition (PDMS-2)
 - Hammersmith Infant Neurological Examination (HINE).
- Parent- rated satisfaction survey

11.4 Study Intervention NEOgrads playgroup

The NEOgrads playgroup will be delivered over a 12-week period including a face-to-face developmental playgroup class and home exercise program to be completed daily.

Set-up

The NEOgrads playgroup classes will be hosted and run by a trained Paediatric Physiotherapist (LP) who is experienced working with NICU graduates and promoting infant development. Once weekly, 30-minute developmental class sessions will be held in a local community centre (community room, hall or church) or at Auckland Children's Physiotherapy rooms (enable three different geographical localities) with free and accessible parking within close vicinity. We will aim to run classes with five infants per week, with a minimum of two infants in one class (scheduled class) on a set rostered day (same class time and day of week for 12

weeks). To accommodate infants missing a class, an additional two extra infants can attend a class outside of their normal session (make up class) to raise class maximum to seven.

Developmentally appropriate toys and equipment will be provided by the physiotherapist to be used within each session to encourage participation by the infant and ensure comfort and safety for participants and their family e.g., mats to play on, cleaning wipes to reduce infection. Each participant will receive toys as part of their Koha to use at home (part of the home exercise program practice).

Intervention session structure

The participants will attend the same developmental class each week with the same group of participants and their family. Parents will be encouraged to be actively involved with support and mentoring provided by the physiotherapist to practice developmental exercises with their infant. The infant's home exercise program will be updated (paper exercise program and practice of new exercises during class) with improvements in infant's developmental skills. During the duration of the class, infant development and motor skill acquisition will be discussed to build parents confidence and application to their own infant development and will support prescribed home program that will be recorded for reporting. Home practice will be encouraged with a duration of 20 minutes daily, with a minimum of 4 separate days of practice over a week.

Intervention design

LP created the NEOgrads training manual (template of developmentally appropriate exercises and progressions are fundamentally based on gestational age motor milestones and will be applied to participants corrected age) that has been developed with the intent to improve fidelity and generalisability of the intervention program. Typically, within a session, 4-5 key domains (supine, prone, sitting, standing, transitions, reaching/ toy exploration) will occur in the context of visual, auditory and social interactions (see example intervention schedule in Table 1). Parents will be supported to identify the level of their infant's ability for each domain, scaffold progression of skill and practice repetition (minimum of 4-5 times but focusing on skill improvement (saturation point) as key repetition threshold) with infant actively participating in the domain. During the playgroup sessions and at each week of the home program, data will be collected on program feasibility through program adherence, program acceptability, protocol fidelity as documented below.

Table 1 Example Intervention Schedule: EI program- developmental skill and progression of domain of supine lying.

Gestational age (weeks)	Domain	Skill practiced	Frequency/ duration of task	Progression	End Goal
12.5-14 weeks	Supine (back lying)	<ol style="list-style-type: none"> 1. Head in midline with chin tuck maintaining visual attention. 2. Batting toys at side of body (elbows flexed). 3. Lifting feet up to 90° of flexion actively. 	Five repetitions & observation of skill plateau (saturation point achieved).	<ol style="list-style-type: none"> 1. Elongation of neck into flexion. 2. Batting of toys across midline. 3. Hands to knees independently. 	<ol style="list-style-type: none"> 1. Head moves independently of body. 2. Batting of toys past midline. 3. Hands to feet.

Home exercise program

Following Pre- intervention assessment at A1, the infant and their family will be provided with a home program with key areas of development to focus on delivering at the “just right level” or “challenge point” [16] provided by the class physiotherapist (LP) based on motor development assessment findings. This type of treatment approach provides scaffolding of infant development to progress their skills. Overload, intensity, specificity, and repetition will underpin the dosage of practice of each exercise to be performed at each session (time point). These are based on the principles for exercise prescription and motor learning [23, 24]. The home exercise program (paper pages) will be created using pictures (generic photos) and easy to follow instructions for parents/caregivers.

Home practice of the exercises will be recommended to take 20 minutes total and be integrated throughout the infant’s day (over the day). Adjustments to the home program will be completed as observed during the class sessions as discussed above.

12. Assessments

12.1 Neurological Screening Assessments

The GMs and HINE are gold standard neurological screening assessments [1, 21, 22], and provide a predictor for future motor function and can identify neurological or other developmental disability.

The Prechtl General Movements Assessment (GMs) is a video observational assessment of the quality of the infant's movements specifically looking for fidgety movements [21]. The GMs video is recorded for a duration of 3 to 5 minutes, whilst the infant is awake, alert and lying on their back. Two certified assessors (investigators LP and SW) will score the videos independently of the assessment appointment. Infants will be scored as having fidgety, abnormal, sporadic or absent GMs. This will be completed at the Pre-Intervention assessment only. Infants with abnormal, sporadic or absent fidgety movements will be excluded as this indicates risk of abnormal neurological function in the infant [21]. The HINE is a hands-on and observational assessment that takes approximately 15 minutes to perform, assessing the infants; cranial nerve function, posture, movements, tone and reflexes and reactions. These scores provide a global score in addition to recording the number of asymmetries noted (see Appendix 5). A HINE global score below 57 will indicate high risk of cerebral palsy [1]. The HINE will be completed by the independent research therapist as part of assessment point 1 and 2. Infants with abnormal GMs or HINE assessments will be excluded from the study at this point as these findings indicate the infant is "at risk" of abnormal neurology [1]. Parents/ guardians will be contacted via telephone and informed of the abnormal findings. Written parental consent will be gained to grant approval for the assessor to refer directly into Early Intervention services. No GP notification or referral is required for this referral. The infant will be offered a single personalised EI home program to promote development whilst awaiting EI services.

12.2 Feasibility: Program adherence

A *Playgroup Logbook* will record participant attendance to the NEOgrads playgroup and will be completed by the therapist after each session (see Appendix 2).

Parent Logbook will record home practice (the frequency and duration) and additional external developmental activities completed during the intervention period.

12.3 Feasibility: Protocol fidelity:

A *class protocol audit*: The first three weeks of classes will be video recorded to audit the consistency of protocol delivery. In addition, Louise Pearce will complete a check list following each class to monitor the delivery and practice of key motor performance exercises as outlined in the weekly session plan (Intervention protocol). If significant changes to the protocol occur, an additional three weeks of video recording of class sessions will be completed and audited.

12.4 Feasibility: Program acceptability

At the completion of the study, the parents/ caregivers will be asked to complete a survey including a series of customised “*Parent- rated satisfaction*” questions using a 5-point Likert scale and open-ended questions regarding the acceptability of the NEOgrads playgroup program (see Appendix 3).

12.5 Feasibility: Limited efficacy testing

Motor development Assessment- (PDMS-2)

Secondary data will be collected to help determine if motor outcomes improve overtime directly following the 12-week intervention. The PDMS-2 is used to measure gross and fine motor development of infants from birth to five years of age [17]. The test comprises of both gross and fine motor items that can be used in isolation or combined to gain an overall score. For this study, the four subsets that make up the Gross Motor Quotient (GMQ) score; Reflexes, Stationary, Locomotion and visual motor integration will be collected at both assessment time points by independent research assessor.

The Peabody Developmental Motor Scale (PDMS-2) will be used to determine changes in gross motor development from pre and post intervention assessments (see Appendix 4). There will be no control group for comparison but a clinically significant improvement of 1 standard deviation in Gross Motor Quotient scores as set by Darrah et al. [17] will show clinically meaningful change based on infant’s age. A sample size of 15 infants was selected for this feasibility pilot study based on similar participation recruitment in EI pilot studies (N= 6-14 in EI arm) [18-20].

The infant will be tested through play as guided by the item gaining a score of 1 for partly achieved and 2 for completed. The infant will continue to progress through each item until they fail three consecutive items, providing a raw outcome score for that subtest. The PDMS-2 can be completed within 40 minutes and is a commonly used assessment tool to measure motor development for infants.

13. Data analysis

Feasibility measures of adherence and intervention fidelity will be determined through descriptive analysis (mean, percentage). Program acceptability will be assessed using two different processes, the Likert scale will be analysed using descriptive statistics (mean, percentage). Whilst the targeted open-ended data of the parent-rated satisfaction survey (question 8-11) will be evaluated using direct content analysis [25]. See Appendix 3.

Participant characteristics will be analysed to show frequency, percentages, mean and minimum and maximum values.

Data from infants who were not able to attend 60% of the in-person sessions will be excluded from analysis.

14. Safety Measures

Assessments

The neurological screening assessments (HINE & GM's), and Motor assessment (PDMS-2) are routinely used in clinical practice for preterm and 'at risk' population by credentialed paediatric physiotherapists worldwide [1]. For this study, the HINE and PDMS-2 assessment will be conducted by an experienced and trained paediatric physiotherapist independent of this study. LP and SW have completed advanced training for GM's assessment. If at any point during the assessments or intervention the infant experiences discomfort or distress the session will stop and the infant will be soothed/ cared for until they are ready to continue.

Intervention

The NEOgrads playgroup program has been developed by a paediatric physiotherapist with over 20 years' of experience within EI. She will provide support and supervision to parents over the intervention period to promote parental confidence in handling and performing the activities to ensure infants safety. Soft play mats will be provided during the class sessions to ensure a safe handling of the infants. Cleaning of playmats and toys following infection control guidelines will be completed following each session to limit infection risks to the participants.

In the unlikely event of physical injury, the injured person may be able to seek treatment through Accident Compensation Corporation if they meet the organisations criteria.

Adverse events

Any adverse events will be recorded in an adverse events form and reported to the research committee.

15. Data Management

General principles of data management for the study are as below. For full details please see the studies data management plan.

Data Management Summary:

- Identifiable data (name, address, date of birth) will be collected through identifiable data (demographic and screening assessment sheet) as a master data sheet that will be saved in a secure password-protected data base (REDCap) with access restricted to LP and NS.
- After consent, participants will be given a unique participant code, and all subsequent data will be recorded against this code.
- De-identified data will be entered in a secure password-protected database (REDCap). Video recordings of the GM's will be saved and protected on the AUT sharepoint in a password protected folder that only LP and SW will have access to for scoring the assessments. Data integrity will be enhanced by using referential data rules and checks and using dropdown lists of coding options where possible to reduce data entry error. Checks will be made on data integrity and reported to the data safety management committee (DSM) who will oversee data management and safety issues.
- Data will be stored in NZ. Māori data will be coded such that it can be disaggregated for use by researchers for the benefit of Māori. Decisions on any future use of Māori data beyond the stated uses of this study will be made in collaboration with Māori and will only progress with agreement from Māori.
- Standardised paper assessment forms (PMDS-2ED and HINE) will be stored at NS office in a locked file, until completion of the study.
- At the end of the study, all study databases will be de-identified and archived at AUT, and for participants aged 16 or above, data will be stored for 10 years before being decommissioned. For participants aged under 16 years, data will be stored for 10 years after the participants has reached the age of 16 years.
- No information concerning the study or the data will be released to any unauthorised third party.
- De-identified study data from assessment tools and outcome measures will be shared with other researchers upon reasonable request. Māori data will only be made available with the agreement of Māori.

16. Quality Assurance

Staff training

The HINE and PDMS-2ed assessments do not require formalise training but the independent therapist will be familiar and competent in these two assessments. The GM's will be assessed and scored by LP and SW who have completed advanced training.

The delivery of the treatment protocol will be completed by LP who has created the Intervention program. Each class session will follow a set format as per above example (NEOgrads playgroup example).

Participants Rights

Participant information sheets describing in detail the study purpose, study procedures, and risks are given to the participant, and written documentation of informed consent is required prior to starting data collection. The following consent materials are included in this protocol. Participant information sheet and Consent Form (see Appendix 1).

Consent Procedures and Documentation

Consent forms will be Northern A Health and Disability Ethics Committee and AUTEK approved, and the participant will be asked to read and review the document. The investigator will explain the research study to the participant and answer any questions that may arise to their satisfaction. A verbal explanation will be provided in terms suited to the participant's comprehension of the purposes, procedures, and potential risks of the study and of their rights as research participants. Participants will have the opportunity to carefully review the written consent form and ask questions prior to signing. The participants will have the opportunity to discuss the study with their family/whānau or think about it prior to agreeing to participate. For participants aged under 16 years, researchers will carry out the process of supported decision making and evaluation of their capacity to provide assent in addition to gaining proxy informed consent by the parent or guardian.

The participant will sign the informed consent document prior to any procedures being done specifically for the study. Participants will be informed that participation is voluntary and that they may withdraw from the study at any time, without prejudice. The rights and welfare of the participants will be protected by emphasising to them that the quality of their medical care will not be adversely affected if they decline to participate in this study.

A copy of the informed consent document will be given to the participants for their records. The informed consent process will be conducted and documented in the source document (including the date), and the form will be signed before the participant undergoes any study-specific procedures.

Research Committee

Louise Pearce	Masters student, co-investigator, responsible for development of intervention protocol, delivering intervention, data processing and analysis.
Dr Nusratnaaz Shaikh	Principle -investigator, responsible for project development, project supervision and mentor for LP.
Ass. Prof. Richard Ellis	Co-investigator, project supervision and mentoring NS.
Dr Sian Williams	Co-investigator, responsible for project development, GM scoring, and project supervision.
Dr Jimmy Chong	Co-investigator, responsible for project development and project supervision.

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Appendix 1. Participant Information Sheet and Consent Form.

Appendix 2: NEOgrads Playgroup Developmental home program – Parent/Caregiver Logbook

Participant ID:

NEOgrads Playgroup- Developmental home program

Parent/ Caregiver Logbook

Thank you for participating in the NEOgrads Playgroup. As part of your infant's developmental home program, we ask you to please complete the following logbook. This helps us understand how the program was practiced across all the infants and allows us to improve the program for future use. We would recommend completing the logbook after completing the home program to help complete with its accuracy.

Information to help complete the logbook:

Each box item asks you to circle your answer or write your own comment or information in.

Exercises completed: If you were not able to practice any part of the home program, please record your answer as "No".

Practice skill: circle all exercise groups that you completed.

Total time of practice: please round up to the nearest five minutes i.e., you practiced for 7 minutes over the course of the day the exercises, round this up to 10 minutes. If you practiced for 6 minutes, round down to 5 minutes. **Plateau in skill:** complete the exercise a few times in a row, looking for the time they can perform the exercise more skillfully, this indicates they have reached a plateau in their practice. Record for each skill how often you have seen this before moving onto the next skill. If the infant is getting tired, they may have greater difficulty with the exercise, give them a rest and try again later.

Each week we will ask you to start a new logbook e.g., week 2. At the end of the 12-week program, we will collect this logbook from you. If you have any questions about completing the logbook, please let Louise Pearce your class physiotherapist know.

NEOgrads Logbook V1.1
20/11/2023

Participant ID:

Week 1 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill practice	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 2 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 3 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 4 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 5 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 6 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 7 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

NEOgrads Logbook V1.1
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Participant ID:

Week 8 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions	Back skills Tummy skills Reaching Sitting Transitions
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 9 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 10 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 11 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Participant ID:

Week 12 Date: / /24	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Exercises completed?	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Skill Practiced	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing	Back skills Tummy skills Reaching Sitting Transitions Standing
Total time of practice per day (minutes)	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20	5 10 15 20 >20
Percentage of plateau in skill observed during exercises	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%	< 25% 26-50% 49-74% >75%
Comments (i.e., infants; health, energy, engagement)							
Other activities (i.e., swimming, SPACE, baby sensory)							

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Appendix 3: Parent/Caregiver Rated Survey.



Participant ID:

NEOgrads Playgroup
Parent- Rated Satisfaction Survey

Thank you for attending the 12-week developmental program with your baby/ pēpē. Now that it has finished, we would like to know what you think about the NEOgrads playgroup program as whole.

What do you think?

Please answer the questions below by circling the number/ word that best describes your answer.

1. The NEOgrads program was of benefit to my baby.

Strongly disagree	Disagree	Undecided	Agree	Strongly Agree
1	2	3	4	5

2. The NEOgrads program was of benefit to me/my family.

Strongly disagree	Disagree	Undecided	Agree	Strongly Agree
1	2	3	4	5

3. Rate how useful you found the class sessions.

Very Important	Important	Moderately Important	Slightly Important	Unimportant
1	2	3	4	5

4. Rate how useful you found the home exercise program.

Very Important	Important	Moderately Important	Slightly Important	Unimportant
1	2	3	4	5

5. Rate the degree the playgroup program made a difference in your relationship (bonding, social interaction, confidence with playing and supporting their development) with your baby.

Excellent	Good	Fair	Poor	Very Poor
1	2	3	4	5

6. Rate the degree the playgroup program made in your knowledge about baby development and motor milestones.

Excellent	Good	Fair	Poor	Very Poor
1	2	3	4	5

7. Rate the degree that you would recommend the playgroup program to other parents of preterm infants.

Definitely	Probably	Possibly	Probably Never	Definitely Not
1	2	3	4	5

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NEOgrads Playgroup
V1.1 21.11.23



Participant ID:

What was useful?

Thinking about all elements NEOgrads playgroup program, what was useful? Are there any aspects of the program that made a difference in your life or in terms of your relationship with your child?

8. How could it be improved?

Thinking about all elements of the NEOgrads playgroup program, how could it be improved? Is there anything you would remove or add?

9. Was it inclusive?

Was there an aspect of the NEOgrads playgroup program that did not fit with your cultural background, life experiences or circumstances?

10. Is there something we could do to make the NEOgrads playgroup program more inclusive and welcoming to everyone?

Thank you from the study team for your time in completing this survey.

PDMS-2

Examiner Record Booklet

Peabody Developmental Motor Scales Second Edition

Section I. Identifying Information

Child's Name _____ Female Male

First Administration				Second Administration			
Year	Month	Day		Year	Month	Day	
Date Tested	___	___	___	Date Tested	___	___	___
Date of Birth	___	___	___	Date of Birth	___	___	___
Chronological Age	___	___	___	Chronological Age	___	___	___
Prematurity Adjustment	___	___	___	Prematurity Adjustment	___	___	___
Corrected Age	___	___	___	Corrected Age	___	___	___
Age in Months	___	___	___	Age in Months	___	___	___
Examiner's Name _____				Examiner's Name _____			
Examiner's Title _____				Examiner's Title _____			
Subtest Results				Subtest Results			
Raw Score		Raw Score		Raw Score		Raw Score	
Reflexes	___	Object Manipulation	___	Reflexes	___	Object Manipulation	___
Stationary	___	Grasping	___	Stationary	___	Grasping	___
Locomotion	___	Visual-Motor Integration	___	Locomotion	___	Visual-Motor Integration	___
Third Administration				Fourth Administration			
Year	Month	Day		Year	Month	Day	
Date Tested	___	___	___	Date Tested	___	___	___
Date of Birth	___	___	___	Date of Birth	___	___	___
Chronological Age	___	___	___	Chronological Age	___	___	___
Prematurity Adjustment	___	___	___	Prematurity Adjustment	___	___	___
Corrected Age	___	___	___	Corrected Age	___	___	___
Age in Months	___	___	___	Age in Months	___	___	___
Examiner's Name _____				Examiner's Name _____			
Examiner's Title _____				Examiner's Title _____			
Subtest Results				Subtest Results			
Raw Score		Raw Score		Raw Score		Raw Score	
Reflexes	___	Object Manipulation	___	Reflexes	___	Object Manipulation	___
Stationary	___	Grasping	___	Stationary	___	Grasping	___
Locomotion	___	Visual-Motor Integration	___	Locomotion	___	Visual-Motor Integration	___



Section II. Record of Item Performance							
Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
Gross Motor Scales							
Reflexes							
1	2	WAITING REFLEX With hands around trunk, hold child in standing position (facing away). Tilt child slightly forward. Brush top of child's feet against edge of table, then hold child so feet are resting on table.	2 Lifts 1 foot, then the other, in forward walking movement within 3 seconds 1 Lifts 1 foot within 3 seconds 0 Feet and legs remain still				
2	4	POSITIONING REFLEX: Asymmetrical Tonic Neck Reflex (Integrated) <i>(Lying on back, head toward examiner)</i> Turn child's face so left cheek is parallel to surface. Hold his or her head in that position for 3 seconds and observe child's reaction. Repeat procedure to right side.	2 Does not move arms and legs as a result of head being turned 1 Arms and legs respond as described below, but can move arms and legs out of position while head is turned 0 Reflex still present [When face is turned left, left arm and leg extend while right arm and right leg flex. When face is turned right, right arm and right leg extend while left arm and left leg flex. Reflex disappears by 6 months.]				
3	6	LANDAUI REACTION Hold child suspended horizontally, stomach toward floor, side toward you with your hands under his or her chest and stomach.	2 Raises head above horizontal plane, extends trunk, and symmetrically raises hips and legs into full extension 1 Extends head above plane and extends trunk but hips and legs remain below horizontal 0 Head and hips remain below horizontal				
4	6	PROTECTING REACTION—Forward <i>(Either kneel on floor or stand facing table so when child is tilted forward, he or she can reach surface.)</i> Hold child in suspended horizontal position, stomach parallel to floor, buttocks toward you, then quickly tilt child's head toward the surface.	2 Extends arms, straightens elbows, and bears weight on open palms 1 Extends arms or puts hands on surface, elbows bent, but doesn't bear weight 0 Fails to extend arms or put hands on surface				
5	6	PROTECTING REACTION—Side <i>(Sitting, back toward you)</i> With hands at hips, support child in sitting position, then quickly tilt child 45 degrees to one side.	2 Breaks fall by extending arm and supporting self with open palm for 2 seconds 1 Breaks fall by falling on forearm 0 Falls on side				
6	6	PROTECTING REACTION—Forward <i>(Sitting, back toward you)</i> With hands at hips, support child in sitting position, then quickly tilt child 45 degrees forward.	2 Breaks fall by extending one or both arms and supporting self with one or both open palms for 2 seconds 1 Extends one or both arms and falls forward 0 Fails to extend arms				
7	9	RIGHTING REACTION—Forward <i>(Sitting, back toward you)</i> Place your hands on child's shoulders and pull him or her backward 20 degrees from vertical. (Be prepared to catch child if no reaction occurs.)	2 Extends arms and head forward to recover balance and returns to upright sitting position 1 Extends arms forward and to floor to recover balance and returns to upright sitting position 0 Fails to extend arms or head forward				
8	10	PROTECTING REACTION—Backward <i>(Sitting, facing you)</i> Place your hands on child's chest and push gently and rapidly backward at least 45 degrees. (Have someone prepared to catch child or stop fall if no reaction occurs.)	2 Stops fall by extending arm(s) backward and supporting weight on open palm(s) 1 Rotates trunk to one side and extends arm but continues to fall 0 Fails to extend arms				

Reflexes—2

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
Stationary							
1	0	ROTATING HEAD (<i>Lying on stomach, head turned to side with cheek resting on surface; examiner out of eyesight</i>) Shake rattle 3 times behind child's head. Repeat procedure with opposite cheek resting on surface.	2 Lifts and turns head so opposite cheek touches surface (both sides) 1 Lifts and turns head so opposite cheek touches surface (1 side only) 0 Head remains as positioned				
2	0	ALIGNING TRUNK (<i>Sitting, facing you</i>) Support child in sitting position by holding his or her wrists and arms. Observe position of child's back.	2 Holds back in rounded position for 3 seconds 1 Holds back in rounded position for 1–2 seconds 0 Arches back immediately				
3	1	ALIGNING HEAD—Front (<i>Sitting, head hanging forward, back to you</i>) With hands around trunk, support child in sitting position. Observe head alignment in relation to trunk.	2 Holds head so that a 45-degree angle (or greater) exists between chin and chest 1 Holds head up slightly from chest 0 Chin touches chest				
4	1	ALIGNING HEAD—Back (<i>Lying on back, pulled to sitting</i>) Grasp child's hands and wrists and gently pull him or her to a sitting position. Observe head alignment during movement cycle and head position at end of cycle.	2 Holds head so that a 45-degree angle (or greater) exists between back of head and back 1 Holds head up slightly from back 0 Head touches back				
5	2	ALIGNING HEAD (<i>Lying on back, pulled to sitting</i>) Grasp child's hands and wrists and gently pull to a sitting position. Observe head alignment during movement cycle and head position at end of cycle.	2 Holds head in midline through 75%–100% of movement cycle 1 Holds head in midline through 50%–74% of movement cycle 0 Holds head in midline for less than 50% of cycle				
6	2	EXTENDING HEAD (<i>Held in a suspended vertical position with head toward ceiling, feet toward floor</i>) Pick child up (facing you) with your hands around trunk. Observe head alignment.	2 Raises head at midline and holds it in alignment for 3 seconds 1 Raises head at midline and holds it in alignment for 1–2 seconds 0 Head remains extended backward or flexed forward				
7	2	ALIGNING HEAD (<i>Held at shoulder</i>) Hold child at your shoulder with one hand under buttocks and other on child's back. (Head is not supported.) Gently bounce child up and down 3 times.	2 Holds head in midline for 2–3 bounces 1 Holds head in midline for 1 bounce 0 Fails to hold head in midline on each bounce				
8	3	ALIGNING HEAD (<i>Held in suspended vertical position with head toward ceiling, feet toward floor</i>) Pick child up (facing you) with your hands around trunk. Slowly tilt child 45 degrees to left of midline. Without pausing, return to midline and tilt 45 degrees to right. Return to midline. Observe alignment of child's head throughout cycle. (Count 4 seconds per segment of movement cycle: left, midline, right, midline.)	2 Holds head in alignment for 75%–100% of movement cycle 1 Holds head in alignment for 50%–74% of movement cycle 0 Holds head in alignment for less than 50% of cycle				
9	3	STABILIZING TRUNK (<i>Sitting</i>) Support child in sitting position (side toward you) by holding his or her hips. Child's hands can be placed on surface for additional support.	2 Holds trunk off legs in a 30-degree angle for 5 seconds 1 Holds trunk off legs in less than a 30-degree angle for 5 seconds 0 Trunk remains in contact with legs				

Stationary—3

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
10 Start: 6 months	4	ALIGNING HEAD <i>(Sitting, supported with pillows around hips)</i> Dangle toy on a string 12 in. in front of child. Slowly move toy in 180-degree arc, from in front of child to his or her left side, back to front, and then to right side. (Count 4 seconds per segment of movement cycle: left, front, right, front.)	2 Holds head aligned for 8 seconds while rotating head to follow toy 1 Holds head aligned for 4–7 seconds while rotating head to follow toy 0 Holds head aligned for less than 4 seconds				
11	5	SITTING Place child in sitting position, hands on surface beside knees. When balance is secure, release child.	2 Maintains balance for 8 seconds 1 Maintains balance for 3–7 seconds 0 Maintains balance for less than 3 seconds				
12 Start: 7–9 months	6	SITTING/REACHING <i>(Sitting, pillows supporting hips)</i> Attract child's attention to toy on a string suspended at midline 12 in. in front of child's chest.	2 Maintains balance for 8 seconds while extending arms and hands to grasp toy 1 Maintains balance for 5–7 seconds while extending arms and hands to grasp toy 0 Maintains balance for less than 5 seconds				
13	6	PULLING TO SIT <i>(Lying on back, feet toward you)</i> Hold index fingers out, touching child's hands, if necessary, to get child to grasp them. Once fingers are grasped, say, "Get up." Pull your hands back so child's arms become straight.	2 Pulls up to sitting position 1 Pulls up 45–90 degrees from the surface 0 Pulls up less than 45 degrees or remains lying on surface				
14 Start: 10–11 months	6	SITTING Place child in sitting position and release your support.	2 Sits unsupported for 60 seconds 1 Sits unsupported for 30–59 seconds 0 Sits for less than 30 seconds				
15	7	SITTING WITH TOY Place child in sitting position and release your support. Place toy 12 in. in front of child. Say, "Get the toy."	2 Retrieves toy, returns to upright sitting, and maintains balance for 30 seconds 1 Retrieves toy, returns to upright sitting, and maintains balance for 15–29 seconds 0 Fails to retrieve toy, return to upright sitting, or maintain balance for 15 seconds				
16 Start: 12–15 months	9	SITTING Place child in sitting position and release your support. Give toy to child and say, "Play with the toy."	2 Maintains balance for 60 seconds while manipulating toy 1 Maintains balance for 30–59 seconds while manipulating toy 0 Maintains balance for less than 30 seconds				
17	10	RAISING TO SIT <i>(Lying on back)</i> Place child on back on floor. Attract child's attention to toy and then place it on chair where child can see it. Say, "Get the toy."	2 Pulls up to sitting position, using chair for support 1 Grasps chair and rotates body in effort to raise up 0 Remains lying on floor				
18	10	SITTING UP <i>(Lying on stomach)</i> Place child on stomach on floor. Attract child's attention to toy ; then hold toy out of child's reach, about 2 ft. above floor. Say, "Get the toy."	2 Raises to sitting position 1 Attempts to maneuver into sitting position 0 Remains lying on floor				
19 Start: 16–26 months	13	KNEELING Place child in a kneeling position, buttocks not resting on heels. Keeping toy at child's eye level and about 2 ft. away, move it in arc to one side of child. Say, "Watch the toy." Return toy to starting position and then move it in arc to other side. (Take about 4 seconds for each segment of movement cycle: front to left, left to front, front to right, right to front.)	2 Maintains balance for 5 seconds while rotating head 1 Maintains balance for 2–4 seconds 0 Maintains balance for less than 2 seconds				

Stationary—4

Item #	Age In Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
20 Starts 29-48 months	31-32	STANDING ON 1 FOOT Stand on 1 foot, hands on hips with free leg bent back at knee. Say, "Put your hands on your hips and stand on 1 foot like I did."	2 Stands on 1 foot with hands on hips for 3 seconds 1 Stands on 1 foot with hands on hips for 1-2 seconds 0 Requires help to stand on 1 foot				
21	41-42	STANDING ON 1 FOOT Stand on 1 foot, hands on hips with free leg bent back at knee. Say, "Put your hands on your hips and stand on 1 foot like I did."	2 Stands on 1 foot with hands on hips for 5 seconds 1 Stands on 1 foot with hands on hips for 2-4 seconds 0 Stands on 1 foot for less than 2 seconds				
22 Starts 49-56 months	43-44	STANDING ON TIPTOES Stand on tiptoes with hands held overhead for 3 seconds. Say, "Hold your hands over your head and stand on your tiptoes like I did."	2 Stands on tiptoes with arms held overhead and without moving feet for 3 seconds 1 Stands on tiptoes with arms held overhead and without moving feet for 1-2 seconds 0 Moves feet or heels remain on floor				
23	45-46	STANDING ON 1 FOOT Stand on 1 foot, hands on hips with free leg bent back at knee for 5 seconds. Say, "Put your hands on your hips and stand on 1 foot like I did."	2 Stands on 1 foot with hands on hips and without swaying more than 20 degrees for 5 seconds 1 Stands on 1 foot with hands on hips and without swaying more than 20 degrees for 2-4 seconds 0 Stands on 1 foot for less than 2 seconds or sways more than 20 degrees				
24 Starts 57-71 months	51-52	STANDING ON TIPTOES Stand on tiptoes with hands held overhead for 8 seconds. Say, "Hold your hands over your head and stand on your tiptoes like I did for as long as you can."	2 Stands on tiptoes with arms held overhead, without moving feet, and without swaying more than 20 degrees for 8 seconds 1 Stands on tiptoes with arms held overhead, without moving feet, and without swaying more than 20 degrees for 5-7 seconds 0 Stands on tiptoes for less than 5 seconds or sways more than 20 degrees				
25	53-54	STANDING ON 1 FOOT Stand on 1 foot with hands on hips for 10 seconds, then on other foot for 10 seconds. Say, "Put your hands on your hips and stand on each foot like I did." Count seconds out loud to encourage child to balance longer.	2 Stands on 1 foot, then on other foot, with hands on hips and without swaying more than 20 degrees for 6 seconds on each foot 1 Stands on one foot, then on other foot, with hands on hips and without swaying more than 20 degrees for 1-5 seconds on each foot 0 Stands on only 1 foot (does not change feet) or sways more than 20 degrees				
26	57-58	IMITATING MOVEMENTS (Standing) Stand 3 feet from child. Say, "I am going to move my arms and I want you to copy my movements." Do practice move (one not on rest) to see if child understands. Do not use verbal cues. Present 6 positions one at a time at 1-second intervals.	2 Imitates 4 positions accurately 1 Imitates 1-3 positions accurately 0 Fails to imitate any position accurately				
27	59-60	STANDING ON 1 FOOT Stand on 1 foot with hands on hips for 10 seconds, then on the other foot for 10 seconds. Say, "Put your hands on your hips and stand on 1 foot and then the other like I did." Count seconds out loud to encourage child to balance longer.	2 Stands on each foot with hands on hips and without swaying more than 20 degrees for 10 seconds 1 Stands on each foot with hands on hips and without swaying more than 20 degrees for 5-9 seconds 0 Stands on each foot for less than 5 seconds, sways more than 20 degrees, or stands on only 1 foot				

Stationary—5

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
28	59-60	SIT-UPS (<i>Lying down on mat</i>) Demonstrate sit-ups on mat. Place child in starting position on mat. Hold child's feet and say, "Do as many sit-ups as you can." Stop child after 30 seconds.	2 Completes 3 sit-ups in 30 seconds 1 Completes 1-2 sit-ups in 30 seconds 0 Fails to complete any sit-ups				
29	68-72	SIT-UPS (<i>Lying down on mat</i>) Demonstrate sit-ups on mat. Place child in starting position on mat. Hold child's feet and say, "Do as many sit-ups as you can." Stop child after 30 seconds.	2 Completes 5 sit-ups in 30 seconds 1 Completes 3-4 sit-ups in 30 seconds 0 Completes less than 3 sit-ups				
30	72	PUSH-UPS (<i>Lying face down on mat</i>) Demonstrate 3 push-ups. Say, "Do as many push-ups as you can." Stop child after 20 seconds.	2 Completes 8 push-ups in 20 seconds 1 Completes 4-7 push-ups in 20 seconds 0 Completes less than 4 push-ups				
Locomotion							
1	0 <i>Start 1-2 months</i>	THRUSTING LEGS (<i>Lying on back</i>) Stimulate leg thrusts by holding child's feet and pushing them toward his or her body so knees are flexed, legs bent, and heels almost touching buttocks. Then pull child's feet out until legs are fully extended. Repeat motions. Let go of child's feet. Observe for more than 1 minute.	2 Bends and straightens legs (alternately or together) 2 times 1 Bends and straightens legs (alternately or together) 1 time or moves only 1 leg 0 Does not move legs				
2	0	TURNING FROM SIDE TO BACK (<i>Lying on side, legs bent to maintain balance, examiner in back of child</i>) Shake rattle 3 times behind child's back. Repeat procedure with child lying on opposite side.	2 Rolls onto back (both sides) 1 Rolls onto back (1 side only) 0 Remains on side				
3	0	THRUSTING ARMS (<i>Lying on back</i>) Stimulate arms by bringing child's hands together at midchest with elbows bent. Then stretch arms out to sides until elbows are straight and hands touch surface. Repeat. Let go of child's hands. Observe for 1 minute.	2 Bends and straightens arms (alternately or together) 2 times 1 Bends and straightens arms (alternately or together) 1 time or moves only 1 arm 0 Does not move arms				
4	2	BEARING WEIGHT (<i>Standing</i>) Hold child in a standing position facing you with his or her feet resting on table or counter top. Observe leg position and whether child can bear weight for 3 seconds.	2 Bears weight with knees flexed and feet flat for 3 seconds 1 Bears weight with knees flexed and toes touching surface for 3 seconds or with knees flexed and feet flat for 1-2 seconds 0 Fails to bear weight or legs remain straight with only toes touching surface				
5	2 <i>Start 3-4 months</i>	EXTENDING TRUNK (<i>Lying on stomach, head turned to side, forearms resting on surface</i>) Attract child's attention by shaking rattle 1 in. above surface. Continue to shake rattle and move it 6 in. above child's head.	2 Elevates head and upper trunk 45 degrees, bearing weight on forearms or hands for 3 seconds 1 Elevates head and upper trunk 45 degrees, bearing weight on forearms or hands for 1-2 seconds 0 Elevates head less than 45 degrees				
6	3	SYMMETRICAL POSTURE (<i>Lying on back; feet toward you</i>) Shake rattle 18 in. from child's nose and then move it to within 12 in.	2 Brings both hands together at midline within 5 seconds (hands come up together) while maintaining midline head and body posture 1 Brings 1 hand to midline and moves the other out of midline while maintaining midline head and body posture 0 Hands remain out of midline position				

Locomotion—6

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
7 Start 6 months	4	PROPPING ON FOREARMS <i>(Lying on stomach, chin and forearms resting on surface)</i> Attract child's attention to toy on a string and then suspend it 12 in. above child's face.	2 Elevates head and upper trunk 45 degrees and bears weight on forearms for 5 seconds 1 Elevates head and upper trunk 45 degrees and bears weight on forearms for 3-4 seconds 0 Elevates head and upper trunk, bearing weight for less than 3 seconds, or fails to elevate trunk				
8	4	ROLLING <i>(Lying on back, feet toward you)</i> Shake rattle at midline 12 in. above child's face. Slowly move rattle in arc toward surface. Repeat procedure to other side.	2 Rolls to side with opposite arm crossing midline (both sides) 1 Rolls to side with opposite arm crossing midline (one side only) 0 Remains on back				
9 Start 8 months	4	EXTENDING ARMS AND LEGS <i>(Lying on stomach, head toward you)</i> Attract child's attention to toy on a string that you dangle at midline 12 in. from child's head. Observe child's arms and legs for 5 seconds.	2 Extends arms and legs (alternately or together) off surface for 3 seconds 1 Extends arms and legs (alternately or together) off surface for 1-2 seconds, or moves only arms or legs for 3 seconds 0 Arms and legs remain inactive				
10	5	FLEXING LEGS <i>(Lying on back, bare feet)</i> If child has socks on, remove them and then gently bend both legs toward child's face, wiggle and then release them.	2 Brings feet to mouth for play or grabs feet with hands (both feet must come up, alternately or together) 1 Raises feet 90 degrees or less or brings 1 foot to mouth 0 Legs remain on surface				
11	5	EXTENDING ARMS AND LEGS <i>(Lying on back, head in midline)</i> Attract child's attention to toy on a string that you dangle at midline 12 in. from child's head. Observe child's arms and legs for 5 seconds.	2 Raises arms and legs (alternately or together) in smooth, fluid movements within 5 seconds after toy is presented 1 Raises arms and legs (alternately or together) within 6-7 seconds after toy is presented 0 Arms and legs remain inactive				
12	6	EXTENDING ARM <i>(Lying on stomach, chin and forearms resting on surface)</i> Attract child's attention to toy on a string just out of reach. Say, "Get the toy."	2 Raises upper trunk, shifts weight to side, lifts free arm, and reaches toward toy 1 Raises upper trunk, shifts weight to side, and lifts free arm without reaching toward toy 0 Both arms remain in contact with surface				
13 Start 7 months	6	FLEXING BODY <i>(Lying on back, bare feet)</i> Gently bend both legs toward head 3 times. Do not place feet in child's hands, but encourage child to grasp them by saying, "Get your feet."	2 Grasps both feet and holds them for 3 seconds 1 Grasps both feet and holds them for 1-2 seconds or grasps 1 foot and holds it for 3 seconds 0 Legs remain on surface				
14	6	PUSHING UP <i>(Lying on stomach, head turned to side, forearms resting on surface)</i> Attract child's attention to rattle . Shake rattle 12 in. in front of child's forehead and 6 in. above child's head.	2 Elevates head and stomach by pushing up with arms, bearing weight on palms for 5 seconds 1 Elevates head and stomach by pushing up with arms, bearing weight on palms for 3-4 seconds 0 Bears weight for less than 3 seconds				
15	6	EXTENDING ARM <i>(Lying on back)</i> Shake toy on a string and then hold it 12 in. to right of child's head and 12 in. above surface. Repeat procedure to opposite side.	2 Shifts weight to side and supports self with arm for 3 seconds while extending opposite arm to reach for toy (both sides) 1 Shifts weight to side and supports self with arm for 1-2 seconds while extending opposite arm to reach for toy (1 or both sides) 0 Remains on back				

Locomotion—7

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
16	7	ROLLING (<i>Lying on back</i>) Shake rattle at midline 12 in. above child. Lower rattle to surface on child's left, out of child's reach. Repeat procedure on opposite side.	2 Rolls from back to stomach (both sides) 1 Rolls from back to stomach (1 side only) 0 Remains on back				
17	7	ROLLING (<i>Lying on back</i>) Attract child's attention to toy by shaking it to side of child. Repeat procedure on opposite side.	2 Rolls from back to stomach, leading with hips and thighs, followed by stomach and then shoulders (both sides) 1 Rolls from back to stomach (1 side only) 0 Remains on back				
18	8	MOVING FORWARD (<i>Lying on stomach</i>) Place toy 5 ft. in front of child. Say, "Get the toy."	2 Moves forward 3 ft. using arms 1 Moves forward at least 2 ft. but less than 3 ft. using arms 0 Moves less than 2 ft.				
19	9	RAISING SHOULDERS AND BUTTOCKS (<i>Lying on stomach</i>) Sit 3 ft. in front of child. Hold your hands out to child and say, "Come here."	2 Raises and bears weight on hands and knees for 5 seconds and rocks back and forth for 2 cycles 1 Raises and bears weight on hands and knees for 1-5 seconds 0 Remains on stomach				
20	9	CREEPING (<i>Hands and knees</i>) Place toy on floor 6 ft. in front of child. Say, "Get the toy." Move toy back as child approaches.	2 Creeps forward on hands and knees, using a cross-lateral pattern (opposite arms and legs moving together) for 5 ft. 1 Creeps forward on hands and knees using cross-lateral pattern for 4 ft. or creeps without using cross-lateral pattern for 5 ft. 0 Remains stationary or moves on stomach				
21	9	SCOOTING (<i>Sitting</i>) Sit beside child on floor. Say, "Watch me." Demonstrate scooting by using your hands to propel your body forward on your buttocks to retrieve toy. Place toy 5 ft. in front of child. Say, "Scoot like I did and get the toy."	2 Maintains sitting posture and uses hands and legs to scoot forward 3 ft. 1 Maintains sitting posture and scoots forward 1-2 ft. 0 Moves less than 1 ft. forward				
22	9	PIVOTING (<i>Sitting</i>) Place child in sitting position on floor. Attract child's attention to toy, then place it 2 ft. from child's right side. Say, "Turn and get the toy." Repeat procedure on opposite side.	2 Turns on buttocks using legs or arms to pivot body 90 degrees (both sides) 1 Turns on buttocks using legs or arms to pivot body 90 degrees (1 side only) 0 Pivots less than 90 degrees				
23	9	STANDING (<i>Sitting next to stable object, such as chair or table</i>) Attract child's attention to toy, then place it on edge of stable object, out of child's reach. Say, "Get the toy."	2 Raises to standing position using stable object for support 1 Attempts to raise to standing, but returns to sitting 0 Makes no attempt to stand				
24	10	CREEPING (<i>Sitting on floor to one side of you</i>) Sit with legs straight and knees touching. Attract child's attention to toy, then place toy on the other side of your legs so child will have to climb across your legs to retrieve it. Say, "Get the toy."	2 Creeps completely over your legs 1 Creeps onto your legs 0 Remains stationary or creeps up to your legs				
25	10	BOUNCING (<i>Standing</i>) Have child hold your index fingers. Stimulate bouncing by moving your hands up and down 2 times.	2 Bounces 3 times by flexing knees 1 Bounces 1-2 times by flexing knees 0 Stiffens legs or sits down				
26	10	CRUISING (<i>Standing next to low table</i>) Place child in standing position at end of table. Place toy on opposite end of table. Say, "Get the toy."	2 Takes 4 steps sideways (holding on to table) 1 Takes 1-3 steps sideways (holding on to table) 0 Remains stationary				

Locomotion—8

Item #	Age In Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
27	10	LOWERING Place child in standing position with side next to stable object (chair or low table) for support. Place toy on floor in front of child. Say, "Sit down and play with the toy."	2 Lowers to sitting position without falling 1 Lowers self, but falls in process 0 Remains standing				
28	10	STEPPING With child facing you, support child in standing position with your hands around trunk. Say, "Let's walk."	2 Takes 4 alternating steps in place or forward 1 Takes 2-3 alternating steps in place or forward 0 Fails to take alternating steps				
29	11	PIVOTING Place child in sitting position straddling one line of taped 3 x 3 ft. cross . Attract child's attention to toy , then place it on line 2 ft. behind child. Say, "Turn and get the toy."	2 Pivots 180 degrees (straddles line in opposite direction), while remaining seated 1 Pivots 90-179 degrees (body midline fails to straddle line), while remaining seated 0 Pivots less than 90 degrees				
30	11	STANDING Place child in standing position next to stable object (chair or low table). Stand 4 ft. in front of child with your arms outstretched. Say, "Come here."	2 Frees hands and body from support and maintains balance in standing position for 5 seconds 1 Frees hands and body from support and maintains balance in standing position for 2-4 seconds 0 Fails to release support				
31	11	STANDING Place child in standing position away from anything that can be used for support. Release your support of child. (Be ready to catch child if necessary.)	2 Maintains balance for 3 seconds before showing instability or dropping to floor 1 Maintains balance for 1-2 seconds before showing instability or dropping to floor 0 Immediately shows signs of instability or drops to floor				
32	11	STEPPING From in front, support child in standing position by holding 1 hand. Say, "Let's walk."	2 Takes 4 alternating steps in place or forward 1 Takes 2-3 alternating steps in place or forward 0 Fails to take alternating steps				
33	12	STANDING UP (<i>Sitting cross-legged on floor</i>) Demonstrate standing up from sitting position. Place palms of hands on floor beside hips. Push down with hands, straighten arms, and shift weight to feet. Stand up without turning body more than 20 degrees to either side. Say, "Get up like I did."	2 Stands without turning body more than 20 degrees 1 Stands but turns body 21-90 degrees 0 Turns body more than 90 degrees or fails to stand				
34	12	WALKING (<i>Standing</i>) From the side, support child by holding 1 hand. Say, "Let's walk."	2 Uses alternating steps to walk 8 ft. 1 Uses alternating steps to walk 4-7 ft. 0 Walks less than 4 ft.				
35	12	WALKING (<i>Standing</i>) Hold toy 2 ft. in front of child. Say, "Come get the toy." Move back as needed to keep toy just out of reach.	2 Walks unaided for 5 steps 1 Walks unaided for 1-4 steps 0 Remains stationary or sits down				
36	13	STANDING AND MOVING BALANCE (<i>Standing</i>) Place toy on floor 2 ft. in front of child. Say, "Get the toy and bring it to me."	2 Picks up toy, returns to standing, and takes 3 steps without losing balance 1 Picks up toy, returns to standing, and takes 1-2 steps before losing balance 0 Remains stationary or loses balance when picking up toy				

Locomotion—9

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
37 Start: 15-16 months	14	CREEPING UP STAIRS (<i>Sitting on floor, facing stairs</i>) Place toy on 3rd step. Say, "Get the toy." Move toy up as child gets closer. (Be prepared to catch child if necessary.)	2 Creeps up 2 steps on hands and knees 1 Creeps up 1 step on hands and knees 0 Remains on 1st step				
38	14	WALKING Stand 10 ft. in front of child and hold your arms out. Say, "Come to me." [Record the time it takes to walk 10 ft. for use in Item 41.] _____ Time to walk 10 ft.	2 Walks 10 ft. with narrow base of support, heel-toe gait, using a reciprocal pattern for at least half the distance 1 Walks 4-9 ft. with narrow base of support, heel-toe gait, using a reciprocal pattern for at least half the distance 0 Walks with wide base of support (feet positioned at shoulder width) and/or arms held out to sides, parallel to surface				
39 Start: 17-18 months	15-16	CREEPING DOWN STAIRS (<i>On stairs, knees on 4th step, hands on 5th step</i>) Stand 2 or 3 steps below child. Say, "Come to me." Move backward as necessary.	2 Creeps backward down 3 steps without support (from adult or rail) 1 Creeps backward down 1-2 steps without support (from adult or rail) 0 Remains on 4th step				
40	15-16	WALKING UP STAIRS (<i>Standing, facing flight of stairs, close to railing or wall</i>) Place toy on 6th step. Get behind child and say, "Walk up the steps and get the toy."	2 Walks up 4 steps with support from wall or rail (may place 1 or both feet on each step) 1 Walks up 1-3 steps with support from wall or rail 0 Remains stationary or drops to hands and knees to ascend steps				
41 Start: 19-20 months	17-18	WALKING FAST Run away from child and say, "Catch me!" _____ Record time to walk 10 ft. _____ Time recorded in Item 38	2 Walks 10 ft. in $\frac{1}{2}$ the time recorded in Item 38 1 Walks 10 ft. in more than $\frac{1}{2}$ but less than $\frac{3}{4}$ of the time recorded in Item 38 0 Walks 10 ft. in $\frac{3}{4}$ or more of the time recorded in Item 38				
42	17-18	WALKING BACKWARD Walk backward while pulling pull toy . Give cord to child and say, "You pull it like I did."	2 Walks backward 5 steps (may or may not pull toy while walking) 1 Walks backward 2-4 steps 0 Takes less than 2 steps backward				
43 Start: 21-22 months	17-18	WALKING DOWN STAIRS (<i>Standing on 4th step, next to wall or railing, facing down</i>) Stand beside child and offer him or her your finger. Say, "Let's walk down the steps."	2 Walks down 4 steps with support only from examiner's finger (may place 1 or both feet on each step) 1 Walks down 1-3 steps with support only from examiner's finger 0 Remains stationary or lowers to sitting to descend steps				
44 Start: 23-24 months	17-18	WALKING BACKWARD Demonstrate walking backward using a normal stride (heels not touching toes). Say, "Walk backward like I did."	2 Walks backward 5 steps 1 Walks backward 2-4 steps 0 Walks backward less than 2 steps				
45	19-20	RUNNING Stand 12 ft. in front of child. Say, "Run to me as fast as you can."	2 Runs forward 10 ft. 1 Runs forward 5-9 ft. 0 Walks or runs less than 5 ft.				
46	19-20	STANDING Taped line (2 in. x 2 ft.) Stand on line with 1 foot in front of other, toe of back foot touching heel of front foot. Say, "Stand on the line like I did."	2 Stands on line with 1 foot in front of other for 2 seconds; toe of back foot is within 3 in. of front foot 1 Places 1 foot on line and attempts to place other foot on line 0 Makes no attempt to place 2nd foot on line				

Locomotion—10

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
47 Starts 24-26 months	21-22	WALKING SIDWAYS Face child and say, "Watch me." Step sideways, leading with same foot, for 10 ft. Say, "Walk like I did."	2 Walks sideways for 10 ft., leading with same foot 1 Walks sideways 4-9 ft., leading with same foot for half the steps 0 Remains stationary or walks in a manner other than sideways				
48	21-22	WALKING LINE Taped line (4 in. x 8 ft.) Walk on the line with 1 foot on line and other foot beside it. Say, "Walk on the line like I did."	2 Walks with 1 foot on line for 6 ft. 1 Walks with 1 foot on line for 4-5 ft. 0 Walks for less than 4 ft. on line				
49	23-24	JUMPING FORWARD Taped line on floor (2 in. x 2 ft.) Using 2-footed takeoff and landing, jump forward 12 in. from starting line. Say, "Jump like I did." Measure distance from line to point where nearest heel touches floor.	2 Jumps forward 4 in., maintaining balance 1 Jumps less than 4 in. forward, maintaining balance 0 Steps forward or falls				
50	23-24	JUMPING UP Demonstrate jumping up with your feet together, knees flexed, and body propelled upward. Say, "Jump like I did."	2 Jumps up 2 in. with feet together 1 Jumps up with feet barely leaving floor, or jumps up 2 in. with 1 foot leading the other 0 Keeps toes in contact with floor				
51 Starts 27-30 months	23-24	JUMPING DOWN (<i>Standing on step 7 in. high</i>) Stand in front of child and say, "Jump down."	2 Jumps down without assistance; 1 foot may lead 1 Steps down without assistance 0 Needs assistance to get down				
52	23-24	WALKING UP STAIRS (<i>Standing, facing flight of stairs, at middle of step width</i>) Place toy on 6th step. Say, "Walk up the steps without holding on."	2 Walks up 4 steps without support from wall or rail (may place 1 or both feet on each step) 1 Walks up 4 steps using rail or wall for support 0 Remains stationary or drops to hands and knees to ascend stairs				
53	25-26	WALKING DOWN STAIRS (<i>Standing on 4th step, facing down stairs, next to wall or railing</i>) Stand 2 steps below child. Say, "Walk down to me." Move down as child begins to descend.	2 Walks down 4 steps without support by placing 1 or both feet on each step 1 Walks down 1-3 steps without support 0 Remains stationary or uses wall or rail for additional support				
54	25-26	WALKING BACKWARD Demonstrate walking backward 10 ft. using a normal backward stride (without touching heels to toes). Say, "Walk backward like I did."	2 Walks backward 10 ft. without heels touching toes 1 Walks backward 1-9 ft. 0 Walks backward less than 1 ft.				
55	25-26	JUMPING UP (<i>Standing next to wall</i>) Mark on wall at standing reach and line 2 in. higher Demonstrate jumping up and touching wall as high as you can. Point to line and say, "Jump up and touch as high as you can."	2 Jumps up and touches line or above 1 Jumps up and touches between mark and line 0 Keeps toes in contact with floor or fingers touch below mark				
56	27-28	WALKING LINE Taped line (4 in. x 8 ft.) Using a normal stride (heels not touching toes), walk forward 3 steps on line. Say, "Keep your hands on your hips and walk on the line like I did."	2 Takes 3 steps forward on line with hands on hips and without heels touching toes 1 Takes 1-2 steps forward on line with hands on hips and without heels touching toes 0 Walks with one foot off the line				

Locomotion—11

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
57 Start: 31-34 months	27-28	WALKING UP STAIRS <i>(Standing at foot of stairs)</i> Get behind child and say, "Walk up the steps."	2 Walks up 4 steps, placing 1 foot on each step, using wall or rail for support 1 Walks up 1-3 steps, placing 1 foot on each step, using wall or rail for support 0 Remains stationary or places both feet on each step and uses support				
58	29-30	JUMPING DOWN <i>(Standing on stable object 16-21 in. high)</i> Say, "Jump down."	2 Jumps down without assistance, 1 foot may lead 1 Steps down without assistance 0 Needs assistance to get down				
59	29-30	WALKING ON TIPTOES Walk on tiptoes with your hands on hips for 5 steps. Say, "Keep your hands on your hips and walk on your tiptoes like I did."	2 Walks on tiptoes for 5 steps with hands on hips and without heels touching floor 1 Walks on tiptoes for 1-4 steps with hands on hips and without heels touching floor 0 Walks with heels touching floor				
60 Start: 35-36 months	29-30	RUNNING SPEED With taped lines (2 in. x 2 ft.) 30 ft. apart , place child with toes behind starting line. Stand 1 yd. behind finish line and say, "Run to me as fast as you can." Time from when child starts running to when he or she crosses finish line.	2 Runs 30 ft. in 6 seconds or less 1 Runs 30 ft. in 7-9 seconds 0 Walks or runs 30 ft. in more than 9 seconds				
61	31-32	JUMPING FORWARD <i>(Standing with toes on line)</i> Taped line (2 in. x 2 ft.) Demonstrate jumping forward using 2-footed takeoff and landing. Say, "Jump like I did."	2 Jumps forward 24 in. using 2-footed takeoff and landing 1 Jumps forward 12-23 in. using 2-footed takeoff and landing 0 Jumps forward less than 12 in., steps forward, or falls				
62	31-32	JUMPING DOWN <i>(Standing on stable object 18-24 in. high)</i> Say, "Jump down with both feet together."	2 Jumps down without assistance using 2-footed takeoff and landing 1 Jumps down, taking off with 1 foot and landing on both feet without assistance, or takes off with 2 feet and falls on landing 0 Needs assistance to get down				
63	33-34	JUMPING HURDLES String (or rope) tied between 2 chair legs, 2 in. off floor and 3 ft. apart (Tie loosely to prevent tripping.) Stand 6 in. away from and facing string. Using 2-footed takeoff and landing, jump over string. Say, "Jump over the string like I did."	2 Jumps over string without tripping using 2-footed takeoff and landing 1 Jumps over string without tripping using 1-footed takeoff and landing 0 Steps over, or jumps but remains on same side				
64 Start: 39-42 months	33-34	WALKING ON TIPTOES Taped line (4 in. x 8 ft.) Walk on tiptoes, hands on hips, for entire length of line. Say, "Keep your hands on your hips and walk on your tiptoes like I did."	2 Walks on tiptoes for entire length of line with hands on hips and without heels touching floor 1 Walks on tiptoes for 1-7 ft. with hands on hips and without heels touching floor 0 Walks on tiptoes for less than 1 ft. on line				
65 Start: 43-45 months	35-36	WALKING UP STAIRS <i>(Standing centered at foot of stairs)</i> Place a toy on the 6th step. Stand behind child and say, "Walk up the steps and get the toy."	2 Walks up 4 steps without support, placing 1 foot on each step 1 Walks up 1-3 steps with support from wall or rail and placing 1 foot on each step, or walks up 4 steps without support but placing both feet on each step 0 Remains stationary or places both feet on each step and uses support				

Locomotion—12

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
66	37-38	RUNNING SPEED Taped line (2 in. × 2 ft.) 45 ft. apart Place the child within 6 in. behind a taped line on the floor and then stand 3 ft. behind finish line. Say, "Run to me as fast as you can without stopping."	2 Runs 45 ft. in 6 seconds or less 1 Runs 45 ft. in 7-9 seconds 0 Walks or runs 45 ft. in more than 9 seconds				
67	39-40	JUMPING FORWARD Taped line (2 in. × 2 ft.) Demonstrate jumping forward using a 2-footed takeoff and landing. Say, "Jump like I did."	2 Jumps forward 26 in. using 2-footed takeoff and landing 1 Jumps forward 12-25 in. using 2-footed takeoff and landing 0 Jumps forward less than 12 in. or falls				
68	41-42 Start: 28-39 months	WALKING LINE Taped line (4 in. × 8 ft.) Using a normal stride (heels not touching toes), walk forward on line. Say, "Keep your hands on your hips and walk on the line like I did. Try not to step off the line."	2 Walks forward 4 ft. without stepping off line, with hands on hips and without heels touching toes 1 Walks forward 4 ft. on line, stepping off 1 time, with hands on hips and without heels touching toes 0 Steps off line more than once				
69	41-42	RUNNING FORM Say, "When I say go, run fast and keep running until I say stop." Stop child after 10 seconds.	2 Runs with arms moving back and forth across body and at or below waist, balls of feet used to push forward, toes pointed forward, a high knee and heel lift, and trunk leaning forward 1 Runs with arms held out to side, or feet remain flat during the run 0 Walks at any time during 10-second period				
70	41-42	WALKING LINE FORWARD Taped line (4 in. × 8 ft.) Using a normal stride (heels not touching toes) and with hands on hips, walk forward on line. Say, "Keep your hands on your hips and walk on the line like I did. Try not to step off the line."	2 Walks forward 8 ft. on line without stepping off, with hands on hips, without heels touching toes, and without swaying more than 20 degrees 1 Walks forward 8 ft. on line and steps off 1 time, with hands on hips, without heels touching toes, and without swaying more than 20 degrees 0 Steps off line more than once or sways more than 20 degrees				
71	43-44	WALKING DOWN STAIRS (<i>Standing on 4th step, facing down stairs</i>) Stand 2 or more steps below child and say, "Walk down the steps without holding on." Move down as child descends.	2 Walks down 4 steps, placing 1 foot on each step without support 1 Walks down 4 steps, placing both feet on 1 or 2 steps without support 0 Remains stationary or places both feet on each step for 3 or more steps				
72	43-44 Start: 31-54 months	JUMPING FORWARD ON 1 FOOT Taped line (2 in. × 2 ft.) Jump forward on 1 foot without letting other foot touch floor. Say, "Jump forward like I did." Measure from line to point where back of heel touches floor.	2 Jumps forward 6 in. on 1 foot without other foot touching floor 1 Jumps forward 2-5 in. on 1 foot without other foot touching floor 0 Jumps less than 2 in. or 2nd foot touches floor				
73	45-46	JUMPING UP (<i>Standing next to wall</i>) Mark on wall at standing reach and line (2 in. × 1 ft.) 3 in. higher Demonstrate jumping up and touching wall as high as you can. Point to line and say, "Jump and touch as high as you can."	2 Jumps up and touches line or above 1 Jumps up and touches between mark and line 0 Toes remain in contact with floor or fingers touch mark or below				

Locomotion—13

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
74	45-46	RUNNING BALANCE/COORDINATION Demonstrate running and stopping on command. Say, "When I say go, run until I say stop. Then stop as quickly as you can. Stay still until I say go. Then run until I say stop." Stop child after 3 cycles.	2 Runs and stops within 2 steps without falling 1 Runs and stops in 3 or more steps without falling 0 Fails to run or takes more than 3 steps to stop cycles.				
75	45-46 Start: 55-58 months	WALKING LINE BACKWARD Taped line (4 in. x 8 ft.) Using normal stride (heels not touching toes) and with hands on hips, walk backward on line. Say, "Put your hands on your hips and walk backward like I did."	2 Walks backward 4 ft. without stepping off line more than once, with hands on hips, and without heels touching toes 1 Walks backward 4 ft. on line and steps off 2-5 times with hands on hips and without heels touching toes 0 Steps off line more than 5 times				
76	47-48	JUMPING FORWARD Taped line (2 in. x 2 ft.) Demonstrate jumping forward using a 2-footed takeoff and landing. Say, "Jump like I did." Measure from line to point where back of nearest heel touches floor.	2 Jumps forward 30 in. using 2-footed takeoff and landing 1 Jumps forward 20-29 in. using 2-footed takeoff and landing 0 Jumps forward less than 20 in. or falls				
77	47-48	HOPPING Hop forward on 1 foot for 5 hops, then on other foot for 5 hops. Say, "Hop like I did."	2 Hops forward 5 hops on 1 foot, then 3-5 hops on other foot 1 Hops forward 1-4 hops on 1 foot, 1-2 hops on other foot 0 Hops in place, or foot fails to leave ground				
78	51-52	WALKING LINE BACKWARD Taped line (4 in. x 8 ft.) With toes touching heels and hands on hips, walk backward on line. Say, "Put your hands on your hips and walk backward touching your heels with your toes like I did. Try not to step off the line."	2 Walks backward 5 steps without stepping off line and with hands on hips and toes touching heels 1 Walks backward 2-4 steps without stepping off line and with hands on hips and toes touching heels 0 Takes less than 2 steps backward				
79	51-52	ROLLING FORWARD (<i>Crouching on edge of mat</i>) Demonstrate forward roll. Place child on edge of mat in crouching position. Say, "Turn a forward roll like I did."	2 Completes forward roll without turning more than 15 degrees to either side 1 Completes forward roll but turns more than 15 degrees to either side 0 Fails to complete forward roll				
80	51-52 Start: 59-69 months	GALLOPING Gallop 8-10 ft. (same foot leading). Say, "Gallop like I did."	2 Gallops 10 ft. with weight transferred smoothly and evenly; arms move freely in opposition to legs 1 Gallops 5-9 ft. with weight transferred smoothly and evenly; arms move freely in opposition to legs 0 Gallops less than 5 ft.				
81	53-54	JUMPING FORWARD Taped line (2 in. x 2 ft.) From taped starting line, demonstrate jumping forward using 2-footed takeoff and landing. Say, "Jump like I did as far as you can."	2 Jumps forward 36 in. using 2-footed takeoff and landing 1 Jumps forward 20-35 in. using 2-footed takeoff and landing 0 Jumps forward less than 20 in. or falls				

Locomotion—14

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
82	53-54	TURNING JUMP <i>(Standing with hands on hips, feet 2-4 in. on either side of line)</i> Taped line (2 in. × 2 ft.) With body not deviating more than 20 degrees from vertical, jump and turn 180 degrees. Land with feet opposite original position. Say, "Jump and turn in the air like I did."	2 Jumps and turns so feet land in opposite direction from starting position with hands on hips and body not deviating more than 20 degrees from vertical 1 Jumps and turns at least 90 degrees but less than 180 degrees with hands on hips and body not deviating more than 20 degrees from vertical 0 Turns less than 90 degrees				
83	53-54 <small>Start: 63-71 months</small>	HOPPING FORWARD 2 taped lines (2 in. × 2 ft.), 3 ft. apart Hop on 1 foot from one line to other, change feet, and hop back to first line. Say, "Hop like I did." If necessary, remind child to change feet when hopping back.	2 Hops on 1 foot from one line to other, changes feet, and hops back to 1st line 1 Hops on 1 foot from one line to other, changes feet, and hops 1-2 hops toward 1st line 0 Hops in place or fails to hop to line				
84	57-58	JUMPING HURDLES String (or rope) tied between 2 chair legs, 3 ft. apart, 10 in. off floor (Tie loosely to prevent tripping.) Stand 6 in. away from and facing string. Using 2-footed takeoff and landing, jump over string. Say, "Jump over the string like I did."	2 Jumps over string without tripping using 2-footed takeoff and landing 1 Jumps over string without tripping using 1-footed takeoff and landing 0 Steps over string or jumps but remains on same side				
85	57-58	RUNNING SPEED AND AGILITY 2 taped lines (2 in. × 2 ft.), 10 ft. apart; empty soft drink can Place can on one line. Have child stand just behind other line. Say, "When I say go, run as fast as you can, pick up the can, and bring it back across the starting line." (Allow 30 seconds of rest between trials.)	2 Completes cycle in 5 seconds or less without tripping or dropping can 1 Completes cycle in 6-10 seconds without tripping or dropping can 0 Takes more than 10 seconds to return to starting line				
86	57-58	SKIPPING Demonstrate skipping for 10 steps. Say, "Skip like I did."	2 Skips 8 steps maintaining balance, using opposing arm and leg movements, and using alternating feet 1 Skips 4-7 steps maintaining balance, using opposing arm and leg movements, and using alternating feet 0 Skips less than 4 steps or holds arms stiffly at sides				
87	59-60	JUMPING SIDEWAYS <i>(Standing, hands on hips, side to line)</i> Taped line (2 in. × 2 ft.) With feet together and without pausing, jump back and forth (sideways) over line for 3 left-right cycles. Say, "Jump across the line like I did."	2 Jumps back and forth 3 cycles with hands on hips, feet together, and without touching line or pausing between jumps 1 Jumps back and forth 1-2 cycles with hands on hips, feet together, and without touching line or pausing between jumps 0 Lands on line or pauses between jumps				
88	61-62	SKIPPING Demonstrate skipping 10 ft. Say, "Skip like I did."	2 Skips 10 ft. maintaining balance and rhythm, using opposing arm and leg movements, and using alternating feet 1 Skips 5-9 ft. maintaining balance and rhythm, using opposing arm and leg movements, and using alternating feet 0 Skips less than 4 ft. or holds arms stiffly at sides				
89	63-64	HOPPING SPEED 2 taped lines (2 in. × 2 ft.), 20 ft. apart Place child behind starting line. Say, "Hop on 1 foot to the other line as fast as you can."	2 Hops 20 ft. in 6 seconds or less without losing balance or letting free foot touch floor 1 Hops 20 ft. in 7-10 seconds without losing balance or letting free foot touch floor 0 Hops less than 20 ft. or requires more than 10 seconds				

Locomotion—15

Item #	Age in Months	Item NAME, Pos/Won, and Description	Score Criteria	Administration			
				1	2	3	4
Object Manipulation							
1 <i>Starts: 12-16 months</i>	12	CATCHING BALL. (<i>Sitting, legs spread apart facing you, you and child sitting 3 ft. apart</i>) Roll ball from between your legs to child. Say, "Catch the ball."	2 Corral ball with arms and/or hands without losing balance 1 Corral ball, but loses balance 0 Misses ball				
2	13	ROLLING BALL. (<i>Sitting, legs spread apart facing you, you and child sitting 3 ft. apart</i>) Roll ball from between your legs to child. Place ball on floor between child's knees. Say, "Roll the ball to me."	2 Rolls ball 3 ft. forward using hand/arm contact 1 Rolls ball 2-3 ft. forward using hand/arm contact 0 Rolls ball forward 2 ft. or less				
3	13	FLINGING BALL. (<i>Standing in an open area</i>) Give tennis ball to child and stand 5 ft. away. Extend your hands to child and say, "Throw the ball to me."	2 Throws ball in any direction by extending arm at shoulder or elbow 1 Releases ball without extending arm at elbow 0 Holds ball or lays it down				
4 <i>Starts: 17-20 months</i>	15-16	KICKING BALL. (<i>Standing in an open area</i>) Kick a stationary ball so that it travels 3 ft. forward. Place ball 6 in. in front of child and say, "Kick the ball like I did."	2 Lifts foot and contacts ball 1 Lifts foot and attempts to kick ball 0 Fails to lift foot				
5	15-16	THROWING BALL. (<i>Standing in an open area</i>) Give tennis ball to child and stand 5 ft. away. Say, "Throw the ball to me."	2 Throws ball by extending arm at shoulder or elbow while maintaining balance 1 Throws ball using an extended arm, but loses balance 0 Drops ball				
6 <i>Starts: 21-28 months</i>	19-20	KICKING BALL. (<i>Standing in an open area</i>) Kick a stationary ball so it travels 3 ft. forward. Place ball 6 in. in front of child and say, "Kick the ball like I did."	2 Kicks ball forward 3 ft. without it deviating more than 45 degrees to either side of midline 1 Kicks ball forward 3 ft. but it deviates more than 45 degrees from midline 0 Ball travels less than 3 ft.				
7	19-20	THROWING BALL.—Overhand. (<i>Standing in an open area</i>) Demonstrate throwing tennis ball overhand at least 3 ft. forward. Give ball to child. Say, "Throw the ball as far as you can."	2 Throws ball forward 3 ft. in the air 1 Throws ball forward 1-2 ft. in the air 0 Drops ball or throws in direction other than forward				
8	23-24	THROWING BALL.—Underhand. (<i>Standing in an open area</i>) Demonstrate throwing tennis ball underhand at least 5 ft. Give ball to child. Say, "Throw the ball as far as you can."	2 Throws ball forward 3 ft. in the air 1 Throws ball forward 1-2 ft. in the air 0 Drops ball or throws in any direction other than forward				
9 <i>Starts: 23-36 months</i>	23-24	KICKING BALL. (<i>Standing in an open area</i>) Kick stationary ball so it travels 3 ft. forward. Place ball 6 in. in front of child and say, "Kick the ball like I did."	2 Kicks ball forward 3 ft. without it deviating more than 20 degrees to either side of midline 1 Kicks ball forward 3 ft. but it deviates more than 20 degrees from midline 0 Ball travels less than 3 ft. and deviates more than 20 degrees from midline				
10	25-26	CATCHING BALL. (<i>Standing in an open area</i>) Stand 5 ft. in front of child. Say, "Catch the ball." Toss ball so that it arrives at chest height, contacting child's outstretched arms.	2 Presents extended arms directly in front, palms upward or facing each other; attempts to secure ball by bending arms toward chest (may or may not catch ball) 1 Presents extended arms directly in front, palms upward or facing each other; arms remain straight when contacted by ball 0 Turns away from thrown ball				

Object Manipulation—16

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
11	27–28	THROWING BALL—Overhand (<i>Standing in an open area</i>) Demonstrate throwing tennis ball overhand at least 7 ft. Give ball to child. Stand 8 ft. away and say, "Throw me the ball."	2 Initiates throw by moving arm upward and back; ball travels 7 ft. in the air 1 Initiates throw by moving arm down and back, sideways and back, upward, or downward; ball travels 6 ft. or less in the air 0 Drops ball or throws in any direction other than forward				
12	29–30 Start: 39–46 months	THROWING BALL—Underhand (<i>Standing in an open area</i>) Demonstrate throwing the tennis ball underhand at least 7 ft. forward. Give ball to child. Stand 8 ft. away and say, "Throw me the ball."	2 Initiates throw by moving arm down and back; ball travels forward 7 ft. in the air 1 Initiates throw by moving arm sideways, upward, or forward; ball travels less than 7 ft. in the air 0 Drops ball or throws in any direction other than forward				
13	29–30	KICKING BALL (<i>Standing in an open area</i>) Kick stationary ball so that it travels at least 6 ft. forward. Place ball 6 in. in front of child and say, "Kick the ball hard like I did."	2 Kicks ball forward 6 ft. using opposing arm and leg movements and initiating kick by extending leg back with bent knee 1 Kicks ball forward 2–6 ft. using opposing arm and leg movements and initiating kick by extending leg back with bent knee 0 Fails to use opposing arm and leg movements or ball travels less than 2 ft.				
14	33–34	CATCHING BALL (<i>Standing in an open area</i>) Stand 5 ft. in front of child. Say, "Catch the ball." Toss ball so that it arrives at chest height, contacting child's outstretched arms.	2 Catches ball with hands and arms extended 1 Brings arms toward chest in effort to catch after ball contacts hands and arms 0 Turns away from ball or arms remain stationary				
15	39–40 Start: 47–59 months	THROWING BALL—Overhand (<i>Standing in an open area</i>) Demonstrate throwing tennis ball overhand at least 10 ft. Give ball to child. Stand 11 ft. away and say, "Throw the ball as far as you can."	2 Throws ball forward 10 ft. by moving arm up and back using upper trunk rotation, arms and legs moving in opposition 1 Throws ball forward 3–9 ft. by moving arm up and back or sideways and back using upper trunk rotation, arms and legs moving in opposition 0 Throws ball forward less than 3 ft. or throws ball by moving arm down and back with trunk remaining stationary				
16	39–40	HITTING TARGET—Underhand (<i>Standing 5 ft. from wall</i>) From 5 ft. away, toss tennis ball underhand to 2-ft. target taped on wall (2 ft. above floor) . Say, "Throw the ball and hit the target like I did."	2 Hits target 2 of 3 trials using an underhand toss 1 Hits target 1 of 3 trials using an underhand toss 0 Fails to hit target using underhand toss				
17	41–42	CATCHING BALL (<i>Standing in an open area</i>) Stand 5 ft. in front of child. Say, "Catch the ball." Toss ball so that it arrives at chest height.	2 Catches ball with hands (securing it to chest if necessary) with arms bent 45–90 degrees at the elbows and palms up or facing each other 1 Catches ball by encircling it with arms and hands, then pulling ball to chest (arms may be held out straight in preparation to catch) 0 Fails to catch ball				
18	43–44	HITTING TARGET—Overhand (<i>Standing 5 ft. from wall</i>) From 5 ft. away, toss tennis ball twice overhand to 2-ft. target taped on wall (2 ft. above floor) . Say, "Throw the ball and hit the target like I did."	2 Hits target 2 of 3 trials using an overhand toss 1 Hits target 1 of 3 trials using an overhand toss 0 Fails to hit target using overhand toss				

Object Manipulation—17

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
19 Start: 53-64 months	45-46	THROWING BALL—Underhand (<i>Standing in an open area</i>) Demonstrate throwing tennis ball underhand at least 10 ft. Give ball to child. Stand about 12 ft. away and say, "Throw the ball as far as you can."	2 Throws ball 10 ft. using upper trunk rotation, arms and legs moving in opposition, and initiating the throw by moving arm down and back 1 Throws ball 5-9 ft. using upper trunk rotation, arms and legs moving in opposition, and initiating the throw by moving arm down and back or sideways and back 0 Throws by moving arm up and back (trunk remains stationary) or ball travels less than 3 ft.				
20 Start: 65-71 months	51-52	HITTING TARGET—Overhand (<i>Standing 12 ft. from wall</i>) From 12 ft. away, toss tennis ball overhand to 2-ft. target taped on wall (2 ft. above floor) . Say, "Throw the ball and hit the target like I did."	2 Hits target 2 of 3 trials using an overhand toss 1 Hits target 1 of 3 trials using an overhand toss 0 Fails to use overhand toss or to hit target				
21	51-52	BOUNCING BALL (<i>Standing 5 ft. from wall</i>) Using 1 hand, bounce tennis ball so it bounces once and then hits wall. Give ball to child and say, "Bounce the ball like I did."	2 Bounces ball to wall so it hits floor once and then hits wall 1 Bounces ball to wall so it hits floor more than once before hitting wall 0 Throws ball that hits wall first or misses wall after bounce				
22	51-52	CATCHING BALL (<i>Standing in an open area</i>) Stand 5 ft. in front of child. Say, "Catch the ball." Toss tennis ball in a 45-degree arc so it arrives at child's hands.	2 Catches ball on 2 of 3 trials with arms bent and using only hands 1 Catches ball on 1 of 3 trials with arms bent and using only hands 0 Fails to catch ball				
23	68-72	KICKING BALL (<i>Standing in an open area</i>) Kick a stationary ball so that it travels in the air for at least 12 ft. Place ball 6 in. in front of child's feet and say, "Kick the ball like I did."	2 Kicks ball so it travels 12 ft. in the air using opposing arm and leg movements and initiating kick by extending leg back with bent knee 1 Kicks ball so it travels 6-11 ft. in the air using opposing arm and leg movements and initiating kick by extending leg back with bent knee 0 Kicks ball that travels less than 6 ft. in air or fails to use opposing arm and leg movements				
24	68-72	CATCHING BOUNCED BALL Bounce tennis ball on floor once and catch it with 1 hand. Say, "Bounce and catch the ball like I did."	2 Bounces and catches ball on 2 of 3 trials 1 Bounces and catches ball on 1 of 3 trials 0 Fails to catch ball				
Fine Motor Scales							
Grasping							
1 Start: 1-2 months	0	GRASPING REFLEX (<i>Lying on back</i>) Stimulate child's palm by inserting your index finger into thumb side of palm.	2 Closes fingers in tight grasp around examiner's finger 1 Bends fingers loosely around examiner's finger 0 Extends fingers, fails to bend them				
2	0	GRASPING CLOTH (<i>Lying on back</i>) Spread washcloth over your forearm. Place child's hand on top of washcloth.	2 Grasps cloth in hand 1 Scratches at cloth but fails to grasp it 0 Extends fingers, fails to grasp cloth				

Grasping—18

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Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
3	0	RELEASING RATTLE—Disappearing Reflex (Lying on back) Place rattle in child's hand. After child holds rattle for 5 seconds, observe amount of time before release.	2 Drops rattle within 3 additional seconds 1 Drops rattle within 4–5 additional seconds 0 Drops rattle after 5 additional seconds				
4	2	GRASPING RATTLE (Lying on back) Lightly touch child's palm with rattle . Say, "Get your rattle."	2 Grasps rattle 1 Touches rattle with fingers but fails to grasp it 0 Fails to extend fingers				
5	2	HOLDING RATTLE (Lying on back) Place rattle in child's hand.	2 Holds rattle for 30 seconds 1 Holds rattle for 15–29 seconds 0 Holds rattle for less than 15 seconds				
6	3	MANIPULATING RATTLE (Lying on back) Shake rattle and place it in child's hand. Say, "Shake your rattle."	2 Moves rattle 15 degrees 1 Moves rattle 5–14 degrees 0 Moves rattle 4 degrees or less				
7	4	GRASPING RATTLE (Sitting on lap, facing table) Place rattle on table within 3 in. of child's hand. Say, "Get your rattle."	2 Grasps rattle 1 Touches rattle 0 Extends arm toward rattle				
8	5	PULLING STRING (Lying on stomach) Place toy on a string so string is at midline between child's hands. Say, "Get the toy."	2 Grasps string, pulls it, and obtains toy 1 Grasps, touches, or pulls string 0 Looks at toy				
9	5	SECURING PAPER (Sitting on lap, facing table) Place 8.5 × 11 in. paper within 3 in. of child's hand. Say, "Get the paper."	2 Secures paper by pulling with open hand or by wrinkling it 1 Touches paper 0 Extends hand toward paper				
10	5	GRASPING CUBE (Sitting on lap, facing table) Place cube on table within 3 in. of child's hand. Say, "Get the block."	2 Grasps cube for 15 seconds 1 Touches cube for 15 seconds 0 Extends hand to cube but fails to touch				
11	6	GRASPING CUBE (Sitting on lap, facing table) Place cube on table within 3 in. of child's hand. Say, "Get the block." Observe how child picks up cube.	2 Grasps cube with 4th and 5th fingers and palm, or grasps cube with thumb and 1st and 2nd fingers 1 Grasps cube with little finger and palm 0 Grasps cube with whole fist				
12	6	SHAKING RATTLE (Sitting on lap, facing table) Place rattle in child's hand. Say, "Shake your rattle."	2 Holds and moves rattle for 60 seconds 1 Holds and moves rattle for 11–59 seconds 0 Moves rattle for 10 seconds or less				
13	7	SHAKING RATTLE (Sitting on lap, facing table) Shake rattle back and forth through a 90-degree arc 3 times. Place it on table in front of child. Say, "Shake the rattle."	2 Moves rattle 3 times through 90-degree arcs 1 Moves rattle 3 times through 45- to 89-degree arcs 0 Moves rattle less than 45 degrees or arcs less than 3 times				
14	7	GRASPING CUBE (Sitting on lap, facing table) Place cube on table within 3 in. of child's hand. Say, "Get the block." Observe how child picks up cube.	2 Grasps cube with thumb and 1st and 2nd fingers with space visible between cube and palm 1 Grasps cube with 1st and 2nd fingers and heel of palm (no space between cube and palm) 0 Grasps cube with whole fist				
15	8	GRASPING PELLETS (Sitting on lap, facing table) Place 2 food pellets on table within child's reach. Say, "Get all the food."	2 Grasps both pellets at once using a raking motion with fingers 1 Grasps 1 pellet using a raking motion with fingers 0 Touches pellet(s)				

Grasping—19

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
16	8	MANIPULATING PAPER (Sitting on lap, facing table) Cut 8.5 × 11 in. sheet of paper in half. Place half on table. Say, "Watch me crumple the paper." Crumple paper in 1 hand. Place other half of paper within 3 in. of child's hand. Say, "Crumple the paper like I did."	2 Crumples paper with palm(s) (1 or 2 hands) 1 Wrinkles paper with fingers 0 Touches or pulls paper				
17	8	GRASPING PELLETS (Sitting on lap, facing table) Place 2 food pellets on table within child's reach. Say, "Get all the food."	2 Grasps 2 pellets using raking motion, but with thumb against side of curled index finger, or grasps 1 pellet with thumb and pad of index finger 1 Grasps 1 pellet with thumb and index finger 0 Grasps both pellets at once using a raking motion				
18	11	GRASPING PELLETS (Sitting on lap, facing table) Place 2 food pellets on table within child's reach. Say, "Get all the food."	2 Grasps 1 or 2 pellets with pad of thumb and pad of index finger; hand, wrist, and arm off table 1 Grasps 1 or 2 pellets with pad of thumb and pad of index finger; arm on table 0 Grasps pellet using grasp other than thumb and pad of index finger				
19	11	GRASPING CUBE (Sitting on lap, facing table) Place cube on table within 3 in. of child's hand. Say, "Get the block." Observe how child picks up cube.	2 Grasps cube with thumb opposed to 1st and 2nd finger pads with space visible between cube and palm and with hand approaching from top 1 Grasps cube with thumb and 1st and 2nd finger pads with hand approaching from side (but not in contact with table) 0 Grasps cube with whole fist				
20	13	GRASPING CUBES (Sitting on lap, facing table) Place 2 cubes side by side. Pick up both cubes with 1 hand. Place cubes on table and say, "Pick up both blocks with 1 hand like I did."	2 Grasps both cubes with 1 hand and holds them for 3 seconds 1 Grasps both cubes with 1 hand and holds them for less than 3 seconds 0 Grasps 1 cube				
21	15-16	GRASPING MARKER (Sitting at table) Place paper and marker by child's hand on table. Say, "Make a mark." Observe how child holds marker.	2 Grasps marker with thumb and 1st finger toward paper and remaining fingers around marker 1 Grasps marker with thumb up and little finger toward paper 0 Fails to grasp marker				
22	41-42	GRASPING MARKER (Sitting at table) Place paper and marker by child's hand on table. Say, "Make a mark." Observe how child holds marker.	2 Grasps marker with thumb and pad of index finger; other 3 fingers are secure against palm; upper portion of marker rests between thumb and index finger; child moves hand as unit when drawing 1 Grasps marker with thumb and pad of index finger; upper portion of marker rests between thumb and index finger 0 Grasps marker with thumb and 1st finger				
23	41-42	UNBUTTONING BUTTONS (Sitting at table) Place button strip on table. Say, "Unbutton these as fast as you can."	2 Unbuttons 3 buttons in 75 seconds or less 1 Unbuttons 3 buttons in 76 seconds or more 0 Attempts to unbutton buttons				
24	47-48	BUTTONING BUTTON (Sitting at table) Place button strip on table. Unbutton the buttons. Point to an end button and say, "Button and unbutton this one as fast as you can."	2 Buttons and unbuttons 1 button in 20 seconds or less 1 Buttons and unbuttons 1 button in 21 seconds or more 0 Holds both strips together				

Grasping—20

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
25	49-50	GRASPING MARKER <i>(Sitting at table)</i> Place paper and marker by child's hand on table. Say, "Make a mark." Observe how child holds marker.	2 Grasps marker between thumb and pad of index finger; marker rests on first joint of middle finger 1 Grasps marker between thumb and pad of index finger; marker rests on first knuckle or pad of middle finger 0 Grasps marker with thumb and 1st finger				
26	53-54	TOUCHING FINGERS At the rate of 1 touch per second, beginning with index finger, touch each finger in succession to thumb. Say, "Touch like I did as fast as you can."	2 Touches each finger to thumb within 8 seconds 1 Touches each finger to thumb in 9-12 seconds 0 Touches each finger in 13 seconds or more				
Visual-Motor Integration							
1	1	TRACKING RATTLE <i>(Lying on back)</i> Hold rattle 12 in. from child's nose. Slowly move rattle in a 90-degree arc to one side (almost to the surface). Return to midline and repeat procedure to other side.	2 Tracks rattle 90 degrees to each side of midline 1 Tracks rattle less than 90 degrees to either or both sides 0 Fixes eyes on rattle for 3 seconds or less				
2	1	TRACKING RATTLE—Side <i>(Lying on back, head turned to side)</i> Hold rattle 12 in. from child's nose. Slowly move rattle in arc to midline. Repeat with child's head turned to other side.	2 Tracks rattle to midline on both sides 1 Tracks rattle to midline on 1 side only 0 Head remains turned to side				
3	1	PLACING HAND <i>(Sitting on lap, facing away from table)</i> Using an upward movement, gently brush the back of child's hand against table edge.	2 Places open hand on table 1 Places fist on table 0 Fails to place hand on table				
4	2	PERCEIVING RATTLE <i>(Lying on back)</i> Hold rattle 12 in. from child's nose. Slowly lower rattle to within 1 in. of nose.	2 Turns head more than 10 degrees 1 Turns head less than 10 degrees 0 Head remains stationary				
5	2	REGARDING HANDS <i>(Lying on back)</i> Hold child's hands and wave them in front of face. If child's arms are too short, turn child's head to side and wave 1 hand.	2 Looks at hands for 3 seconds 1 Looks at hands for 1-2 seconds 0 Eyes remain fixed or averted				
6	2	TRACKING BALL—Left to Right <i>(Sitting on lap, facing table, examiner sits with side to table)</i> Roll tennis ball on table from left to right. Say, "Watch the ball."	2 Tracks ball beyond midline 1 Tracks ball to midline 0 Head remains still				
7	2	TRACKING BALL—Right to Left <i>(Sitting on lap, facing table, examiner sits with side to table)</i> Roll tennis ball on table from right to left. Say, "Watch the ball."	2 Tracks ball beyond midline 1 Tracks ball to midline 0 Head remains still				
8	2	TRACKING RATTLE <i>(Lying on back with head turned to side)</i> Hold rattle 12 in. from child's nose. Slowly move rattle in a 110-degree arc through midline. Return rattle to side position. Repeat with child's head turned to other side.	2 Tracks rattle through midline on both sides 1 Tracks rattle through midline on one side only 0 Tracks rattle to midline or less				
9	3	EXTENDING ARMS <i>(Lying on back)</i> Shake rattle and then hold it 12 in. above child's chest. Say, "Get your rattle."	2 Extends straight arms toward rattle 1 Extends bent arms (90-degree angle or less) toward rattle or extends arms in any direction other than toward rattle 0 Arms remain in same position or continue in same activity				

Visual-Motor—21

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
10	4	APPROACHING MIDLINE <i>(Lying on back)</i> Dangle toy on a string 12 in. above child's chest. Say, "Get the toy."	2 Moves hand within 4 in. of midline while reaching for toy 1 Moves hand in any direction except toward midline 0 Fails to move hand				
11	4 Start 7 months	FINGERING HANDS <i>(Lying on back)</i> Hold child's arms between wrist and elbow and bring child's fingers together at midline; then release your hands.	2 Engages fingers in mutual touching for 5 seconds 1 Engages fingers in mutual touching for 3-4 seconds 0 Engages fingers in mutual touching for 0-2 seconds				
12	6	BRINGING HANDS TOGETHER <i>(Sitting on lap, facing table)</i> Place cube in child's hand. Say, "Play with your block."	2 Brings hands together and secures cube for 15 seconds 1 Brings hands together and secures cube for 1-14 seconds 0 Fails to bring hands together				
13	6 Start 8 months	EXTENDING ARM <i>(Lying on back)</i> Shake and hold rattle 12 in. from child's nose. Say, "Get your rattle."	2 Extends arm toward rattle with elbow angle greater than 90 degrees while other arm remains stationary 1 Extends arm toward rattle with elbow angle less than 90 degrees while other arm remains stationary 0 Extends both arms toward rattle				
14	6	RETAINING CUBES <i>(Sitting on lap, facing table)</i> 2 cubes Place cube on table and say, "Get the block." After child picks up cube, place 2nd cube on table. Say, "Get this one, too."	2 Picks up 2nd cube and retains both for 5 seconds 1 Picks up 2nd cube and retains both for less than 5 seconds 0 Picks up only 1 cube				
15	7	TRANSFERRING CUBE <i>(Sitting on lap, facing table)</i> 2 cubes Place cube in child's hand. Place 2nd cube on table within reach of hand already holding cube and as far away as possible from empty hand. Say, "Get this one, too."	2 Transfers cube to other hand and picks up 2nd cube with original hand 1 Transfers cube to other hand and extends either hand to 2nd cube 0 Reaches for 2nd cube without transferring 1st cube				
16	7 Start 9 months	TOUCHING PELLET <i>(Sitting on lap, facing table)</i> Place food pellet on table within child's reach. Say, "Get the food."	2 Touches pellet with finger(s) 1 Touches pellet with palm or touches table near pellet 0 Extends hand toward pellet				
17	7	BANGING CUP <i>(Sitting on lap, facing table)</i> Bang cup 3 times on table; then set it down. Say, "Bang the cup."	2 Bangs cup 3 times 1 Bangs cup 1-2 times 0 Picks up cup but fails to bang				
18	8 Start 10 months	POKING FINGER <i>(Sitting on lap, facing table)</i> Put pegboard on table in front of child. Demonstrate poking index finger into hole. Say, "You do it."	2 Pokes finger in hole 1 Places finger within 1/4 in. of hole 0 Touches table or pegboard				
19	8	REMOVING PEGS <i>(Sitting on lap, facing table)</i> Place pegboard with 3 pegs loosely inserted in front of child. Say, "Get the pegs."	2 Removes 1 or more pegs 1 Attempts to remove peg 0 Touches pegs				

Visual-Motor—22

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
20	9	COMBINING CUBES (Sitting on lap, facing table) 2 cubes Place cube in child's left hand. Place 2nd cube near right hand. Say, "Get this one, too, and hang them together." Demonstrate if necessary.	2 Secures 2nd cube and brings cubes together at midline 1 Takes 2nd cube but fails to bring them together at midline 0 Fails to secure 2nd cube				
21	9	CLAPPING HANDS (Sitting facing examiner) Clap your hands while you say, "Do pat-a-cake" or "Clap your hands."	2 Claps hands 3 times 1 Claps hands 1-2 times 0 Brings hands together				
22	10 Start: 11 months	RETAINING CUBES (Sitting on lap, facing table) 3 cubes Place cube in each of child's hands. After child has retained cubes for 3 seconds, place 3rd cube on table. Say, "Get this one, too. Hold all the blocks."	2 Extends hand toward 3rd cube while holding both cubes 1 Drops a cube while extending hand to 3rd cube 0 Looks at cube				
23	10	MANIPULATING STRING (Sitting on lap, facing table) Toy on a string Place string on table with toy below table and out of sight. Say, "Get the string."	2 Secures string and pulls it 1 Pats string 0 Touches string				
24	10 Start: 12 months	REMOVING PEGS (Sitting on lap, facing table) Place pegboard with 3 pegs loosely inserted in front of child. Say, "Take out the pegs."	2 Removes 3 pegs 1 Removes 2 pegs 0 Removes 0-1 peg				
25	10	RELEASING CUBE (Sitting on lap, facing table) Place cube in child's hand. Say, "Drop the block in my hand." Hold your hand 6 in. below and to the side of child's hand.	2 Releases cube into examiner's hand 1 Drops cube to table 0 Retains cube				
26	11 Start: 13 months	REMOVING SOCKS (Sitting on floor) Remove child's shoes and say, "Take off your socks."	2 Removes both socks 1 Removes 1 sock 0 Attempts to remove a sock or touches socks				
27	11	PLACING PELLETS (Sitting on lap, facing table) Place food pellet and cup on table. Point to pellet and say, "Put it in the cup."	2 Grasps pellet with thumb and index finger and drops it into cup 1 Grasps pellet with thumb and index finger and extends hand toward cup 0 Grasps pellet				
28	11	PLACING CUBES (Sitting on lap, facing table) Place 7 cubes and cup on table. Say, "Put the blocks in the cup."	2 Places 3-7 cubes in cup 1 Places 1-2 cubes in cup 0 Fails to place any cubes in cup				
29	12 Start: 14 months	TURNING PAGES (Sitting on lap or in a safe seated position, facing table) Place book with thick cover and thick pages on table. Say, "Open the book."	2 Opens book 1 Attempts to open book 0 Pats book				
30	12	STIRRING SPOON (Sitting on lap or in a safe seated position, facing table) Demonstrate stirring spoon in cup . Place spoon next to cup. Say, "Stir with the spoon."	2 Stirs spoon in cup 1 Moves spoon up and down in cup or pats spoon in cup 0 Secures spoon				
31	12 Start: 15-16 months	REMOVING PELLETS (Sitting on lap or in a safe seated position, facing table) Give bottle (without cap) with food pellet inside and say, "Get it out."	2 Turns bottle and dumps out pellet 1 Attempts to dump out pellet 0 Holds bottle				

Visual-Motor—23

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
32	13	PLACING CUBES <i>(Sitting on lap or in a safe seated position, facing table)</i> Place 7 cubes and cup on table. Say, "Put the blocks in the cup."	2 Places 7 cubes in cup 1 Places 4-6 cubes in cup 0 Places 0-3 cubes in cup				
33	13	PLACING PEGS <i>(Sitting on lap or in a safe seated position, facing table)</i> Place pegboard on table and 3 pegs between pegboard and child. Say, "Put the pegs in the board."	2 Places 3 pegs in pegboard 1 Places 1-2 pegs in pegboard 0 Picks up pegs				
34	13	TAPPING SPOON <i>(Sitting on lap or in a safe seated position, facing table)</i> Demonstrate using horizontal motion to tap cup with spoon . Place spoon on table. Say, "You do it."	2 Taps cup with horizontal motion 1 Taps cup with vertical motion 0 Picks up spoon				
35	13	INSERTING SHAPES <i>(Sitting on lap, facing table)</i> Place formboard on table. Place shapes between child and board under holes in which they belong. Point to shapes and then to holes and say, "Put the shapes in the board."	2 Places 1 shape into correct hole 1 Places 1 shape partially into correct hole 0 Picks up shape and puts it on board				
36	14	PLACING PELLETS <i>(Sitting on lap or in a safe seated position, facing table)</i> Place bottle and 4 food pellets on table. Pick up pellet and put it in bottle. Point to another pellet and say, "Put it in the bottle."	2 Puts pellet in bottle 1 Attempts to put pellet in bottle 0 Picks up pellet				
37	14	SCRIBBLING <i>(Sitting on lap or in a safe seated position, facing table)</i> 2 markers and 2 sheets of paper Draw 2 vertical lines about 3 in. long. Place 2nd sheet of paper and marker on table. Say, "Do what I did."	2 Makes at least 1 scribble more than 1 in. long 1 Makes scribble less than 1 in. long 0 Touches paper with marker				
38	15-16	BUILDING TOWER <i>(Sitting on lap, facing table)</i> 6 cubes Say, "Watch me build a tower." Build tower of 3 cubes . Leave tower standing. Give child 3 cubes and say, "You build a tower."	2 Stacks 2-3 cubes 1 Attempts to stack 2 cubes 0 Grasps cube				
39	17-18	INSERTING SHAPES <i>(Sitting on lap, facing table)</i> Place formboard on table. Place 3 shapes between child and board but not next to correct holes. Point to shapes and then to holes and say, "Put the shapes in the board."	2 Places 2 shapes into correct holes 1 Places 1 shape into correct hole and 2nd shape partially into correct hole 0 Places 1 shape into correct hole				
40	19-20	BUILDING TOWER <i>(Sitting on lap or in a safe seated position, facing table)</i> 10 cubes Say, "Watch me build a tall tower." Build tower of 5 cubes . Leave tower standing. Give child 5 cubes and say, "You build a tall tower."	2 Stacks 4-5 cubes 1 Stacks 3 cubes 0 Stacks 2 cubes				
41	19-20	TURNING PAGES <i>(Sitting on lap, facing table)</i> Place book with thick cover and thick pages on table. Say, "Look at the book."	2 Turns 3 pages, 1 at a time 1 Turns 2 pages singly or turns 2 or more pages together 0 Opens book				

Visual-Motor—24

Item #	Age in Months	Item NAME, Pos/Won, and Description	Score Criteria	Administration			
				1	2	3	4
42	19–20	INSERTING SHAPES <i>(Sitting on lap, facing table)</i> Place formboard on table. Place 3 shapes between child and board but not next to correct holes. Point to shapes and then to holes and say, "Put the shapes in the board."	2 Places 3 shapes into correct holes 1 Places 2 shapes into correct holes and 3rd shape partially into correct hole 0 Places 2 shapes into correct holes				
43	21–22 Start: 27–28 months	BUILDING TOWER <i>(Sitting on lap or in a safe seated position, facing table)</i> Say, "Watch me build a tall tower." Build a tower of 6 cubes . Let tower stand for a few seconds, then knock it down. Give child 6 cubes and say, "You build a tall tower."	2 Stacks 6 cubes 1 Stacks 5 cubes 0 Stacks 4 cubes				
44	23–24	IMITATING VERTICAL STROKES <i>(Sitting on lap, facing table)</i> 2 markers and 2 sheets of paper Draw 2 vertical lines about 3 in. long. Place 2nd sheet of paper and marker on table. Say, "Draw a line up and down like I did."	2 Makes stroke 2 in. long and within 20 degrees of vertical 1 Makes stroke 2 in. long and within 21–45 degrees of vertical 0 Makes stroke less than 2 in. long or more than 45 degrees of vertical				
45	25–26 Start: 29–30 months	REMOVING TOP <i>(Sitting at a table)</i> Place food pellet in bottle and screw on lid . Give bottle to child and say, "Get the food."	2 Removes lid 1 Attempts to remove lid 0 Shakes bottle				
46	25–26	BUILDING TOWER <i>(Sitting at a table)</i> Say, "Watch me build a tall tower." Build a tower of 10 cubes . Let tower stand for few seconds, then knock it down. Give child 10 cubes and say, "You build a tall tower."	2 Stacks 8 cubes 1 Stacks 7 cubes 0 Stacks 6 cubes				
47	25–26	SNIPPING WITH SCISSORS <i>(Sitting at a table)</i> Cut edge of a piece of paper in 3 places. Give paper and scissors to child. Say, "You cut the paper."	2 Cuts paper in 1 place 1 Opens scissors and attempts to cut 0 Touches paper with scissors				
48	27–28 Start: 31–32 months	IMITATING HORIZONTAL STROKES <i>(Sitting at a table)</i> 2 markers and 2 sheets of paper Draw 2 horizontal lines 3 in. long. Place 2nd sheet of paper and marker on table. Say, "Draw a line like I did."	2 Makes stroke 2 in. long and within 20 degrees of horizontal 1 Makes stroke 2 in. long and within 21–45 degrees of horizontal 0 Makes stroke less than 2 in. long or more than 45 degrees from horizontal				
49	27–28	STRINGING BEADS <i>(Sitting at a table)</i> Lace and 6 square beads String 2 beads on lace . Hand lace to child. Put 4 beads on table and say, "String the beads like I did."	2 Strings 2 beads 1 Strings 1 bead 0 Attempts to string a bead				
50	27–28 Start: 33–34 months	FOLDING PAPER <i>(Sitting at a table)</i> 8.5 × 11 in. sheet of paper, cut in half Fold piece of paper in half and leave it where child can see it. Give child other piece of paper and say, "Fold it like mine."	2 Bends paper, producing a crease 1 Crumples paper 0 Touches paper				
51	29–30	BUILDING TRAIN <i>(Sitting at a table)</i> 8 cubes Build train as pictured in Guide to Item Administration. Push train across table making train sounds. Leave it where child can see it. Put 4 cubes in front of child and say, "Make a train like mine."	2 Aligns 3 cubes and positions 4th cube on top at one end 1 Aligns 3 cubes but incorrectly positions top cube 0 Aligns 2 cubes				

Visual-Motor—25

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
52 Start: 29-33 months	29-30	STRINGING BEADS <i>(Sitting at a table)</i> Lace and 6 square beads String 2 beads on lace. Hand lace to child. Put 4 beads on table and say, "String all of these beads like I did."	2 Strings 4 beads 1 Strings 3 beads 0 Strings 2 beads				
53	29-30	BUILDING TOWER <i>(Sitting at a table)</i> Say, "Watch me build a tower." Build tower of 5 cubes. Let tower stand for a few seconds, then knock it down. Give child 10 cubes and say, "Build a tall tower using as many blocks as you can."	2 Stacks 10 cubes 1 Stacks 9 cubes 0 Stacks less than 9 cubes				
54	31-32	BUILDING BRIDGE <i>(Sitting at a table)</i> Build bridge with 3 cubes as pictured in the Guide to Item Administration and leave it standing. Put 3 cubes in front of child and say, "Build a bridge like mine."	2 Builds bridge as illustrated 1 Builds bridge with bottom 2 cubes touching or top cube out of position 0 Stacks cubes				
55 Start: 33-42 months	33-34	COPYING CIRCLE <i>(Sitting at a table)</i> Place paper, marker, and card with circle on table. Say, "Draw a circle."	2 Draws circle with end points within 1/2 in. of each other 1 Draws circle with end points 1/2 to 1 in. of beginning point; circle is at least 1/2 complete 0 End points are more than 1 in. apart or circle is less than 1/2 complete				
56	35-36	BUILDING WALL <i>(Sitting at a table)</i> 8 cubes Build 4-cube wall as pictured in Guide to Item Administration and leave standing. Place 4 cubes in front of child and say, "Build a wall like mine."	2 Builds wall as illustrated or 2 towers touching 1 Builds two 2-cube towers with space between the towers 0 Builds single tower				
57 Start: 43-46 months	37-38	CUTTING PAPER <i>(Sitting at a table)</i> Cut piece of 8.5 x 11 in. paper in half. Give 1 piece of paper and scissors to child. Say, "Cut the paper like I did."	2 Cuts paper into 2 pieces 1 Cuts paper 1/2 or less across 0 Snips with scissors				
58	39-40	LACING STRING <i>(Sitting at a table)</i> Lacing strip and lace Say, "Watch me lace." Lace down through 1st hole, up through 2nd hole. Lace string through 3 holes. Show strip to child, then remove lace and give to child. Say, "You do it like I did."	2 Laces 3 holes 1 Laces 2 holes 0 Puts lace through 0-1 hole				
59	39-40	COPYING CROSS <i>(Sitting at a table)</i> Place paper, marker, and card with cross on table. Say, "Draw lines just like these that cross in the middle."	2 Draws intersecting lines that are within 20 degrees of perpendicular 1 Draws intersecting lines that are more than 20 degrees from perpendicular 0 Fails to intersect lines				
60	41-42	CUTTING LINE <i>(Sitting at a table)</i> Give child paper with 5 x 1/4 in. line and scissors. Run your finger along line and say, "Cut on the line."	2 Cuts within 1/2 in. of line the entire length of line 1 Cuts in direction of line but more than 1/2 in. from line 0 Snips with scissors				
61 Start: 43-54 months	41-42	COPYING CROSS <i>(Sitting at a table)</i> Place paper, marker, and card with cross on table. Say, "Draw lines just like these that cross in the middle."	2 Draws intersecting lines that are within 20 degrees of perpendicular and lengths on each side of middle vary no more than 1/2 in. 1 Draws intersecting lines that are more than 20 degrees from perpendicular and/or lengths on each side of middle vary more than 1/2 in. 0 Fails to intersect lines				

Visual-Motor—26

Item #	Age in Months	Item NAME, Position, and Description	Score Criteria	Administration			
				1	2	3	4
62	41-42	DROPPING PELLETS <i>(Sitting at a table)</i> Place bottle and 10 food pellets on table. Say, "Put the food in the bottle as fast as you can. Put only 1 in at a time."	2 Puts 10 pellets in bottle in 30 seconds or less 1 Puts 5-10 pellets in bottle in 31-60 seconds 0 Puts 4 or fewer pellets in bottle in 60 seconds				
63	41-42 Start: 65-69 months	TRACING LINE <i>(Sitting at a table)</i> Place paper with 5 × ½ in. line on table with line in horizontal position. Run your finger along the line and say, "Draw on this line. Try to stay right on the line."	2 Deviates off line no more than 2 times and by no more than ½ in. 1 Deviates off line 3-4 times and by no more than ½ in. 0 Deviates off line more than 4 times				
64	49-50	COPYING SQUARE <i>(Sitting at a table)</i> Place paper, marker, and card with square on table. Say, "Draw a square."	2 Draws lines that are straight and within 15 degrees of vertical and horizontal, with closed corners 1 Draws lines that deviate from vertical or horizontal by 16-30 degrees or a corner is open 0 Draws lines that deviate from vertical or horizontal by more than 30 degrees or 2 corners are open				
65	49-50	CUTTING CIRCLE <i>(Sitting at a table)</i> Give child paper with circle on it and scissors . Run your finger around circle and say, "Cut out the circle along the line."	2 Cuts within ¼ in. of line for ¾ of circle 1 Cuts within ½-¾ in. of line for ½-¾ of circle 0 Cuts out circle more than ½ in. from line				
66	51-52 Start: 63-71 months	BUILDING STEPS <i>(Sitting at a table)</i> Build steps as pictured in Guide to Item Administration (3 cubes on bottom). Leave steps standing briefly. Then knock down and give 6 cubes to child. Say, "Build the steps like I did."	2 Builds steps as illustrated 1 Builds steps with space between cubes or without proper alignment 0 Builds structure other than steps				
67	53-54	CONNECTING DOTS <i>(Sitting at a table)</i> Place paper with 2 dots and marker on table. Point to dots and say, "Draw a straight line from 1 dot to the other dot."	2 Connects dots; line does not deviate more than ¼ in. from horizontal 1 Connects dots; line deviates between ¼ and ½ in. from horizontal 0 Fails to connect dots or line deviates more than ½ in. from horizontal				
68	53-54	CUTTING SQUARE <i>(Sitting at a table)</i> Give paper with square on it and scissors . Run your finger around square and say, "Cut out the square along the lines."	2 Cuts out square within ¼ in. of lines 1 Cuts out square within ½-¾ in. of lines 0 Cuts out square more than ½ in. from lines				
69	53-54	BUILDING PYRAMID <i>(Sitting at a table)</i> 12 cubes Build 6-cube pyramid as pictured in Guide to Item Administration and leave standing. Put 6 cubes in front of child and say, "Build one like mine."	2 Builds pyramid as illustrated 1 Builds pyramid but cubes are touching in some places 0 Builds structure other than pyramid				
70	55-56	FOLDING PAPER <i>(Sitting at a table)</i> Show child 8.5 × 11 in. piece of paper folded in half lengthwise and leave where child can see. Give child piece of paper and say, "Fold your paper to look like this one."	2 Folds paper in half with edges parallel and within ½ in. of each other 1 Folds paper in half with edges roughly parallel and within ½-¾ in. of each other 0 Folds paper with edges more than ½ in. of each other				
71	59-60	COLORING BETWEEN LINES <i>(Sitting at a table)</i> Place paper with parallel lines and marker on table. Run your finger back and forth between lines and say, "Color only between the lines."	2 Colors ¾ of space without crossing lines more than 2 times 1 Colors ¾ of space and crosses line 3-4 times 0 Crosses lines more than 4 times				

Visual-Motor—27

Item #	Age in Months	Item NAME, Pos/Won, and Description	Score Criteria	Administration			
				1	2	3	4
72	68-72	FOLDING PAPER <i>(Sitting at a table)</i> Show child 8.5 × 11 in. piece of paper folded in half twice and leave where child can see it. Give child piece of paper . Say, "Fold your paper to look like this one."	2 Folds paper in half twice with edges parallel and within $\frac{1}{4}$ in. of each other 1 Folds paper in half twice with edges parallel and within $\frac{1}{2}$ - $\frac{3}{4}$ in. of each other 0 Folds paper in half twice with edges more than $\frac{1}{2}$ in. from each other				

Appendix 5: Hammersmith Infant Neurological Examination

HAMMERSMITH INFANT NEUROLOGICAL EXAMINATION (v 08.02.19)

Name: _____ Date of birth: _____
 Gestational age: _____ Date of examination: _____
 Chronological age / Corrected age: _____ Head circumference: _____

SUMMARY OF EXAMINATION

Global score (max 78): _____
 Number of asymmetries: _____

Behavioural score (not part of the optimality score)

Cranial nerve function score (max 15): _____
 Posture score (max 18): _____
 Movements score (max 4): _____
 Tone score (max 24): _____
 Reflexes and reactions score (max 15): _____

COMMENTS

(Throughout the exam, if a response is not optimal but not poor enough to score 1, give a score of 2)

NEUROLOGICAL EXAMINATION

ASSESSMENT OF CRANIAL NERVE FUNCTION

	score 3	score 2	score 1	score 0	score	Asymmetry / Comments
Facial appearance or facial activity or asymmetry	Closes or reacts to stimuli on blowing	Closes eyes but not tightly, or no response	Expressionless, does not react to stimuli	Expressionless, does not react to stimuli		
Eye movements	Normal conjugate eye movements	Normal conjugate eye movements	Intermittent deviation of eyes or abnormal eye movements	Continuous deviation of eyes or abnormal eye movements		
Visual response Test ability to follow a blackwhite target	Follows the target in a complete arc	Follows target in an incomplete arc	Does not follow the target	No response		
Auditory response Test the response to a rattle	Good start and swivelling	Good start and swivelling	No response	No response		
Suckingswallowing Watch infant suck on breast or bottle. If bottle, note about feeding, breast caught, excessive spitback	Good suck and swallowing	Good suck and swallowing	No response	No suckling reflex, no swallowing		

ASSESSMENT OF TONE

	score 3	score 2	score 1	score 0	score	Asymmetry / Comments
Shoulder girdle Test the infant's head and neck. The infant's head and neck should be in a neutral position. Note the position of the head in relation to the neck.	Normal	Normal	Normal	Normal		
Passive shoulder elevation (if arm is abductable, abduct head. Note resistance at shoulder and elbow)	Normal	Normal	Normal	Normal		
Prone/extension/rotation Range the upper arm while supporting and supporting the infant's head.	Full pronation and extension	Full pronation and extension	Reduced to full pronation	Reduced to full pronation		
Hip abduction With both the infant's legs extended, abduct them to the maximum. The angle formed by the legs is noted.	Range: 100°-130°	Range: 100°-130°	Range: 100°-130°	Range: 100°-130°		
Passive ankle Flexion: The infant's foot is drawn up to the knee. The infant's knee is held in a neutral position. Note the angle between upper and lower leg.	Range: 90°-130°	Range: 90°-130°	Range: 90°-130°	Range: 90°-130°		
Active dorsiflexion Range: 90°-130°	Range: 90°-130°	Range: 90°-130°	Range: 90°-130°	Range: 90°-130°		
Pull to sit Push infant to sit by the wrists (one per head "necessary")	Normal	Normal	Normal	Normal		
Wheeler response Hold infant horizontally and lift up or over the shoulders. Note position of legs, arms and head.	Normal	Normal	Normal	Normal		

REFLEXES AND REACTIONS

	score 3	score 2	score 1	score 0	score	Asymmetry / Comments
Arm protection The infant is held in a sitting position. The infant's arms are held in a neutral position. Note the position of the arms in relation to the body.	Normal	Normal	Normal	Normal		
Vertical suspension The infant is held in a sitting position. The infant's arms are held in a neutral position. Note the position of the arms in relation to the body.	Normal	Normal	Normal	Normal		
Lateralsitting (observe while holding the infant's head and neck. Note the position of the arms in relation to the body.)	Normal	Normal	Normal	Normal		
Forward posture (note infant's head, neck, arms and legs)	Normal	Normal	Normal	Normal		
Forward posture (note infant's head, neck, arms and legs)	Normal	Normal	Normal	Normal		
Forward posture (note infant's head, neck, arms and legs)	Normal	Normal	Normal	Normal		

ASSESSMENT OF POSTURE (note any asymmetries)

	score 3	score 2	score 1	score 0	score	Asymmetry / Comments
Head in sitting	Straight or vertical	Slightly to side or backward	Markedly to side or backward	Markedly to side or backward		
Trunk in sitting	Straight	Slightly curved or bent to side	Very rounded	Very rounded		
Arms at rest	In a neutral position, vertical, straight or slightly bent	Slight internal rotation or external rotation	Marked internal rotation or external rotation	Marked internal rotation or external rotation		
Hands	Hands open	Intermittent adducted thumb or fist	Persistent adducted thumb or fist	Persistent adducted thumb or fist		
Legs in sitting	Ability to sit with a straight back and legs straight or slightly bent (being sitting)	Sit with straight back but knees bent at 15-20°	Unable to sit upright unless knees markedly bent (no long sitting)	Unable to sit upright unless knees markedly bent (no long sitting)		
Legs in supine and in standing	Legs in neutral position, straight or slightly bent	Slight internal rotation or external rotation	Marked internal rotation or external rotation	Marked internal rotation or external rotation		
Feet in supine and in standing	Central in neutral position	Slight internal rotation or external rotation	Marked internal rotation or external rotation of the ankle	Marked internal rotation or external rotation of the ankle		

ASSESSMENT OF MOVEMENTS

	score 3	score 2	score 1	score 0	score	Asymmetry / Comments
Quantity	Normal	Normal	Normal	Normal		
Quality	Free, alternating, and smooth	Free, alternating, and smooth	Jerky	Stagnant		
Observation	Free, alternating, and smooth	Free, alternating, and smooth	Jerky	Stagnant		

SECTION 2 MOTOR MILESTONES (not scored; note asymmetries)

	score 3	score 2	score 1	score 0	score	Asymmetry / Comments
Head control	Upright head control	Upright head control	Upright head control	Upright head control		
Bringing	Normal sit	Normal sit	Normal sit	Normal sit		
Voluntary grasp	No grasp	Use of whole hand	Use of thumb and fingers	Use of thumb and fingers		
Ability to back to supine	Back to supine	Back to supine	Back to supine	Back to supine		
Rolling	No rolling	Rolling to side	Rolling to side	Rolling to side		
Crawling	Does not sit	On elbows	On hands	Crawling on hands		
Walking	Does not walk	Staggering	Staggering	Staggering		

SECTION 3 BEHAVIOUR (not scored)

	1	2	3	4	5	6	Comments
Contentment	Contentment	Contentment	Contentment	Contentment	Contentment	Contentment	
Emotional state	Contentment	Contentment	Contentment	Contentment	Contentment	Contentment	
Social orientation	Contentment	Contentment	Contentment	Contentment	Contentment	Contentment	

Footnote: This is the official form for use with the Hammersmith Infant Neurological Examination. It should not be modified or changed. Make reference to copy 1 of 1. Page 2005.05.25.25.43. For enquiries about the examination, please contact Prof. Emma Coxon, E.Coxon@hammersmith.ac.uk. Prof. Emma Coxon, E.Coxon@hammersmith.ac.uk. Prof. Emma Coxon, E.Coxon@hammersmith.ac.uk.