



2023

PRIMITIVE REFLEX SCREENING AND CAREGIVER EDUCATION AND SUPPORT. A PRODUCT TO SUPPORT CHILDREN WITH RETAINED PRIMITIVE REFLEXES TRANSITIONING INTO THE FORMAL EDUCATION SYSTEM.

Anna Justine Logan

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PRIMITIVE REFLEX SCREENING AND CAREGIVER EDUCATION AND SUPPORT. A
PRODUCT TO SUPPORT CHILDREN WITH RETAINED PRIMITIVE REFLEXES
TRANSITIONING INTO THE FORMAL EDUCATION SYSTEM.

by

Anna Justine Logan

Occupational Therapy Doctorate, University of North Dakota, 2023

A Scholarly Project

Submitted to the Graduate Faculty

of the University of North Dakota

in partial fulfillment of the requirements

for the degree of

Occupational Therapy Doctorate

Grand Forks, North Dakota

May

2023

APPROVAL

This scholarly project, submitted by Anna J. Logan in partial fulfillment of the requirement for the Degree of Occupational Therapy Doctorate from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Kelly Dornbier, OTD, OTR/L

Kelly Dornbier, Faculty Advisor

April 17, 2023

Date

PERMISSION

Title: Primitive Reflex Screening and Caregiver Education and Support. A product to support children with retained primitive reflexes transitioning into the formal education system.

Department: Occupational Therapy

Degree: Occupational Therapy Doctorate

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Anna J. Logan

16 April 2023

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ACKNOWLEDGMENTS

I would like to thank Dr. Kelly Dornbier, OTD, OTR/L, for her guidance throughout this project and for her guidance throughout my time in this program as my faculty advisor.

I would like to thank Cortney Connolly, MS, OTR/L, for her guidance as my site mentor, her encouragement, and her enthusiasm for this project.

I would like to thank my husband, Aaron Logan, for his love, support, and an attempted move on this crazy adventure.

ABSTRACT

Introduction: Infants are born with movement patterns called primitive reflexes. Primitive reflexes are active for approximate times during the first few years of life (Smet et al, 2020; Myott et al., 2016).

Retained primitive reflexes are primitive reflexes that have not integrated in the expected time. Retained primitive reflexes have been linked to a variety of developmental delays in older children including fine and gross motor (Gieysztor et al., 2018a), visual (Andrich et al., 2018), and academic performance (Feldhacker et al., 2021; Calvin & Ramli, 2020).

Methodology: A comprehensive literature review was completed prior to the start of the Doctoral Experiential Placement (DEP), at a pediatric outpatient clinic. After arrival at the DEP clinic, an onsite needs assessment was completed identifying the retained primitive reflexes most frequently seen at the clinic. Ecology of Human Performance Model ([EHP] Dunn et al., 1994) was used to guide the development of the retained primitive reflex screening and home exercise program.

Results: The product includes a retained primitive reflex screening for five primitive reflexes, parent/caregiver education handouts on primitive reflexes, and home exercise program focused on movement to integrate retained primitive reflexes created based on evidence from the literature review. The product is intended to be used prior to the start of formal education.

Summary: Retained primitive reflexes can impact children entering the formal educational system (Feldhacker et al., 2021; Gieysztor et al., 2018a). However, there are screenings available to determine which retained primitive reflexes children have (Goddard, 2005; Gieysztor et al., 2018a). There are exercises that will integrate retained primitive reflexes in older children (Gieysztor et al., 2018a) allowing them to decrease the impacts of retained primitive reflexes and improve their academic performance (Feldhacker et al., 2021; Calvin & Ramli, 2020). The product stream-lined the retained primitive reflex screening process at a pediatric outpatient clinic and provides parent/caregiver handouts and home exercises.

Chapter I: Introduction

Need

Retained primitive reflexes can delay many areas of development including fine and gross motor skills (Gieysztor et al., 2018a), concentration (Calvin & Ramli, 2020), bladder control (Goddard, 2005), crossing midline (Chinello et al., 2018), and many others. Retained primitive reflexes have been associated with diagnoses such as autism spectrum disorder (Chinello et al., 2018), attention deficit hyperactivity disorder ([ADHD]; Konicarova & Bob, 2012), and cerebral palsy (Gieysztor et al., 2018a). Recent studies have found retained primitive reflexes in populations of healthy, typically developing children (Gieysztor et al., 2018a; Feldhacker et al., 2021), demonstrating a need to provide all children with screenings for retained primitive reflexes.

Purpose Statement

The purpose of this project was to understand the developmental delays associated with retained primitive reflexes and develop a retained primitive reflex screening tool to be used with children aged four to six years old prior to the start of formal education. The second part of this product was developing an exercise program to integrate retained primitive reflexes. After an onsite needs assessment was completed, it was determined parent/caregiver education would also be developed for the pediatric outpatient setting.

Project Objectives

The first objective was to develop a screening tool for retained primitive reflexes to be completed with children aged four to six years old prior to the start of formal education. This objective was met after an eight-page screening tool was developed.

The second objective was to develop an exercise program to be completed with occupational therapists and with a parent/caregiver at home to promote integration of the retained primitive reflexes. This objective was met after an integration exercise home program was developed that included step-by-step instructions and photos of the exercises.

Theoretical framework

Ecology of Human Performance ([EHP]; Dunn et al., 1994; Dunn, 2017) model was used to guide the development of this product. Dunn et al. (1994) developed EHP with five intervention approaches to occupational therapy: establish/restore, alter, adapt/modify, prevent, and create. The establish/restore intervention approach was chosen as the intervention approach to guide the development of the screening tool and integration exercise program. EHP considers the person, task, context, and performance range. The person factor includes past experiences, individual values, individual interests, sensorimotor skills, cognitive skills, and psychosocial skills (Dunn, 2017). The task is a set of observable behaviors a person completes to reach a goal. Context includes the age of the person, developmental stage of the person, the physical environment surrounding the person, family and friends of the person, and other cultural aspects. The person factor, task, and context come together to determine the performance range. Performance ranges can start small and grow as the person develops needed skills. The performance range can also shrink due to illness, injury, or limiting environments (Dunn et al., 1994; Dunn, 2017). The goal with this product is to establish integrated reflexes to increase the performance range of children preparing to enter formal education.

Chapter II: Literature Review

Primitive Reflexes and Retained Primitive Reflexes Defined

Infants are born with patterns of movement known as primitive reflexes. Primitive reflexes help during the birthing process and through the first years of life. “Primitive reflexes are automatic movements that are usually stimulated by sensory factors and performed without conscious volition” (Smet et al., 2020, p. 78). According to Smet et al. (2020) primitive “reflexes are predictable motor responses prompted by proprioceptive, tactile, and vestibular stimulation” (p. 78); these primitive reflexes typically integrate during the first few years of life (Smet et al., 2020; Chandradasa & Rathnayake, 2019). The integration of primitive reflexes allows for development of natural motor patterns and age-appropriate movement within the child’s environment (Gieysztor et al., 2018a). Primitive reflexes that are retained, or do not integrate, have been linked to developmental delays in both fine and gross motor skills (Gieysztor et al., 2018a) and delays in the acquisition of academic skills (Feldhacker et al., 2021). There are seven primitive reflexes to consider when assessing for retained primitive reflexes including Moro reflex, Palmar reflex, Rooting reflex, Spinal Galant reflex, Asymmetrical Tonic Neck reflex (ATNR), Tonic Labyrinthine reflex (TLR), and Symmetrical Tonic Neck reflex (STNR) (Goddard, 2005; Gieysztor et al., 2018a). For each primitive reflex there is a timeframe of when the reflex should be active and when the reflex should integrate to allow for higher level neural development (Myott et al., 2016; Gieysztor et al., 2018a; Goddard, 2005).

The Rooting reflex is demonstrated when the infant’s cheek is brushed and they turn their head toward the stimulus (Smet et al., 2020). This primitive reflex is beneficial to an infant in finding their food source, either the nipple of a breast or the nipple of a bottle. The Rooting

reflex is present at birth and typically integrates at approximately three months of age (Smet et al., 2020). Retained Rooting reflex can cause delays in learning control of head movement (Smet et al., 2020), cause hypersensitivity around the mouth, and lead to difficulty tolerating new food textures (Goddard, 2005).

The Palmar reflex is demonstrated when pressure is placed on the palm of the infant's hand and the infant's fingers close around the object applying pressure (Smet et al., 2020). The Palmar reflex is present at birth and typically integrates between four and six months of age (Smet et al., 2020). Retained Palmar reflex can delay the fine motor skill of releasing objects (Smet et al., 2020) thus impacting play and later handwriting skills.

The Moro reflex, also known as the startle reflex, is demonstrated when the infant's head is extended unexpectedly while the infant is positioned in supine. The infant demonstrates the Moro reflex by extending the arms and opening the hands then rapidly flexing the arms and closing the hands (Smet et al., 2020). The infant also typically cries. The Moro reflex is present at birth and typically integrates between four and six months of age (Smet et al., 2020). Retained Moro reflex can cause delays in the development of protective reactions (Smet et al., 2020). Retained Moro reflex can also impact concentration and focus thus later impacting academic performance (Calvin & Ramli, 2020).

The Spinal Galant reflex is demonstrated when the infant is prone and one side of the spine is tapped or stroked, in response to this stimulus the infant flexes laterally to the side stimulated (Myott et al., 2016; Chandradasa & Rathnayake, 2019). Spinal Galant reflex is present at birth and typically integrates at approximately two months of age (Myott et al., 2016). Retained Spinal Galant reflex can delay learning bladder control with the possibility of prolonged bed wetting in older children (Goddard, 2005). Calvin and Ramli (2020) found

retained Spinal Galant reflex affected gait, later leading to difficulties with athletic capabilities. Calvin and Ramli (2020) also found small spinal stimuli often led to the individual experiencing discomfort and decreased concentration when Spinal Galant is retained.

The Asymmetrical Tonic Neck Reflex (ATNR) is demonstrated when the infant's head is turned to the right or the left and the arm on the face side extends while the back arm simultaneously flexes (Smet et al., 2020; Myott et al., 2016). ATNR is present at birth and typically integrates between four and six months of age (Smet et al., 2020). When ATNR is integrated properly the child experiences and displays coordination between their left and right sides (Calvin & Ramli, 2020). Retained ATNR has been linked to delays in crawling and decreased fine motor skills including the ability to shake items, rotate and manipulate objects between hands, and transferring objects across the midline of the body (Chinello et al., 2018). Gieysztor et al. (2018a) found retained ATNR can affect eye tracking and crossing midline thus later leading to difficulty with distinguishing between left and right, learning to read, and learning to tell time. Chandradasa and Rathnayake (2019) found retained ATNR has also been linked to dyslexia and low reading scores for children.

Symmetrical Tonic Neck Reflex (STNR) is demonstrated when the infant is in quadruped with the head extended. When the infant is in this position the obligatory response that occurs is extension of the arms and flexion of both legs (Smet et al., 2020). STNR can be present at birth (Smet et al., 2020) or develop between four and six months of age (Myott et al., 2016). Integration of STNR can range from four months to one year of age (Myott et al., 2016). Retained STNR has been linked to poor posture, poor eye-hand coordination, and difficulty focusing (Gieysztor et al., 2018a).

Tonic Labyrinthine Reflex (TLR) is demonstrated when the infant is supine with head in midline and the arms and legs move into a flexed position, the arms and legs will display increased extensor tone (Smet et al., 2020). TLR is present at birth and typically integrates between four and six months of age (Smet et al., 2020). Retained TLR can delay the infant in learning the ability to move to the side and rolling over (Smet et al., 2020). When TLR is retained, there can be difficulties with balance and coordination (Calvin & Ramli, 2020).

Integrated reflexes allow “more sophisticated neural structures to develop, which then allow the infant control of voluntary response” (Goddard, 2005, p. 1). As an infant grows, primitive reflexes should integrate to allow postural reflexes to develop thus leading to expected motor development (Chandradasa & Rathnayake, 2019).

When primitive reflexes have not integrated, they are considered retained primitive reflexes. When primitive reflexes are retained beyond the age they should have integrated the retained primitive reflexes “may result in immature patterns of behavior or may cause immature systems to remain prevalent, despite the acquisition of later skills” (Goddard, 2005, p. 1). Retained primitive reflexes can be partially retained or fully retained. Partially retained primitive reflexes demonstrate part of the primitive reflex movement whereas fully retained primitive reflexes demonstrate the full movement. Using ATNR as an example, if the child is in a quadruped position and the head is turned to the right and there is slight or clear movement of the left arm, ATNR is partially retained. If when the head is turned to the right, the left elbow fully bends there is full retainment of the ANTR (Goddard, 2005; Gieysztor et al., 2018a). Retained primitive reflexes can cause delays in gross and fine motor development (Gieysztor et al., 2018a), vision (Andrich et al., 2018), concentration and attention (Calvin & Ramli, 2020), and

difficulty with academic skills (Feldhacker et al., 2021). These delays then ultimately impact the child's participation in formal education.

Impacts of Retained Primitive Reflexes

Some of the overall developmental delays related to retained primitive reflexes include poor motor ability and sensory processing (Gieysztor et al., 2018a), difficulty with balance and muscle tone (Andrich et al., 2018), and crawling, walking, and kicking a ball using both sides of the body (Chinello et al., 2018). Gieysztor et al. (2018a) found when multiple primitive reflexes are retained there was a decrease in “the brain's ability and efficiency in processing sensory information” (p.168). The difficulties children experience from retained primitive reflexes can be from one primitive reflex or a combination of primitive reflexes. The developmental delays, if left untreated, can impact academic learning.

Gieysztor et al. (2018a) and Feldhacker et al. (2021), focused on populations of typically developing children with no developmental delay diagnoses to determine if retained primitive reflexes were present and to what extent retained primitive reflexes impacted educational performance. Gieysztor et al. (2018a) sample population was 35 children aged four to six years old. This study found 65 percent of the children had retained primitive reflexes. The sample population for Feldhacker et al. (2021) was 53 children aged five to seven years old. The results of this study were 100 percent of children involved in the study demonstrated at least one retained primitive reflex. These two studies indicate it is appropriate to screen all children for retained primitive reflexes due to the high percentages of retained primitive reflexes found in the populations studied.

Feldhacker et al. (2021) completed a study with 53 typically developing kindergarten and first grade students looking at the impact of retained primitive reflexes related to educational

performance. Their findings indicated that male students with retained primitive reflexes demonstrated decreased scholastic performance with reading, reading comprehension, written language, math, and spelling. Female students, in the same study, with retained primitive reflexes demonstrated decreased scholastic performance with reading and math. Andrich et al. (2018) focused on the relationship of retained primitive reflexes and visual skill deficits. This study found that TLR, ATNR, and STNR had “statistically significant relationships with visual skill deficits” (p. 109) with the potential to impact academic success. According to Andrich et al. (2018) “students who retain ATNR, STNR, and/or TLR may benefit from therapy services that focus on integrating these reflexes in order to promote the development of visual skills needed for success at school” (p. 109). Retained primitive reflexes can negatively impact saccadic eye movements thus creating academic challenges in the classroom (Andrich et al., 2018).

Retained Primitive Reflexes Screening

Based on the available evidence it is recommended screenings for retained primitive reflexes take place prior to the start of formal education (Gieysztor et al., 2018a; Calvin & Ramli, 2020; Feldhacker et al., 2021; Eastwood, 2017). Calvin and Ramli (2020) argued “screening for retained primitive reflexes is crucial in determining the chance of future neurodevelopmental problems, as immediate intervention and treatment can be done” (p. 32). The Institute for Neuro Physiological Psychology (INPP) screening test (Goddard, 2005) is a widely used screening tool for retained primitive reflexes (Gieysztor et al., 2018a; Calvin & Ramli, 2020). This screening tool will be beneficial in creating a retained primitive reflex screening protocol for kindergarten screening events prior to the start of the school year.

Screening for retained primitive reflexes can be completed within 20-30 minutes and requires very little equipment. An exam area, a two-inch cushion or foam block, and a soft-tipped utensil are the equipment requirements to complete a reflex screening using this tool (Goddard, 2005). The cushion or foam block is used for the Moro reflex screen. The soft-tipped brush is used for the Rooting reflex and Sucking reflex screens. A gloved hand would also work in the place of a brush. To screen for the Rooting reflex, the examiner would brush the child's cheek from the edge of the nose to the corners of the mouth. If there is movement from the mouth or head in the direction of the stimuli, the Rooting reflex is likely present (Chandradasa & Rathnayake, 2019). To screen for the Sucking reflex the examiner would brush just above the upper lip and below the nose. If there is movement of the lips the Sucking reflex is likely present (Chandradasa & Rathnayake, 2019). Goddard's (2005) screening for the Moro reflex includes having the child in supine with the shoulders resting on the two-inch cushion or foam block. The examiner cradles the child's head elevated approximately two inches above the spine. The examiner would allow the child's head to drop two to three inches below the spine but not reach the floor. If there is movement of the arms away from the body or distress the reflex is likely present (Goddard, 2005). Screening for the Palmar reflex includes the child having elbows flexed and palms facing upwards. The examiner would brush the palm of the hand from the thenar web space to approximately the pisiform bone. If there is inward movement of the thumb or fingers the reflex is likely present (Chandradasa & Rathnayake, 2019; Goddard, 2005). Spinal Galant reflex, Asymmetrical Tonic Neck Reflex, and Symmetrical Tonic Neck Reflex can all be screened with the child in a quadruped position. For Spinal Galant reflex, the examiner would stroke the child's back along the left side then the right side of the spinal column. If there is lateral movement on the side stroked the reflex is likely present (Chandradasa & Rathnayake,

2019; Goddard, 2005). For ATNR, the examiner would turn the child's head to the left and hold for four seconds, then turn the head to the right and hold for four seconds. This can be repeated up to four times. If there is movement in the opposite elbow from the direction the head is turned the reflex is likely present (Gieysztor et al., 2018a; Chandradasa & Rathnayake, 2019). For STNR, the examiner would flex the child's neck and hold for five seconds then extend the child's neck and hold this position for five seconds. This series of movements can be repeated up to four times. If there is movement such as arching of the back, body weight shifting backwards, or arms bending the reflex is likely present (Gieysztor et al., 2018a; Chandradasa & Rathnayake, 2019). To screen for TLR, the child stands with feet together. The examiner is either behind the child or to one side to provide support in case the child loses their balance during this screen. The child is asked to slowly extend the head, close their eyes, and to hold this position for ten seconds. Then the child is asked to slowly flex the head and hold the position for ten seconds. This is repeated four to six times. If there is a change in balance or the child sways the reflex is likely present (Goddard, 2005; Gieysztor, 2018a). Completing these screenings would allow an examiner to determine which primitive reflexes are present and which exercises should be completed to integrate the retained primitive reflexes.

Parent Education

After a screening for retained primitive reflexes has been completed, parent or caregiver education will need to be provided. Parent/caregiver education should consist of explanations of primitive reflexes, retained primitive reflexes, information on the types of delays the child could experience with retained primitive reflexes, and the types of exercises used to integrate retained primitive reflexes. Education intentionally written to support parent/caregiver understanding of reflex integration and treatment will promote adherence and consistency with following a home

exercise program for reflex integration (Lin et al., 2018; Segal & Beyer, 2006). Lin et al. (2018) found when parents/caregivers are involved in occupational therapy interventions, children experience significant positive outcomes compared with children whose parents/caregivers do not actively take part in provided home programs. A study completed by Segal and Beyer (2006) found that parents/caregivers evaluate the effectiveness of interventions and their children's responses to the intervention(s), and when a parent/caregiver believes their child has benefitted from the intervention, such as improved behavior and fewer outbursts, the parent/caregiver has better consistency with follow through of the home exercise program. Providing parent/caregiver education that explains the changes parents/caregivers should see after adding the exercises for retained primitive reflexes will be important for the completion of a home program. When parents/caregivers have an understanding of the potential positive impacts of completing the home exercise program for reflex integration, there is a greater chance of the exercise program being implemented as directed by the occupational therapist.

Reflex Integration Exercises

Based on the evidence, it is recommended that exercises be used to help integrate retained primitive reflexes in order to address the delays associated with retained primitive reflexes. Gieysztor et al. (2018a), suggested using “movements based on early brain development sequences” (p. 171) for the exercises to help integrate retained primitive reflexes. Chandradasa and Rathnayake (2019) advised obtaining the guidance and expertise of a pediatric occupational therapist for the exercises recommended for retained primitive reflexes in children. Chandradasa and Rathnayake (2019) recommended implementing exercises for Moro reflex, Rooting and Sucking reflexes, Spinal Galant reflex, and Palmar reflex to promote a child's ability to meet developmental milestones. To integrate the Rooting and Sucking reflexes, the

cheeks and area above the upper lip should be brushed or stroked with a soft-tipped brush or gloved fingertip to produce the reflex. The brushing is continued until the reflex fatigues or stops being displayed. After a few seconds break the exercise is repeated. To integrate the Moro reflex, the child sits in a chair in the fetal position with wrists and ankles crossed. The child then swings their arms and legs out like a star and extends the head back on an inhale. This position is held for five seconds then the child returns to the start position on an exhale (Chandradasa & Rathnayake, 2019). This sequence is repeated alternating which wrist and ankle are on top for six cycles. To integrate the Spinal Galant reflex, the child lies on the floor or a mat and completes the movements to make snow angles with the hands touching above the child's head during an inhalation. On an exhalation the child returns to the start position. Both sets of movements are completed slowing, taking 10 seconds to begin with and increasing to 30 seconds as the exercise program progresses (Chandradasa & Rathnayake, 2019). To integrate the Palmar reflex, Chandradasa and Rathnayake (2019), recommend the child squeeze a tennis ball or stress ball and slowly release. A variety of exercises can be introduced to a child with retained primitive reflexes to integrate the reflexes and decrease the developmental delays experienced.

“Retained primitive reflexes are increasingly being recognized as a potential contributing factor to behavioral abnormalities and learning deficits” (Chandradasa & Rathnayake, 2019, p. 6). Research has presented a wide range of developmental areas impacted by retained primitive reflexes. Research has also presented ways of screening for the retained primitive reflexes and potential exercises to be completed to integrate the retained primitive reflexes thus giving children with retained primitive reflexes avenues for better academic experiences and the potential for fewer developmental delays. Based on this evidence, a screening tool and exercise program will positively impact incoming kindergarten students by identifying the children with

retained primitive reflexes and providing exercises to complete to help integrate the identified retained primitive reflexes prior to the start of the school year. Thus, positively impacting the child's ability to learn academic skills.

Occupational therapy is uniquely suited to implement this program for multiple reasons. Occupational therapists are trained in completing evaluations and building treatment plans with clients and client caretakers to address the difficulties found during the evaluation (American Occupational Therapy Association [AOTA], 2020). Occupational therapists are also trained in task analysis, being able to break down tasks to each step required to complete the task. Because of occupational therapists' knowledge of task analysis, occupational therapists are able to include elements of the exercises for retained primitive reflex integration into everyday tasks and activities children with retained primitive reflexes already participate in (AOTA, 2020). An example of one such intervention is having a child prone on the floor while using building toys with the instructions for the building toy posted on a wall resulting in the child looking down at the building toys then up at the instructions using the movements required to integrate retained STNR. Building elements into everyday tasks allows the exercises to be completed with multiple repetitions throughout the day. Occupational therapists also are skilled at building home programs for clients. Home programs allow exercises or other programs to be completed outside of clinic hours allowing the client to continue establishing or restoring skills for activities of daily living (ADLs) (Segal & Beyer, 2006).

When occupational therapists complete screenings for retained primitive reflexes then provide parent/caregiver education and exercises at the clinic and in a home program, children with retained primitive reflexes have a greater chance of integrating retained primitive reflexes and decreasing developmental delays affecting academic performance. Completing a retained

primitive reflex screening does not take more than 30 minutes and provides information on which retained primitive reflexes a child still demonstrates immediately. Knowledge of which retained primitive reflexes a child still has allows occupational therapists to provide parent/caregiver education and specific exercises to target the retained primitive reflexes for integration. With targeted exercises for the integration of retained primitive reflexes children entering the formal educational system are able to work toward decreasing developmental delays and increasing academic performance (Gieysztor et al., 2018a; Chandradasa & Rathnayake, 2019).

Chapter III: Methods

Product Design

The beginning element of this project design was a literature review using the search engines CINAHL Complete, PubMed, and Google Scholar. Terms used within the search engines included, “primitive reflexes,” “reflexes,” “retained reflexes,” “retained primitive reflexes,” “children,” “pediatrics,” “reflex integration,” “integration program,” and “occupational therapy.” The first objective was to understand the impacts of retained primitive reflexes and what screening tools are available to measure retained primitive reflexes in children, specifically children aged four to six years old preparing to enter kindergarten. The second objective was to identify evidence-based integration exercises for retained primitive reflexes. Because of the population of children entering kindergarten, Ecology of Human Performance (EHP) was chosen as the theoretical framework (Dunn et al., 1994; Dunn, 2017). EHP was chosen because it was created to work in the school system with interdisciplinary teams.

Timeline

The timeline of this project was fourteen weeks long, starting the first week in January 2023 and ending the first week in April 2023. Initial drafts of the literature review had been completed and the theoretical framework had been chosen prior to the start date at the pediatric outpatient clinic in Sheridan, Wyoming. The first three weeks included learning the policies and procedures at the clinic and observing the occupational therapists during sessions. A needs assessment completed with the clinical director helped narrow the focus of the retained primitive reflexes to the retained primitive reflexes most frequently addressed at the clinic and identified the type of screenings currently used by the clinic for retained primitive reflexes. The retained

primitive reflexes were narrowed down to include Moro Reflex, Asymmetrical Tonic Neck Reflex (ATNR), Symmetrical Tonic Neck Reflex (STNR), Spinal Galant Reflex, and Tonic Labyrinthine Reflex (TLR). A one-page screen for each of the five retained primitive reflexes identified was adapted using sources from the literature review (Goddard, 2005; Smet et al., 2020; Gieysztor et al., 2018a) and preferred screening methods the clinical director had been using in the clinical setting. By the end of the third week, it was determined parent/caregiver education should also be developed as handouts the clinic can provide after retained primitive reflex screenings have taken place. A one-page informational handout for parent/caregivers was developed for each of the retained primitive reflexes. Types of exercises and activities used to address retained primitive reflexes were topics of later informal discussions with the clinical director. One-page directions for home program use were developed for each of the retained primitive reflexes.

Ethical Considerations

Ethical considerations for the project included the reading literacy of the audiences during the development of the informational handouts on the retained primitive reflexes with the goal of the handouts being at or below the eighth-grade reading level. Learning styles of the parents/caregivers and pediatric clients were also considered with the development of videos demonstrating the movements of the exercises for integration of the retained primitive reflexes. The clinic is able to provide both the handouts and the code required to view the demonstrational videos on their website for varying learning styles.

The main goal of this project was to develop an evidenced-based retained primitive reflex screening tool and an evidenced-based exercise program to integrate the retained primitive reflexes. A third need was identified as informational handouts for parent/caregivers explaining

primitive reflexes and retained primitive reflexes. Readability and understandability were priorities in the development of the screenings and informational parent/caregiver handouts.

Chapter IV: Product

Results

The results of this project include the project objectives of developing a retained primitive reflex screening and developing an exercise program to be completed with occupational therapy practitioners both of which are based on research completed prior to the start of the fourteen-week clinical doctoral experiential placement. The parent/caregiver educational handouts were developed after the need was identified at the clinical setting. The retained primitive reflex screenings are each one page long for each of the following primitive reflexes, Moro Reflex, Asymmetrical Tonic Neck Reflex (ANTR), Symmetrical Tonic Neck Reflex (STNR), Spinal Galant Reflex, and Tonic Labyrinthine Reflex (TLR). The screening tool can be completed in its entirety or by selecting the specific primitive reflex page. Each page identifies the retained primitive reflex, provided step-by-step instructions for completing the screening, a checklist for observed movements, and an area to write additional comments. For all screenings the occupational therapy practitioner demonstrates the movements prior to the child completing the screening.

The screening for the Moro Reflex can be completed with the child standing, in supine, or both. For the standing Moro Reflex screening, the practitioner instructs the child to stand with feet hip width apart. The practitioner asks the child to shake hands and the practitioner holds on to the child's hand as the child extends the neck to look at the ceiling. The child is then instructed to lean backward with their body, stepping back to catch themselves before losing their balance. The practitioner will observe any loss of balance, stiffness in neck or trunk, dilated pupils, tension or stress, breath-holding, accessory movements, and if the child stepped back to catch themselves. The supine Moro Reflex screening uses a crash pad or a yoga ball. If the

practitioner is using a crash pad, the child lays on the crash pad in supine with their head at one end of the crash mat. The child's arms are near their body. The practitioner will lift the child's head two to three inches above the crash pad and allow the head to drop approximately three inches. The practitioner will catch the child's head before it hits the crash pad. If the practitioner is using a yoga ball, the practitioner will stabilize the yoga ball and instruct the child to recline backwards over the yoga ball so that the child's head is upside down over the side of the yoga ball. For both screenings the practitioner will observe for distress in completing the screening in supine, stiffness in neck and/or trunk, outward movement of the arms or hands, crying out, stress or tension, and breath-holding.

The Tonic Labyrinthine Reflex screening is completed with the child standing. The practitioner instructs the child to stand with feet together. The practitioner is on one side of the child with one arm in front and one arm behind the child prepared to catch the child if they completely lose their balance. The child is instructed to extend their neck to look at the ceiling. The child is instructed to hold this position, close their eyes, and count to ten. The practitioner observes any loss of balance. The child is instructed to flex their neck to look at the floor, if they have opened their eyes, they are asked to close their eyes, hold the position, and count to ten. This cycle will be repeated four to six times. The practitioner observes any loss of balance or swaying, rigidity or locked knees, dizziness, stress, breath-holding, and limb movement.

The Asymmetrical Tonic Neck Reflex (ATNR) screening can be completed with the child standing, in quadruped, or both. For the standing ATNR screening the child stands with feet hip width apart. The child is instructed to hold arms straight out in front of their body at shoulder height with wrist slightly flexed. The practitioner instructs the child to look to the left and count to seven. The child is instructed to look to the right and count to seven. This cycle is repeated

three times. The practitioner observes any movement of the arm or hands and movement of the trunk. For the quadruped ATNR screening, the child is instructed to move to quadruped without locking elbows. The child is instructed to look to the left and count to five. The child is then instructed to look to the right and count to five. The cycle is repeated four times. The practitioner observes any slight or full bending movement in the elbow opposite of the direction the child is looking.

The Spinal Galant Reflex screening can be completed with the child standing, in quadruped, or both. The standing Spinal Galant Reflex screening starts with the child standing with feet hip width apart. The practitioner explains they will be using two fingers to gently but firmly run their fingers down the child's back. The practitioner will run their fingers from the scapula to the lumbar region one to two inches from the child's spine. The practitioner will run their fingers down the left then the right sides of the child's spine. This cycle is repeated once. The practitioner observes any hip flexion on the side stimulated, back twitching, and ticklishness or wiggling away. The same steps used for the standing screening are completed when the child is in quadruped for the quadruped screening with the same observations being completed by the practitioner.

The Symmetrical Tonic Neck Reflex is completed with the child in quadruped. The child is instructed to tuck their chin to their chest, look to their knees or the floor, and count to five. The child is then instructed to extend their neck, look to the ceiling, and count to five. This cycle is repeated four times. The practitioner observes any movement of the trunk and/or arms, locking elbows, position of the hands, if the hands or fingers are tented, and movement or tension in the legs or feet.

The design for the caregiver handouts on each retained primitive reflex was intentional to keep the page length at one page, provide information on the retained primitive reflex, and how occupational therapy can help treat the retained primitive reflex. The integration exercise instructions were also intentionally designed to be one page in length with simple step-by-step instructions to complete the exercise, and photos of an individual completing the exercises. The home exercise program provides three exercises for a specific retained primitive reflex for the parent/caregiver to guide the child through after the exercises have been introduced in the clinical setting. The home exercise program was designed to start with the simplest exercise then slowly add more challenging exercises. Pictures are included with the instructions for guidance to the parent/caregiver and as reminders to the child for how the exercise should be completed.

To address the integration of Moro Reflex the exercises provided include “Starfish,” “Rocking Egg,” and “Superman/Banana.” “Starfish” is completed in a chair, beanbag, or other type of cushion. The child moves into a fetal position with right wrist crossed over left wrist and right ankle crossed over left ankle. On an exhale the child extends their head, spreads out their arms and legs, and counts to ten. On the inhale the child flexes into the fetal position with left wrist over the right wrist and left ankle over the right ankle. This movement is continued with alternating right over left and left over right for ten cycles. “Rocking Egg” is completed on the floor. The child flexes their head so their chin tucks to their chest, the hips and knees are flexed and the child wraps their arms around their knees. In this position they roll backward onto their back and forward to the start position ten times. To grade this exercise up or increase the difficulty, the exercise is completed with a partner and a ball. The child holds a ball as they roll backwards and upon returning to the start position, toss the ball to their partner who then rolls backward with the ball and tosses the ball upon returning to the start position.

“Superman/Banana” is completed on the floor. The child is prone, flat on the floor, they move into extension of their head, arms, and legs. The child then rolls to supine tucking their chin to their chest while maintaining extension of their arms and legs.

To address the integration of the Tonic Labyrinthine Reflex the prone position is most often used. The first recommendation is to have the child complete activities in prone, such as coloring, putting together a puzzle, and for older children completing homework in prone. Additional exercises include “Sphinx” and “Superman.” “Sphinx” is completed with the child in prone then the child lifts up their chest bringing their elbows under their shoulders with forearms and hands flat on the floor. This position is held beginning with ten seconds and increasing the time to one minute. “Superman” is completed on the floor. The child is prone, flat on the floor, they extend their head, arms, and legs holding for ten seconds. As tolerance is built the time is increased also.

For the integration of Asymmetrical Tonic Neck Reflex (ATNR), exercises include crawling, “Mummy Walks,” and “Lizard.” Crawling is introduced as the first exercise. To grade the exercise up, the child is instructed to tuck a small, soft ball or toy between one shoulder and their chin then crawl a distance of 10 feet. The child is then instructed to switch shoulders and crawl again. “Mummy Walks” can be completed while kneeling or standing depending on the comfort level of the child or any injuries. The child is instructed to have arms straight out in front of body at shoulder level. The child is then instructed to walk while turning their head from left to right while keeping their arms straight. To down grade this exercise, a pool noodle or other straight item may be held by the child to help keep their arms straight while turning their head. “Lizard” is completed on the floor in prone. The child has their arms straight out at shoulder level with the head turned to the right. The child flexes the right knee and counts to ten.

The child then extends the right knee and turns their head to the left. The child flexes the left knee and counts to ten. This cycle is slowly repeated ten times.

For the integration of Spinal Galant Reflex, exercises include sitting back-to-back with a peer, sibling, or parent/caregiver, “Slow Angels,” and “Sit bone walking.” The first exercise has the child sit back-to-back with a peer, sibling, or parent/caregiver on a bed or the floor. Each person wiggles and moves their back against the other person’s back. If the parent/caregiver is unable to sit on the floor the child can sit with their back against the parent/caregiver’s legs while the parent/caregiver sits in a chair. The parent/caregiver can wiggle and move their legs while the child wiggles and moves their back. “Slow Angels” are completed in supine on a bed or on the floor. The child starts with legs straight and arms straight at their sides. As the child counts to ten they slowly spread their arms and legs out in the motion of making a “snow angel.” The child holds the end position to the count of five. As the child returns to the start position they count to ten. This cycle is repeated ten times. “Sit bone walking” is completed on the floor with the child in long sit with legs straight out in front of them. The child is instructed to lift one hip and slide that hip backwards then lower the hip to the floor. This cycle is repeated alternating hips for a distance of six feet.

For the integration of Symmetrical Tonic Neck Reflex (STNR), exercises are completed in quadruped on the floor. The exercises include “Cat/Cow,” “Puppy,” and crawling forward and backward while extending and flexing the neck. “Cat/Cow” is completed in quadruped with the child moving with each exhale and inhale. On the inhale the child tucks their chin to their chest and pretends to be a cat arching its back and on the exhale the child extends their head to look up and moves their back to a swayed position pretending to be a cow. This cycle is completed a minimum of ten times. “Puppy” is started in quadruped with the child’s head level. The child is

instructed to tuck their chin to their chest then shift their hips backward and lower their hips to their ankles with their arms outstretched. The child is then instructed to extend their head and look to the ceiling before moving their core back to the start position of quadruped. Crawling forward and backward while also extending and flexing the head is also used to integrate STNR.

The parent/caregiver information pages include information regarding how each primitive reflex is displayed in infancy, how the primitive reflex helps the infant, the timeframe the primitive reflex should be present, possible developmental delays in toddlers and older children, and how occupational therapist can help children with retained primitive reflexes. Each page is specific to one primitive reflex.

Chapter V: Summary

Discussion

Using Ecology of Human Performance ([EHP] Dunn et al., 1994) to guide the development of the retained primitive reflex screening, caregiver education, and integration exercise home program, the focus was to establish the integration of the retained primitive reflexes. Establishing the integration of the retained primitive reflexes allows the child with retained primitive reflexes to develop a larger performance range, especially within the formal educational system.

Gieysztor et al., (2018a) and Feldhacker et al (2021) identified the need for all children to complete a retained primitive reflex screening prior to the start of formal education. The results of both studies highlighted the fact that typically developing children had high percentages of retained primitive reflexes, 65 percent (Gieysztor et al., 2018a) and 100 percent (Feldhacker et al., 2021).

Some of the implications of including a retained primitive reflex screening in kindergarten screening days within school districts include identifying which retained primitive reflexes a child may have and providing integration exercises to the child and caregiver. When the integration exercises are completed regularly, the child's retained primitive reflex integrates allowing the child an increased performance range with fine and gross motor skills (Gieysztor et al., 2018a), vision (Andrich, 2018), concentration (Calvin & Ramli, 2020), and academic performance (Feldhacker et al., 2021).

Strengths of the product include the flexibility of the screening tool, the single page design for the caregiver handouts, and the step-by-step instructions with photos for the integration exercise home program.

The limitations of the product include the product being developed for one specific clinic and the possibility that the product is not generalizable, there are only three exercises per retained primitive reflex included in the integration exercise home program, and the exercises have not been adapted for children with mobility or range of motion limitations.

Recommendations for the retained primitive reflex screening tool include trialing the screening tool at other pediatric outpatient clinics to determine if the screening tool is generalizable, adding more integration exercises to the clinical and home exercise program, and adapting the exercises for children who experience mobility and range of motion limitations.

The retained primitive reflex screening tool was trialed at the DEP site. Edits followed the first trial, including the addition of an indicator line of which supine Moro reflex screening was used and progress screening indication line. The retained primitive reflex tool was again trial with satisfaction of use. The retained primitive reflex tool was used four additional times with no other edits.

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Appendix A

PRIMITIVE REFLEX SCREENING AND CAREGIVER EDUCATION AND SUPPORT. A
PRODUCT TO SUPPORT CHILDREN WITH RETAINED PRIMITIVE REFLEXES
TRANSITIONING INTO THE FORMAL EDUCATION SYSTEM

Anna J. Logan, OTDS

Retained Reflex Screening

Therapist demonstrates movements for child prior to screening

Child's Name: _____ Age: _____

Treating Therapist: _____ Date: _____

Initial Screening: _____ Progress Note (6 months): _____ Reassessment (1 year): _____

Moro Reflex

Standing

1. Child stands with feet hip width apart.
2. Ask the child to shake hands with therapist.
3. Therapist holds child's hand (in hand shaking position).
4. Ask child to look up to the ceiling and tip head back.
5. With head tipped back, ask child to tilt body backward, catching self before falling.

Observations:

Loss of balance	Yes ____	No ____
Stepping back	Yes ____	No ____
Neck and/or Trunk stiffness	Yes ____	No ____
Dilated pupils	Yes ____	No ____
Tension or Stress	Yes ____	No ____
Holding breath	Yes ____	No ____
Accessory movements	Yes ____	No ____

Details: _____

Comments: _____

Adapted from Goddard (2005), Johnson (n.d.), and Story (n.d.)

Retained Reflex Screening

Therapist demonstrates movements for child prior to screening

Child's Name: _____ Age: _____

Treating Therapist: _____ Date: _____

Initial Screening: _____ Progress Note (6 months): _____ Reassessment (1 year): _____

Tonic Labyrinthine Reflex

Standing (Therapist is either behind or to one side for safety, prepared to assist child if balance is lost)

1. Child stands with feet together.
2. Child slowly extends neck to look at ceiling.
3. Ask child to close eyes and hold position for 10 seconds.
4. Child flexes neck to look down.
5. Ask child to close eyes and hold position for 10 seconds.
6. Repeat cycle 4-6 times.

Observations:

Loss of balance/Swaying: Yes ___ No ___

Rigidity/Locked knees: Yes ___ No ___

Dizziness: Yes ___ No ___

Stress: Yes ___ No ___

Holding breath: Yes ___ No ___

Limb movement: Yes ___ No ___

Comments: _____

Retained Reflex Screening

Therapist demonstrates movements for child prior to screening

Child's Name: _____ Age: _____

Treating Therapist: _____ Date: _____

Initial Screening: _____ Progress Note (6 months): _____ Reassessment (1 year): _____

Asymmetrical Tonic Neck Reflex

Standing

1. Child stands with feet hip width apart.
2. Arms straight out in front of body at shoulder level with slightly flexed wrists.
3. Ask child to look over left shoulder and hold for 5-7 seconds.
4. Ask child to look over right shoulder and hold for 5-7 seconds.
5. Repeat cycle 3 times.

Observations:

Movement of arms or hands	Yes ____	No ____
Right _____	Left _____	Bilateral _____
Movement of trunk	Yes ____	No ____

Comments: _____

Retained Reflex Screening

Therapist demonstrates movements for child prior to screening

Child's Name: _____ Age: _____

Treating Therapist: _____ Date: _____

Initial Screening: _____ Progress Note (6 months): _____ Reassessment (1 year): _____

Spinal Galant Reflex

Standing

1. Child stands with feet hip width apart.
2. Gently but firmly, press two fingers down the child's left side of back 1-2 inches from spine.
3. Run fingers from below shoulder to lumbar region.
4. Gently but firmly, press two fingers down the child's right side of back 1-2 inches from spine.
5. Run fingers from below shoulder to lumbar region.
6. Repeat cycle once.

Observations:

Hip flexion	Yes ____	No ____
Right ____	Left ____	Bilateral ____
Back twitching	Yes ____	No ____
Right ____	Left ____	Bilateral ____
Ticklishness or Wiggling away	Yes ____	No ____

Comments: _____

Adapted from Goddard (2005), Johnson (n.d.), and Story (n.d.)

Retained Reflex Screening

Therapist demonstrates movements for child prior to screening

Child's Name: _____ Age: _____

Treating Therapist: _____ Date: _____

Initial Screening: _____ Progress Note (6 months): _____ Reassessment (1 year): _____

Asymmetrical Tonic Neck Reflex

Quadruped

1. Child moves to hands and knees.
2. Elbows should not be locked.
3. Child looks to left shoulder and holds for 5 seconds.
4. Child looks to right shoulder and holds for 5 seconds.
5. Repeat 4 cycles.

Observations:

Slight movement of arm/elbow	Yes ____	No ____
Right _____	Left _____	Bilateral _____
Full bend of elbow	Yes ____	No ____
Right _____	Left _____	Bilateral _____

Comments: _____

Retained Reflex Screening

Therapist demonstrates movements for child prior to screening

Child's Name: _____ Age: _____

Treating Therapist: _____ Date: _____

Initial Screening: _____ Progress Note (6 months): _____ Reassessment (1 year): _____

Symmetrical Tonic Neck Reflex

Quadruped

1. Child moves to hands and knees.
2. Elbows should not be locked.
3. Child tucks chin to chest and looks toward knees/floor.
4. Ask child to hold this position for 5 seconds.
5. Child moves head to look up to the ceiling.
6. Ask child to hold this position for 5 seconds.
7. Repeat 4 cycles.

Observations:

Movement of trunk Yes ____ No ____

Movement of arms Yes ____ No ____

Locking of elbows Yes ____ No ____

Right ____ Left ____ Bilateral ____

Hands and fingers flat Yes ____ No ____

Movement/Tension in legs or feet Yes ____ No ____

Comments: _____

Adapted from Goddard (2005), Johnson, (n.d.), and Story (n.d.)

Retained Reflex Screening

Therapist demonstrates movements for child prior to screening

Child's Name: _____ Age: _____

Treating Therapist: _____ Date: _____

Initial Screening: _____ Progress Note (6 months): _____ Reassessment (1 year): _____

Spinal Galant Reflex

Quadruped

1. Child moves to hands and knees.
2. Gently but firmly, press two fingers down the child's left side of back 1-2 inches from spine.
3. Run fingers from below shoulder to lumbar region.
4. Gently but firmly, press two fingers down the child's right side of back 1-2 inches from spine.
5. Run fingers from below shoulder to lumbar region.
6. Repeat cycle once.

Observations:

Hip flexion	Yes ____	No ____
Right ____	Left ____	Bilateral ____
Back twitching	Yes ____	No ____
Right ____	Left ____	Bilateral ____
Ticklishness or Wiggling away	Yes ____	No ____

Comments: _____

Adapted from Goddard (2005), Johnson (n.d.), and Story (n.d.)

Retained Reflex Screening

Therapist demonstrates movements for child prior to screening

Child's Name: _____ Age: _____

Treating Therapist: _____ Date: _____

Initial Screening: _____ Progress Note (6 months): _____ Reassessment (1 year): _____

Moro Reflex

This screening can be completed with a crash mat or other padding or with a yoga ball.

Supine on crash mat _____

1. Child lays down on crash pad with head at one end and arms near body.
2. Therapist lifts child's head about 2 inches above the crash pad.
3. Therapist will release child's head, allowing the head to drop 3-4 inches to crash pad.

Supine on a yoga ball _____

1. Therapist will stabilize a yoga ball for child to sit on.
2. Ask child to lay back on the yoga ball (while therapist continues to stabilize yoga ball) with head being upside down.

Observations:

Distress in completing screening	Yes ____	No ____
Stiffness of neck and/or trunk	Yes ____	No ____
Outward movement of arms/hands	Yes ____	No ____
Crying out	Yes ____	No ____
Stress or Tension	Yes ____	No ____
Holding breath	Yes ____	No ____

Comments: _____

Adapted from Goddard (2005) and Johnson, (n.d.)

What are Primitive Reflexes?

Primitive Reflexes are movements babies are born with or develop in the first year of life. Primitive Reflexes help the baby learn movement patterns that will be used for holding up their head, holding and playing with toys, and learning to crawl.

Primitive Reflexes include Rooting Reflex, Moro Reflex, Palmar Reflex, Asymmetrical Tonic Neck Reflex, Symmetrical Tonic Neck Reflex, and Spinal Galant Reflex.

Each reflex has a time it should be present and a time the reflex should go away (integrate) or develop into a different movement pattern. If a Primitive Reflex doesn't integrate, or go away, the Primitive Reflex will be called a Retained Primitive Reflex.

Sometimes when Primitive Reflexes don't integrate or don't go away the baby or child can have problems learning new skills. For example, if the Palmar Reflex doesn't integrate, or go away, the baby or toddler may have a hard time learning to let go of toys.

Retained Primitive Reflexes can later impact grade school children also. For example, Retained Palmar Reflex can impact handwriting. Retained Spinal Galant can lead to increased bed wetting and not being able to sit still at school.

Occupational Therapy can help children with Retained Primitive Reflex by teaching exercises that will help integrate the Retained Primitive Reflex. Many of the exercises are like movements that babies make to help the Primitive Reflexes integrate. The exercises will be completed at the clinic and the Occupational Therapist will ask you to have your child complete the exercises at home also.

Gieysztor et al. (2018a), Goddard (2005), Myott et al. (2016), Smet et al. (2020)

What is Moro Reflex?

Moro Reflex is also called the Startle Reflex.

What does Moro Reflex look like in a baby? Moro Reflex is seen when a baby's head drops back unexpectedly when the baby is on their back. The baby will spread their arms out then quickly bring them back to their chest and cry.

How does Moro Reflex help a baby? Scientists believe Moro Reflex helps the baby call for help from mom, dad, or other caregiver when they have been scared.

When is Moro Reflex present in a baby? Moro Reflex is present at birth.

When does Moro Reflex integrate or go away? Moro Reflex usually integrates when the baby is 4 to 6 months old. If Moro Reflex doesn't integrate it is called Retained Moro Reflex.

What happens if Moro Reflex doesn't integrate or go away? If Moro Reflex doesn't integrate in the normal time or after the baby is 6 months old, the baby may take longer in learning new movement patterns called Righting Reflexes. Righting Reflexes help a toddler catch themselves when they might be falling over from sitting or standing. One Righting Reflex is a toddler putting their hand out to catch themselves from falling over when they are sitting on the floor. Older children may continue to be frightened easily and may be overly sensitive to sensory input.

How can occupational therapy help Retained Moro Reflex? An occupational therapist, or OT, will help your child learn exercises that help Retained Moro Reflex integrate or go away. Some of these exercises are called "Starfish" and "Egg." The OT will ask you to have your child do these exercises at home also. You will receive a second paper with directions for the exercises.

Goddard (2005), Johnson (n.d.), Myott et al. (2016), Smet et al. (2020), Story & Kane (n.d.)

What is Spinal Galant Reflex?

What does Spinal Galant Reflex look like in a baby? Spinal Galant Reflex is seen when a baby is on their stomach and one side of the back is stroked from the shoulder blade to just above the hip, the baby will flex or curl their body to the side stroked or stimulated.

How does Spinal Galant Reflex help a baby? Spinal Galant Reflex helps a baby move down the birth canal during the birthing process.

When is Spinal Galant Reflex present in a baby? Spinal Galant Reflex is present at birth.

When does Spinal Galant Reflex integrate or go away? Spinal Galant Reflex usually integrates when the baby is 3 to 9 months old. If Spinal Galant Reflex doesn't integrate it is called Retained Spinal Galant Reflex.

What happens if Spinal Galant Reflex doesn't integrate or go away? If Spinal Galant Reflex doesn't integrate in the normal time or after the baby is 9 months old, the baby may take longer in learning to crawl and later learning to potty train. Older children may have trouble with wetting the bed and sitting still in class at school.

How can occupational therapy help Retained Spinal Galant Reflex? An occupational therapist, or OT, will help your child learn exercises that help Retained Spinal Galant Reflex integrate or go away. Some of these exercises are called "Slow Angels" and "Bottom Walking." The OT will ask you to have your child do these exercises at home also. You will receive a second paper with directions for the exercises.

Goddard (2005), Johnson (n.d.), Myott et al. (2016), Smet et al. (2020), Story & Kane (n.d.)

What is Tonic Labyrinthine Reflex?

Tonic Labyrinthine Reflex is often referred to by the initials TLR.

What does TLR look like in a baby? TLR is seen when a baby's head is moved forward (flexion) the arms and legs move in toward the trunk. This position is also known as the Fetal Position. TLR is also seen when a baby's head is moved backwards (extension) and the arms and legs straighten out.

How does TLR help a baby? TLR helps a baby learn how to move against gravity after birth, helps develop muscle tone, helps the baby learn to control their head movements, and learning where their body is in space (Proprioception).

When is TLR present in a baby? TLR is present at birth.

When does TLR integrate or go away? TLR Flexion usually integrates when the baby is 4 to 6 months old. TLR Extension usually integrates when the child is between 3 and 4 years old. If TLR doesn't integrate it is called Retained TLR.

What happens if TLR doesn't integrate or go away? If TLR doesn't integrate in the normal time or after the baby is 6 months old, the baby may take longer in learning to move to their side, learning to roll over, and learning to crawl. Older children may have problems with balance and Proprioception.

How can occupational therapy help Retained TLR? An occupational therapist, or OT, will help your child learn exercises that help Retained TLR integrate or go away. Some of these exercises are called "Fly to the Moon" and "Superman." The OT will ask you to have your child do these exercises at home also. You will receive a second paper with directions for the exercises.

Goddard (2005), Johnson (n.d.), Myott et al. (2016), Smet et al. (2020), Story & Kane (n.d.)

What is Asymmetrical Tonic Neck Reflex?

Asymmetrical Tonic Neck Reflex is often referred to by the initials ATNR. Asymmetrical Tonic Neck Reflex is sometimes called the Archer pose.

What does ATNR look like in a baby? ATNR is seen when a baby's head is turned to right and the right arm straightens, and the right leg straightens. At the same time the baby's left elbow and left knee will bend. When the baby's head is turned to the left, the left arm and leg straighten, and the right elbow and knee will bend.

How does ATNR help a baby? ATNR helps a baby move down the birth canal during the birthing process. ATNR also helps a baby learn reaching movements and the beginning of eye-hand coordination.

When is ATNR present in a baby? ATNR is present at birth.

When does ATNR integrate or go away? ATNR usually integrates when the baby is 4 to 6 months old. If ATNR doesn't integrate it is called Retained ATNR.

What happens if ATNR doesn't integrate or go away? If ATNR doesn't integrate in the normal time or after the baby is 6 months old, the baby may take longer in learning to crawl and learning to pass a toy between their hands. Older children may have trouble with riding a bike and copying information from whiteboards in school.

How can occupational therapy help Retained ATNR? An occupational therapist, or OT, will help your child learn exercises that help Retained ATNR integrate or go away. Some of these exercises are called "Lizard" and "Mummy Walks." The OT will ask you to have your child do these exercises at home also. You will receive a second paper with directions for the exercises.

Goddard (2005), Johnson (n.d.), Myott et al. (2016), Smet et al. (2020), Story & Kane (n.d.)

What is Symmetrical Tonic Neck Reflex?

Symmetrical Tonic Neck Reflex is often referred to by the initials STNR.

What does STNR look like in a baby? STNR is seen when a baby is on their hands and knees and looks down to the floor, the baby's arms will bend and their legs will straighten. When a baby is on their hands and knees and looks up, the baby's arms will straighten and their hips will sink to their ankles.

How does STNR help a baby? STNR helps a baby prepare for crawling. STNR also helps a baby's vision, learning to use far vision when their head is up and near vision when they are looking down.

When is STNR present in a baby? STNR is present from 4 to 6 months old.

When does STNR integrate or go away? STNR usually integrates when the baby is 9 to 12 months old. If STNR doesn't integrate it is called Retained STNR.

What happens if STNR doesn't integrate or go away? If STNR doesn't integrate in the normal time or after the baby is 12 months old, the baby may take longer in learning to crawl and coordinating their upper body and lower body. Older children may have trouble with posture and eye-hand coordination.

How can occupational therapy help Retained STNR? An occupational therapist, or OT, will help your child learn exercises that help Retained STNR integrate or go away. Some of these exercises are called "Cat/Cow" and "Giraffe." The OT will ask you to have your child do these exercises at home also. You will receive a second paper with directions for the exercises.

Asymmetrical Tonic Neck Reflex (ATNR) Integration Exercises

Crawling with toy tucked between chin and shoulder

Find a soft, squishy toy.

Start on your hands and knees.

Put the toy on your **right** shoulder and hold the toy there with your chin.

As you hold the toy between your chin and shoulder crawl about 10 feet.

Put the toy on your **left** shoulder and hold the toy there with your chin.

As you hold the toy between your chin and shoulder crawl about 10 feet.

Repeat this cycle 4 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Asymmetrical Tonic Neck Reflex (ATNR) Integration Exercises

Lizard

Lay on your stomach on the floor.

Turn your head to the **left**.

Move your arms so that they are straight out from your shoulders.

Bend your **left** knee and slide it to hip height.

Turn your head to the **right**.

Lower your **left** knee down.

Bend your right **knee** and slide it to hip height.

Turn your head to the **left**.

Lower your **right** knee down.

Repeat this cycle 20 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Asymmetrical Tonic Neck Reflex (ATNR) Integration Exercises

Mummy Walk

Start on your knees.

Move your arms straight out in front of you at your shoulders.

As you “walk” on your knees look to the left then to the right.

Keep your arms straight as you turn your head.



Option #2 Holding a straight object

Start on your knees.

Hold a straight object, like a pool noodle or a baton, in your hands.

Move your arms straight out in front of you at your shoulders.

As you “walk” on your knees look to the left then to the right.

Keep your arms straight as you turn your head.

Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Moro Reflex Integration Exercises

Starfish

Sit in a chair or beanbag.

Tuck your chin to your chest.

Cross your arms across your chest making an “X” with **right** wrist on top of left wrist.

With bent knees, cross your ankles with **right** ankle on top of left ankle.

Stay in this position and count to 10.

As you breathe out tilt your head back, reach out and up with your arms, and stretch out your legs. You look like a star!

Stay in this position and count to 10.

Move back to start position with tucked chin, arms crossed with **left** wrist on top of right wrist, and **left** ankle on top of right ankle.

Continue alternating right wrist and ankle on top then left wrist and ankle on top for a total of 20 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Moro Reflex Integration Exercises

Rocking Egg

Sit on the floor with your knees bent and feet on the floor.

Wrap your arms around your knees.

Tuck your chin to your chest.

Roll backwards onto your back.

Keeping your momentum roll back up to sitting.

Roll back and forth 20 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Moro Reflex Integration Exercises

Superman/Banana

Lay on your stomach on the floor.

As you breathe in lift your chest, arms, and legs off the floor. You look like Superman! Count to 10.

As you breathe out lower your chest, arms, and legs back down to the floor.

Roll over on to your back.

As you breathe in lift your head, arms, and legs off the floor. You look like a banana! Count to 10.

As you breathe out lower your head, arms, and legs back to the floor.

Continue switching from your stomach to your back 20 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Spinal Galant Reflex Integration Exercises

Sitting Back-to-Back with Someone

Sit on the floor or on a bed.

Sit with your back touching someone else's back. Or a giant stuffed animal like in the picture.

You each will move your back, wiggling around.

Work up to 3 minutes.



Option #2 Sit against someone's legs

Sit on the floor while the other person sits in a chair.

Sit with your back touching the other person's legs.

As you wiggle your back around, the other person will move their legs up and down or side to side while keeping contact with your back.

Work up to 3 minutes.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Spinal Galant Reflex Integration Exercises

Slow Angels

Lay on your back on the floor.

As you count to 10, **slowly** move your arms and legs as if you are making a Snow Angel.

Hold your arms and legs stretched out as you count to 10.

As you count to 10, **slowly** move back to the start position.

Complete this cycle 20 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Spinal Galant Reflex Integration Exercises

Sit Bone Walking

Sit on the floor with your legs stretched out in front of you.

Shift your weight to the left side.

Lift up your right hip.

Move your right hip backwards.

Lower your right hip to the floor.

Shift your weight to the right side.

Lift up your left hip.

Move your left hip backwards.

Lower your left hip to the floor.

Keep “walking” for a distance of 6 feet.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Symmetrical Tonic Neck Reflex (STNR) Integration Exercises

Cat/Cow

Start on your hands and knees.

As you breathe in tuck your chin to your chest and arch your back like a Cat.

As you breathe out look up and let your back and stomach sink toward the floor to look like a Cow.

Change back to Cat as you breathe in and back to Cow as you breathe out.

Repeat this cycle 20 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Symmetrical Tonic Neck Reflex (STNR) Integration Exercises

Puppy

Start on your hands and knees.

Tuck your chin to your chest.

Sink your hips back toward your ankles.

Hold as you count to 3.

Look up.

Slowly move back to the start position of hands and knees.

Repeat this cycle 10 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Symmetrical Tonic Neck Reflex (STNR) Integration Exercises

Crawling Forward and Backward Looking Up and Down

Start on your hands and knees.

As you crawl forward look up to the ceiling and then down to the floor.

Crawl about 10 feet forward looking up and down.

Crawl backward looking up to the ceiling and then down to the floor.

Crawl about 10 feet backward looking up and down.

Repeat this cycle 4 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Tonic Labyrinthine Reflex (TLR) Integration Exercises

Activities on your stomach (prone)

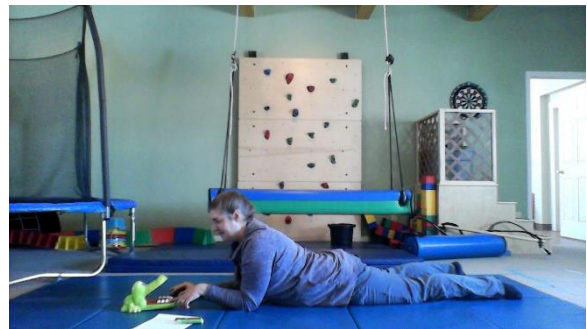
Lay on your stomach to do an activity.

Color a picture.

Play a game.

Build Legos.

Do homework.



Adapted from Goddard (2005), Johnson (n.d.), and
Story & Kane (n.d.)

Tonic Labyrinthine Reflex (TLR) Integration Exercises

Sphinx

Lay on your stomach on the floor.

As you breathe in lift your head and chest off the floor.

Bring your elbows under your shoulders.

Your forearms and hands will be flat on the floor.

Hold this position and count to 10.

If you need a break, lie flat on the floor and count to 10.

Repeat this cycle 10 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)

Tonic Labyrinthine Reflex (TLR) Integration Exercises

Superman

Lay on your stomach on the floor.

As you breathe in lift your head, arms, and legs off the floor. You look like Superman!

Count to 10.

Let your head, arms, and legs rest on the floor.

Count to 10.

Repeat this cycle 10 times.



Adapted from Goddard (2005), Johnson (n.d.), and Story & Kane (n.d.)