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The Effects Of Retained Primitive Reflexes On Students' Occupational And Academic Performance In The School Setting

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THE EFFECTS OF RETAINED PRIMITIVE REFLEXES ON STUDENTS' OCCUPATIONAL AND ACADEMIC PERFORMANCE IN THE SCHOOL SETTING

by

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This scholarly project, submitted by Molly Banks 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.

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Faculty Advisor

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Molly Banks
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ABSTRACT

Primitive reflexes (PR) are survival responses necessary for infants' health and safety and are the foundation for higher motor skills (Desorbay, 2013). While they usually integrate a year after birth, there are instances when these reflexes stay retained. The retention of PRs often indicates a higher probability of a disruption/delay in motor and cognitive-emotional development. This disruption/delay can be observed in a school setting and can negatively impact a student's academic performance and behavior in school. There is significant research on the impact of retained primitive reflexes (RPR), but there is a gap in research about effectively implementing reflex integration into the classroom. Additional research has also found that many educators would benefit from education on RPRs, as many are unaware of RPRs and their effects on students (Bilbilaj et al., 2017; Melillo et al., 2020).

This project aims to promote awareness of the effects of RPRs in a school setting. School-based occupational therapists can work with students with RPRs as they possess the medical and background knowledge on how RPRs affect the body and have a dense understanding of fine and gross motor skills development. Additionally, they can analyze how delays in typical development caused by the effects of RPRs interfere with occupations (or everyday activities), including school tasks. This project intends to provide resources for school-based occupational therapists to use and educate, empower, and give teachers to understand, identify, and help integrate RPRs to improve students' academic performance.

CHAPTER 1

Introduction

Primitive reflexes (PR) are survival responses necessary for infants' health and safety. The purpose of these reflexes is to help with the delivery process and a child's first movements and future voluntary motor skills (Desorbay, 2013; Pecuch et al., 2020). These reflexes should integrate into the central nervous system as a child's brain and body mature and higher motor skills develop (Chandradasa & Rathnayake, 2020). However, there are instances when these reflexes do not integrate, and depending on the degree of retention, the effects can disrupt future motor and cognitive-emotional development (Gieysztor, Choińska, et al., 2018; Pecuch et al., 2020, 2021). This disruption/delay in motor and cognitive-emotional development can also affect the child later in life once they start attending school, impacting their academic performance and behavior in school.

The problem addressed by the project lies in the school system, as many educators are not aware of retained primitive reflexes (RPRs) and how their symptoms affect children (Melillo et al., 2020). Students who are already receiving services through the school may be working on reflex integration. However, the students who do not require additional services or are eligible for additional services and/or supports can also be experiencing RPRs but not receive any help because the retained reflexes are not detected. Additionally, the symptoms of RPRs mimic the symptoms of learning disorders seen in a school setting. This list includes attention deficit hyperactivity disorder, autism spectrum disorder, and dyslexia (Bilbilaj et al., 2017; Sigafoos et al., 2021). Due to the similarities in symptoms, educators can often believe the child with RPRs has a behavioral problem or learning disorder. This commonality has led research to support

early and routine screening for RPRs in school to integrate reflexes early and reduce the effects of the RPRs (Goddard Blythe et al., 2021; Hickey & Feldhacker, 2021; Pecuch et al., 2021).

This scholarly project, *The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting*, aims to promote awareness of the effects of retained primitive reflexes in a school setting. In addition, this project intends to provide resources for school-based occupational therapists to use and educate, empower, and give teachers the resources needed to understand, identify, and help integrate retained primitive reflexes to improve students' academic performance. Through this scholarly project, this author hopes to educate staff and improve students' school experience by integrating RPRs. Steps to meet this goal will involve researching the best methods for integrating RPRs in a school-based setting and collaborating with school staff to develop a reflex integration program that occupational therapists and teachers can use inside and outside the classroom.

The Ecology of Human Performance (EHP) model was used as a lens to analyze the literature and guide this project (Dunn et al., 1994). This model uses commonly used terms, is designed to be inter-professional, and entails specific intervention approaches (establish/restore, adapt/modify, alter, prevent, and create) (Dunn, 2017). Several of those interventions were used while developing the resources/tools for this project. Examples include creating resources and tools for occupational therapists and educators to establish higher-level motor and behavioral skills, prevent disruptive behaviors and developmental delays, and for educators to possibly adapt/modify their classroom schedule or routine to incorporate reflex integration. The common goal of using these resources/tools is to improve students' performance range (Dunn, 2017). According to this model, the goal is to maximize a person's performance range, which fits the purpose of this project; educate/inform educators on RPRs so they can incorporate reflex

integration strategies into a classroom setting to improve students' academic performance and behavior(s) (Dunn, 2017).

Chapter II contains findings from an extensive literature review conducted to establish the resources/tools created for this project. The conclusions of the literature review were located using library databases, textbooks, conversations with licensed occupational therapists, and other educational materials to provide information about the role of occupational therapy in the school context and the effects of RPRs, specifically in a school setting. The specific areas in the literature review included an overview of primitive reflexes, the impact of RPRs on academic performance at school, changes in the school system, occupational therapy in a school-based setting, RPRs, and related disorders, and reflex integration programs. Chapter III describes the methodology used in developing the resources/tools, and Chapter IV contains more detailed information on the resources/tools. Lastly, Chapter V concludes this project with a final summary of the project, limitations of the project, implications for occupational therapy practice, future recommendations, and strengths and limitations of the project.

Chapter II

Literature Review

Primitive reflexes (PR) are necessary involuntary survival responses designed for infants' health and safety. They develop during fetal life as they are responsible for helping facilitate child delivery, a baby's first movements after birth, and providing the foundation for future voluntary motor skills (Desorbay, 2013; Pecuch et al., 2020). The responses from the reflexes arise by either proprioceptive, tactile, or vestibular stimulation (Smet & Lucas, 2020). The onset and inhibition of each reflex are related to age. However, most PRs will spontaneously integrate after one year of birth as higher motor skills develop and aid with balance, posture, and coordination (Desorbay, 2013; Pecuch et al., 2020, 2021). However, when they do not fully integrate, there is a potential risk for future motor and cognitive-emotional developmental problems (Gieysztor, Choińska, et al., 2018; Konicarova & Bob, 2013; Pecuch et al., 2020). These potential problems associated with retained primitive reflexes (RPR) can affect a student's academic performance in school. These effects include behaviors and limitations of movements that impact specific classroom tasks. This literature review aims to understand the symptoms of RPRs and their impact on elementary school-aged children in a school setting. Evidence from the literature will include strategies for occupational therapy-based interventions regarding integrating RPRs, within school-based settings.

Occupation Based Model

The Ecology of Human Performance (EHP) model guided this scholarly project as it is designed to be used with interdisciplinary teams and uses common, everyday language (Dunn et al., 1994). EHP includes three constructs: person, context, and task, and together those constructs affect an individual’s overall performance range, or the range of tasks an individual can do based

on three constructs (Dunn, 2017). This model can be used as a lens to analyze the research and its relation to the model's constructs and concepts (person, context, task, and performance range). Specifically, how classroom tasks are affected by the RPRs, how RPRs correlate to various contexts in the school setting (physical, social, temporal, and cultural), and how teaching beliefs and styles affect a child with RPRs school experience and academic performance.

Overview on Primitive Reflexes

Reasons for Retainment

There are several reasons why PRs may not integrate or resurface. One possible cause is not having enough movement in early childhood (Story, n.d.-a). While devices such as plastic carriers, propping carriers, and swings can be convenient, they can also restrict movement by the child. If a child spends a great deal of time on those types of devices, they do not have the opportunity to move independently and develop higher motor skills. Retainment can be detrimental as brain development needs physical activity. Other possible causes may include stress from pregnancy, chronic stress, illness, trauma, or an injury (i.e., a traumatic brain injury) (Chandradasa & Rathnayake, 2020; Story, n.d.-a). However, this is still an area that needs more research.

Types of Primitive Reflexes

There are numerous PRs, but six associated with needing integration and interfering with academic performance were included in this project. These reflexes include the Asymmetrical Tonic Neck Reflex (ATNR), Symmetrical Tonic Neck Reflex (STNR), Tonic Labyrinthine Reflex (TLR), Spinal Galant Reflex (SGR), Moro Reflex, and Palmar Reflex. There are various ways to test for active PRs in children depending on age and developmental stage. The testing involves using distinct movements to determine if a PR is retained or not. The ATNR is present

at birth and typically integrates around three to nine months after birth. This reflex is observed when a child's head turns to one side, the arm on that same side straightens, and the arm on the other side bends. This reflex helps with future cross pattern movements, hand-eye coordination skills, and developing muscle tone (Chandradasa & Rathnayake, 2020; Story, n.d.-a).

STNR appears six to nine months after birth and integrates around nine to eleven months (Pecuch et al., 2021). This retained reflex can be seen in infancy when their upper limbs extend and their lower limbs flex due to the baby's head tilting back; the opposite will occur when the head flexes down (their upper limbs flex and their lower limbs extend). It prepares babies for crawling by promoting head control/and lifting their heads (Chandradasa & Rathnayake, 2020). TLR is present at birth and integrates approximately four to six months after birth. This retained reflex can be seen in infancy when a baby is lying on their back, and their head is tilted back, their back arches, legs straighten, and arms bend at the elbows. This reflex aims to control the neck and head and improve balance and muscle tone (Chandradasa & Rathnayake, 2020).

The SGR appears at birth and integrates around six months after birth. When this reflex is active in the later stages of infancy and early childhood, it can be checked by stroking a side of a baby's back. The reflex is still active if the baby flexes to the stroked side (Chandradasa & Rathnayake, 2020). The SGR works alongside the ATNR to aid the baby down the birth canal. It also helps with the balance and coordination of the body for creeping/crawling (Story, n.d.-a). The Moro reflex (also known as the startle reflex and fight or flight reaction) is present at birth and typically integrates around four to six months after birth (Chandradasa & Rathnayake, 2020; Smet & Lucas, 2020). This reflex is active when a baby extends their arms and legs (and most likely cry) in response to a sudden movement or if they experience a sudden sensory stimulus (loud noise or bright light) (Chandradasa & Rathnayake, 2020). Lastly, the Palmar reflex is also

present at birth and integrates approximately six months after birth. This retained reflex can be seen in infancy and early childhood when a child flexes their fingers around an object placed in their palm to grab it. This reflex is a precursor for voluntary grabbing and holding objects (Chandradasa & Rathnayake, 2020).

The Effects of Retained Primitive Reflexes on Academic Performance at School

Children who have RPRs spend a great deal of energy and concentration trying to control the effects of the retained reflex(es), which affects their learning abilities and behaviors (Desorbay, 2013). The outcomes of the RPRs may present in different ways depending on the reflex and level of retainment, which impacts specific classroom tasks and academic performance. The results/symptoms of RPRs can also be seen in many different contexts in the school setting (i.e., the classroom, hallway, playground, lunchroom, gym, etc.). The overall impact of the RPR(s) affects students(s), educators, classmates/peers, and families. The effects of the RPR(s) can make it difficult for teachers to teach subjects associated with RPRs (handwriting, reading, and mathematics) (Chandradasa & Rathnayake, 2020; Bilbilaj et al., 2017). The RPR effects can also make it difficult for the student to play with peers (especially games that involve throwing and catching balls if they have a retained STNR) or make friends, as anxiety and emotional dysregulation are symptoms of RPRs. Lastly, poor academic performance may cause stress on families.

Research has indicated that postural deformities may be due to a retained ATNR. A child with an active ATNR will have difficulty isolating their head and arm movements. This impairment will result in poor eye tracking, difficulty crossing the visual midline, and poor hand-eye coordination (Chandradasa & Rathnayake, 2020). Specific classroom tasks that may be affected include learning how to read and write, telling time, and left-right confusion. Gieysztor,

Sadowska, et al. (2018) looked at the relationship between trunk asymmetry and RPRs. They found that RPRs (specifically ATNR and SGR) correlated to trunk rotation and body posture, indicating that RPRs impact trunk rotation and scoliosis. The detection and integration of those specific PRs may help prevent scoliosis and other possible physical developmental setbacks.

A retained STNR is associated with the following symptoms: poor posture, impaired hand-eye coordination, copying something from the board, difficulty writing with a writing utensil, and difficulty focusing on a task and sitting still (Chandradasa & Rathnayake, 2020; Bilbilaj et al., 2017; Gieysztor, Choińska, et al., 2018). These symptoms can affect a student's performance in the classroom as students are required to sit still, read/write, and focus/listen to their teacher(s). Additionally, if a child has a retained STNR, it may appear as a child does not enjoy games that require catching a ball, and they also may find learning how to swim difficult (Chandradasa & Rathnayake, 2020).

The retention of the TLR may result in poor balance and difficulties with muscle tone, spatial skills, control of eye movements, and following directions (Andrich et al., 2018; Chandradasa & Rathnayake, 2020; Gieysztor, Choińska, et al., 2018). Symptoms of a retained TLR may present in a child having difficulties copying a sentence off the board onto a piece of paper, reading, and making careless mistakes (Andrich et al., 2018; Pecuch et al., 2021). A retained SGR is often associated with fidgeting while sitting/restlessness, poor concentration, and short-term memory (Desorbay, 2013). Poor concentration and short-term memory can affect all school subjects as students need to concentrate on the teacher while they are teaching and remember instructions/directions.

A retained Moro reflex is associated with poor impulse control, sensory overload, anxiety, and social immaturity (Harsanyi et al., 2020). These symptoms can affect how the child

interacts with peers and reacts to school assignments and environment. A sensory overload experience occurs through different sensory experiences in various school contexts (i.e., an abundance of noises in the classroom, lunchroom, playground, bright lights, too much movement, etc.). Lastly, the Palmar reflex may result in a poor pencil grip and manual dexterity and speech articulation/mouth movements when writing if it is retained (Desorbay, 2013). Problems with pencil grip and manual dexterity will affect a child's ability to complete tasks effectively. Handwriting and fine motor skills, in general, are essential skills for school success as students will be expected to either use a pen or pencil to write on assignments or write papers or type on a computer throughout their academic career.

There has been little research on the number of RPRs that must be active for motor or cognitive impairments to be present. However, one study by Gieysztor et al. (2020) found that just one active ANTR could affect the pelvic symmetry (motor impairments) of the participants (elementary school-aged children). Another study found that even if children have one RPR, there may only be a problem if several PRs are actively present (Pecuch et al., 2020). One RPR is not always associated with developmental deficits or a neurodevelopmental disorder, and it may spontaneously integrate with age due to minor degrees of retention (Chandradasa & Rathnayake, 2020; Gieysztor et al., 2017). RPRs may be present but have minor degrees of retention, allowing the reflex to go unnoticed (Chandradasa & Rathnayake, 2020). While one RPR may not detrimentally impact a child's motor, sensory, or cognitive development, it still may have some impact. However, due to the lack of research, there needs to be more research conducted on this topic.

Retained Primitive Reflexes and Disorders

ADHD

The symptoms of the RPRs, previously mentioned, closely align with symptoms of attention deficit hyperactivity disorder (ADHD). The symptoms of ADHD include frequent inattention or hyperactivity/impulsivity behaviors. Those behaviors may negatively affect functioning and development (National Institute of Mental Health, 2021). While this may not be the case for every diagnosis of ADHD, the ADHD deficits may be due to RPRs or the resurface of PRs (Bob et al., 2021). According to the Centers for Disease Control and Prevention (CDC), approximately 9.4% of children aged 2-17 years old (6.1 million) have been diagnosed with ADHD (Centers for Disease Control and Prevention [CDC], 2021). The CDC also reported that 6 in 10 who had an ADHD diagnosis also had a mental, emotional, or behavioral disorder (CDC, 2021).

The correlation between RPRs and ADHD may also stem from research supporting the delay in brain maturation, which affects the ability of PRs to integrate and may cause ADHD symptoms to arise (Sripada et al., 2014). Konicarova and Bob (2013) found that a persisting ATNR may correlate to ADHD symptoms. Those ADHD symptoms "may present a compensation of unfinished or delayed developmental stages related to diminishing ATNR" (p. 768) which results in developmental balance and coordination deficits (Konicarova & Bob, 2013). A recent study found that "ADHD development in boys and girls is related to neurologically different developmental pathways that specifically influence disinhibition of ATNR [in] girls and STNR in boys" (Bob et al., 2021, p. 4). These results may stem from gender differences in brain maturation, but the authors noted there needs to be more research on this topic (Bob et al., 2021).

Learning Disabilities

There is starting to be more research that supports the correlation between RPRs and ADHD. Children with a diagnosed learning disorder (autism spectrum disorder (ASD), dyslexia, ADHD, and an oral disorder) or cerebral palsy are more likely to have higher levels of RPRs compared to children without a diagnosed learning disorder (Bilbilaj et al., 2017; Sigafoos et al., 2021). Children with ASD may have RPRs as there is a reduction in their cortical, top-down inhibition in the brainstem (where PRs are often found) (Shaw & Soto – Garcia, 2021). STNR has been linked to dyslexia as this reflex involves difficulties with accommodation (the eye's ability to focus). It is not uncommon for children with a retained STNR to experience tunnel vision, convergence problems, and have eye strain when reading (Bilbilaj et al., 2017). However, research has also shown that a reduction in RPRs is likely to increase academic performance, specifically in mathematics and listening comprehension, and reduce symptoms in diagnoses (Melillo et al., 2020).

Sensory Disorders

Sensory disorders may also correlate to RPRs as each PR corresponds to at least one of the senses (taste, touch, smell, vision, hearing, and proprioception). Therefore, if a PR is active, the corresponding sense may be affected as well (i.e., ATNR affects eye tracking and coordination (vision) and can lead to a sensory disorder (Bilbilaj et al., 2017). Pecuch et al. (2020) researched what parents noticed types of sensory disorders (if any) were present along with RPRs. They found a strong association between retained reflex activity and sensory disorders, including dyspraxia, sensory-vestibular disorders, and postural disorders (Pecuch et al., 2020).

Academic Performance and the Use of Screening

It is critical to consider how RPRs affect a child's academic performance as children spend a great deal of time at school (approximately 35 hours a week). Additionally, there are relationships between high retention rates of RPRs and poor academic performance (Feldhacker et al., 2021). Feldhacker et al. found that every one of 24 kindergartners and 29 first graders assessed had at least one RPR (2021). Previous research has also found that many preschool-aged children had at least one RPR (Goddard Blythe et al., 2021; Hickey & Feldhacker, 2021). Those results have led to many researchers recommending and supporting early and routine screening for RPRs in schools (specifically aimed at preschool-aged children). The purpose behind the screening is to integrate any retained reflexes early, reduce the behaviors and effects of the RPRs, and facilitate better integration into a school setting (especially for preschool and kindergarten students) (Goddard Blythe et al., 2021; Hickey & Feldhacker, 2021; Pecuch et al., 2021). Screening for RPR would be a preventative measure and serve as a holistic measure of addressing client care (Feldhacker et al., 2021).

Additionally, providing education to educators would be beneficial, as research has found a lack of information/resources on RPRs provided in educational systems and a lack of overall knowledge on PRs (Bilbilaj et al., 2017; Melillo et al., 2020). This research indicates many educators also are not aware of the RPRs and their effects on students (Melillo et al., 2020). Bringing this information to educators' attention would help them understand the certain behaviors and actions often associated with RPRs. Occupational therapists are qualified to educate and inform individuals on this topic as they know the reflexes, their effects, and how they affect students in a school setting. An occupational therapist could educate educators and administrators through an in-service and provide them with relevant information.

Changes in the School System

RPRs could potentially have a detrimental effect on academic performance/success. The symptoms of RPRs may also be more noticeable in early childhood and elementary school students as curriculums and priorities have shifted over the past 20 years. School readiness policies have increasingly emphasized implementing more academic content early on. These policies have reduced time and resources on non-academic content (i.e., recess, free play, physical education, and the creative arts) and have ultimately served as a barrier (Ginsburg, 2007; Hustedt et al., 2018). However, despite a more academic-driven focus, not all educators agree with that prioritized direction. In a survey given out in 2018, teachers "consistently ranked self-help and social-emotional skills as higher priorities than academic skills" (Hustedt et al., 2018, p. 62). These skills, self-help, social-emotional, and other similar skills, can be developed through play.

Play is a crucial part of childhood development and holds many benefits. There are many opportunities for play in a school context (i.e., the physical context includes the classroom, gym, and playground, the social context includes classmates/peers, and the temporal context consists of the time of day (recess or gym)). A few benefits include healthy brain development, learning how to work in groups, resolving conflicts, learning self-advocacy skills, and practicing decision-making skills (Ginsburg, 2007).

Occupational Therapy in a School Based Setting

In a general sense, occupational therapy (OT) helps people of all ages develop the skills they need to succeed in life, learn, work, or play. OT's role and focus may shift depending on the setting. OT has the unique opportunity to work on academic and non-academic outcomes in a school-based setting with students. These outcomes include "social skills, math, reading and writing, behavior management, recess, participation in sports, self-help skills,

prevocational/vocational participation, transportation, and more" (American Occupational Therapy Association, 2016, para 1). Occupational therapists can work on those outcomes and plan relevant interventions as experts in activity and environmental analysis (American Occupational Therapy Association, 2016). OT provides various types of services in school and works with students in different ways depending on the needs of the students. These include services for students struggling to learn in general and special education classes, providing training and resources for school staff and families, and partnering with teams (i.e., IEP meetings) and districts (American Occupational Therapy Association, n.d.).

OT works with many different populations in the school setting. Part of which is determined by legislation. Individuals with Disabilities Education Act (IDEA) is one legislative act that "requires that states and public education educational agencies provide a [free appropriate public education] to children with disabilities in the [least restrictive environment]" (Cahill & Bazyk, 2020, p. 628). OT falls under Part B of IDEA, as it is a related service and plays a role in the inter-disciplinary team that coordinates students' individualized education programs (Cahill & Bazyk, 2020). To be eligible for IDEA, the student must have a disability defined by the disability categories in IDEA. Another legislative act that plays a role in the school setting is Section 504 of the Rehabilitation Act of 1973. This act aimed to "ensure nondiscrimination against children with disabilities in public school" (Cahill & Bazyk, 2020, p. 630). Section 504 is similar to IDEA but is broader and allows students who do not meet the criteria for IDEA to be eligible for Section 504. Lastly, the Every Student Succeeds Act (ESSA) replaced No Child Left Behind. This act "allows local education agencies to establish their own accountability goals and monitoring systems, which may be less reliant on standardized assessments as a single measure of performance or improvement that was required under NCLB"

(Cahill & Bazyk, 2020, p. 603). One part of ESSA requires all schools to adopt academic standards. Many schools adopted the Common Core Standards (CCS), a set of goals and expectations for students in grades kindergarten through 12 in math, English, and language arts/literacy, to promote college and career readiness (Cahill & Bazyk, 2020).

There are also parts of the legislation that allow students in general education classes who are not eligible for special education or have a disability but still require academic or behavioral support for school participation. These parts of legislation include early intervening services (EIS), which allow that particular population to receive services while in school. EIS is commonly provided through Response to Intervention (RTI). RTI is a process that determines the level of support a student may need, most often implemented through the Multi-Tiered Systems of Support (MTSS). MTSS is used to determine the required level of support and address the needs early on to reduce the potential for future problems. There are three tiers used in this system: tier 1 services are for the entire student body (universal and core instruction), tier 2 services are designed for at-risk students and involve more targeted interventions, and tier 3 services are intensive interventions designed for individuals (Cahill & Bazyk, 2020).

Occupational Therapy and Integrating Retained Primitive Reflexes in Schools

Occupational therapists are qualified to work with students with RPRs. Occupational therapists have a dense knowledge of gross and fine motor skills development. They can analyze how delays in typical development interfere with occupations (or everyday activities). They also have a medical background/knowledge and can understand how RPRs affect students and school tasks. Along with knowing integration activities and exercises, occupational therapists can help integrate the RPRs and improve students' performance range in school (Dunn, 2017). Furthermore, occupational therapists in a school setting can analyze the various contexts in a

school setting, understand how RPRs affect students, and educate teachers, administrators, and other school personnel on RPRs and their effects on students.

RPRs affect many school contexts, including physical, social, temporal, and cultural (Dunn, 2017). Physical contexts include aspects of the physical environment. Tasks that may be affected by RPRs in the physical context could include a student fidgeting at his desk or sitting in a slouched position at his desk or at lunch (Desorbay, 2013). Additionally, a student could demonstrate having poor balance and coordination skills and walking with an uneven gait in the hallway or classroom (Chandradasa & Rathnayake, 2020; Desorbay, 2013). The social context includes any social interaction a student may have with someone in school. This context can consist of family, friends, classmates, teachers, principals, custodians, etc. Within the social context, tasks that are affected by RPRs include playing games with peers that involve throwing or catching a ball or difficulty following directions/paying attention to the teacher (Chandradasa & Rathnayake, 2020; Desorbay, 2013; Story, n.d.-a).

The primary focus of the temporal context is time, and in a school-based setting, this may include aspects such as the developmental stage of the student, time of year, time of classes, or length of classroom breaks. Examples of how RPRs in the temporal context include not reading at their grade level, having difficulty with writing (compared to their peers), or having difficulty with a sense of time and organization (Chandradasa & Rathnayake, 2020; Story, n.d.-a). Lastly, the cultural context comprises cultural aspects in a school setting, including a teacher's classroom management techniques, teaching strategies, family expectations, school/academic expectations, etc. When students have RPRs, they may not meet academic expectations for their grade level, appear hyperactive or anxious, do not follow classroom rules or directions, etc. (Konicarova & Bob, 2013; Harsanyi et al., 2020; Story, n.d.-a).

Reflex Integration Programs

There are different types of programs available to integrate PRs. The purpose of the integration programs is to integrate RPRs by creating connections in the brain to increase the maturity of the brain and central nervous system and improve psychomotor and cognitive development (Harsanyi et al., 2020). One reflex integration program example is Rhythmic Movement Training (RMT). RMT incorporates developmental movements, gentle isometric pressure, and self-awareness (Chandradasa & Rathnayake, 2020). This program integrates retained reflexes, but it also activates "critical links between the cerebellum, limbic system, and prefrontal cortex" (Story, n.d.-b, para. 8). However, it requires specific training. Grigg et al. (2018) studied the effectiveness of this program (in a home-based setting) and found that participants gained improvements in cognitive, physical, and social skills.

Ready Bodies, Learning Minds is another reflex integration program used by OT. This program incorporates the dynamic systems theory concepts, including the complexity of self-organization, continuity in time, and dynamic (Oden, 2016). The author of this program, Athena Oden, an occupational therapist, designed this program after she noticed the lack of time in school available for children to move, develop, mature, and build readiness skills. This program aims to achieve academic success by developing the skills needed for students to learn. There are activities designed that stem from sensory integration and motor learning. The focus of the activities is to "stimulate the development of the child's motor, tactile, proprioceptive, vestibular, visual and auditory systems" (Oden, 2016, p. 145). The techniques from this program have been used in a school-based setting before, and both therapists, educators, and parents noticed the improvements seen in kindergarten students with those neurological dysfunctions who participated (improved handwriting and reading scores) (Ortego et al., n.d.).

Another reflex integration program is the Masgutova Neurosensorimotor Reflex Integration (MNRI) program. This program, founded in 1989, “offers a novel solution on how to organize the treatment of reflex circuits leading them to proper neurophysiological functioning to balance the excitation-inhibition processes of the nervous system. Hypothalamus-Pituitary-Adrenal (HPA) stress-axis and resilience, and increased neuroplasticity” (Masgutova et al., 2020, p. 2). It is built on the premise that dysfunctional reflex circuits can be reconstructed “by [the] re-training of reflexes targeted at awakening the genetic sensorimotor memory in individuals” (Masgutova et al., 2020, p. 2). This program has demonstrated improvements in overall functioning, including reflex pattern maturation, sensory-motor integration, postural and motor coordination, and emotional-behavioral and cognitive progress. Individuals with neurological dysfunctions that would benefit from this program included children with cerebral palsy, a traumatic brain injury, ASD, and ADHD, to name a few (Masgutova et al., 2020).

The commonality among these reflex integration programs and others is pinpointing the PR that needs to be integrated and practicing specific exercises or movements. Due to an occupational therapist's medical and activity analysis background, they understand the correct movements and exercises needed to integrate PRs. This understanding gives occupational therapists the authority/ability to supervise the program sessions to ensure the specific exercises and activities are done correctly, with the goal of each PR becoming integrated. The types of activities and techniques (crossing midline, bilateral coordination, etc.) often used in these programs can be implemented through various activities in the classroom and during gym class. While these programs are beneficial and have shown success, they are not always feasible for school settings as they require time commitments that are not always available during the school day.

Summary

PRs affect various school contexts when retained, causing numerous disruptions to the school day and routine. The affected contexts include the classroom, playground, lunchroom, teachers, classmates, class schedule, age/developmental stage, classroom expectations, etc. RPRs can affect a student's academic performance and overall school experience. The effects of RPRs vary depending on the type of PR. Examples of the impacts of RPRs include difficulty learning to read and write, impaired handwriting, and difficulty focusing/following directions. Additional effects include poor posture, visual-perceptual problems, poor concentration, and short-term memory, all of which affect the student's ability to complete school-related tasks successfully.

Occupational therapists play a vital role in the school, helping students achieve academic success through evaluation and intervention and providing direct or indirect services. OT can also determine how person, context, and task factors affect a student's performance range. Additionally, if one of those factors is involved (i.e., a student has RPR), OT can work with the student to integrate the reflex(es) because they understand the origin and purpose of each PR. Besides working with students, OT can also provide education to educators, administrators, and caregivers on the effects of RPRs. Research has indicated that many school staff is unaware of how RPRs affect students and do not have access to credible or valuable resources. Educating school staff will allow them to change their perspectives and understand the reasoning behind certain behaviors and actions. It will also open the scope of OT services in a school setting to reach more students and enhance their performance range.

CHAPTER III

Methodology

The need for this scholarly project was evident as the literature identified the adverse effects retained primitive reflexes (RPRs) have on children and the lack of knowledge and resources educators have (Bilbilaj et al., 2017; Melillo et al., 2020; Story, n.d.-a). Primitive reflexes (PR) are necessary involuntary survival responses for infants designed to integrate a year after birth (Desorbay, 2013; Pecuch et al., 2020). However, when reflexes do not integrate on time, there is a potential risk for the child's future motor and cognitive-emotional developmental problems (Gieysztor, Choińska, et al., 2018; Konicarova & Bob, 2013; Pecuch et al., 2020). These problems can affect the child in many different contexts at school, including their ability to complete assignments, listen/follow directions, play with peers, etc. (Chandradasa & Rathnayake, 2020). While many students with RPRs may already receive occupational therapy services during school, some have undetected RPRs and are not receiving occupational therapy services. This discovery presented an area of need and led to further investigation on the topic looking at how school-based occupational therapists can address and promote this topic in a school-based setting. Having practical and credible resources for occupational therapists and educators will allow all students who have RPRs to be reached.

This project required a placement and site mentor to oversee and assist the student while onsite. In this case, this author's placement was at an Elementary School, and the site mentor was the school's special education coordinator. While onsite, this author talked and collaborated with the school-based occupational therapist, various general and special education teachers, and early childhood specialists to create a project that fits accordingly to the need of the school.

Additionally, this author observed classrooms of various grade levels and observed the occupational therapist complete reflex integration activities with students on her caseload.

After the needs assessment, an in-service event was hosted by this author, week 4, to introduce the project and three of the resources/tools (the informational packet, screening tool, and observation sheet) to the educators who attended (the PowerPoint used during the in-service can be found in Appendix E). The in-service was held early during the placement to introduce educators to the resources, receive buy-in, and allow educators to ask questions and make recommendations on students that this author could observe—the information and the materials from the in-service sparked queries and interest from the educators that attended. The interest in the project and ideas led to great conversations and ideas for an additional product (brain break cards).

Following the preliminary stages of research, a literature review was conducted, before and during the placement, to gain a thorough understanding of PRs and their effects on elementary school-aged children. First, a literature matrix was filled in and guided the literature review by identifying the model used throughout the project, creating questions, obtaining and organizing literature according to relevance, and summarizing findings from the literature. The databases used to find research included CINAHL Complete, ERIC, PubMed, AJOT, and Google Scholar. The terms searched included "retained primitive reflexes," children, "reflex integration," "primitive reflexes," school, preschool, "active primitive reflexes," and "school-based occupational therapy." The inclusion criteria consisted of articles published within the last ten years, participants aged 4-10 (elementary-school ages), and RPRs. The exclusion criteria included articles with participants who were not elementary-school-aged, articles published 15 years from the current year (except for seminal work), and no mention of RPRs. Upon the

conclusion of the literature review, it became evident that RPRs can negatively affect a student's academic performance. The research also alluded to a lack of resources/tools and information available to educators on retained primitive reflexes. As well as a need for PR screening as early as preschool.

The need identified through the literature influenced the creation of the resources/tools (an informational packet, an observation sheet, a screening tool, and brain break cards). All of them were shared in a folder on Google Drive and shared with the staff at the elementary school to allow easy access for whoever wants or needs to use them. The informational packet was designed for educators, administrators, and others in the classroom (i.e., paraprofessionals or classroom aides). This packet included an overview of PRs, their purpose, the effects of RPRs, how RPRs relate to different types of disorders, and information on how to test for RPRs (including photos and links to online videos), and integrative activities. The informational packet had pictures of an elementary school-aged child, not at school, demonstrating how integrated and retained reflexes appear. A consent form signed by the parents can be found in Appendix F.

During week four, an in-service event was held to distribute this packet to educators and present the information. The observation sheet and screening tool were included in the informational packet, explained during the in-service, and shared as separate documents in the Google Drive folder. The information was presented in layman's terms and clearly explained to avoid confusion and feeling overwhelmed. There were ethical considerations that included: following HIPAA guidelines by not discussing students I saw during observations with any staff, family, or friends and giving credit to authors by citing the correct sources in the resources/tools

Occupation-Based Model

The Ecology of Human Performance (EHP) model guided this project (Dunn et al., 1994). This model includes three core constructs: person, context, and task (Dunn, 2017). This model also emphasizes maximizing a person's performance range ("the range of tasks a person has capacity for relative to their contexts, skills, and ability") (Dunn, 2017, p. 212). Another key feature is its interdisciplinary aspect which will be beneficial in a school setting where many different professions (administrators, social workers, teachers, psychologists, physical therapists, occupational therapists, speech-language pathologists, etc.) are present. This model uses commonly used terms to eliminate confusion which is helpful for a setting that includes many different professions (i.e., "task" instead of "occupation"). In the context of elementary-school-aged students in a school setting, the EHP model provides a framework for determining how the effects of RPRs may interfere with academic performance/success (required classroom tasks, classroom environment, etc.). Also, how to best address that problem and develop a reflex integration program. The following chart defines EHP's constructs and illustrates them in a school setting.

Ecology of Human Performance (EHP) Constructs		
Person	**Context**	**Tasks**

• Experiences
• Values
• Interests
• Sensorimotor skills
• Psychosocial skills
• Cognitive skills
 	
(Dunn, 2017)
	• Physical
	  ○ Natural and fabricated
	  ○ Objects within the context
	• Social
	  ○ Family, friends, and places with social interaction occurs (i.e., church, clubs, etc.)
	• Temporal
	  ○ Aspects of time (i.e., chronological age, developmental state, life cycle)
	• Cultural
	  ○ What contributes to a person's sense of identity
	(Dunn, 2017)
		• Observable behaviors that allow a goal to be accomplished
		
		(Dunn, 2017)

Performance Range

- "The range of tasks a person has capacity for relative to their contexts, skills, and ability" (Dunn, 2017, p. 212)

EHP Constructs in the Schools		
Person	**Context**	**Tasks**

• Students' school experience
• Students' favorite subjects or teachers
• Students' motor skills in relation to class assignments (i.e., using writing utensils, using scissors correctly to cut, participating in gym class activities, etc.)
• Students' social skills (i.e., knowing personal space/boundaries, playing with peers, etc.)
• Students' cognitive skills
• Educators' experience teaching
	• Physical
	  ○ Classrooms (i.e., desks/tables, whiteboard or smart board, books, and other physical objects in the classroom)
	  ○ Gym
	  ○ Cafeteria (i.e., lunch tables, trays, food, lunch boxes, etc.)
	  ○ Library (i.e., books, tables, and chairs)
	  ○ Playground
	  ○ School bus
	• Social
	  ○ Teachers
	  ○ Paraprofessionals/classroom aides
	  ○ Peers and classmates
	  ○ Administrators
	  ○ Families
	• Temporal
	  ○ Student's developmental stage
	  ○ Age
	  ○ Time of year for school (fall, winter, or spring)
	  ○ Class schedule/duration of classes
	  ○ Length of classroom breaks
	• Cultural
	  ○ Teaching beliefs (classroom management, how to discipline, teaching techniques, etc.)
	  ○ The student's and families' beliefs and values
		The number of tasks a student does during the school day is endless. Here are a few examples:
		• Reading
		• Writing
		• Copying from the board
		• Sitting at a desk/table/lunch table
		• Playing in the gym or on the playground
		• Listening to the teacher
		• Eating breakfast, lunch, or snack
		• Transitioning to a new subject or classroom

CHAPTER IV

Product

Research has shown that while primitive reflexes are necessary survival responses for infancy, they can also indicate a higher probability of a disruption/delay in motor and cognitive-emotional development if retained (Gieysztor, Choińska, et al., 2018; Pecuch et al., 2020, 2021). The motor and cognitive-emotional developmental disruptions/delays can be seen in a school setting and negatively impact their academic performance and performance range. While there is significant research on the impact of retained primitive reflexes (RPR) on an individual, there is a gap in research regarding effectively implementing reflex integration into the classroom. Additional research has also found that many educators are unaware of RPRs and their effects on students, and there is a lack of available resources (Bilbilaj et al., 2017; Melillo et al., 2020). Therefore, *The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting,* is intended to be used by occupational therapists (OT) who work in school settings. The project provides OTs and educators resources and tools focused on RPRs that can be implemented in a school setting.

The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting is organized to provide information beneficial to OTs as well as educators, administrators, and other school personnel. The information is organized in the following manner.

- Primitive Reflex Informational Packet: This resource includes background information on primitive reflexes, reasons for why primitive reflexes become retained, the effects of RPRs, details on how RPRs related to learning and sensory disorders, information on how to screen for RPRs, and examples of reflex integration activities that can be used in

the classroom. An OT would use this packet to promote awareness and educate teachers, administrators, and other school personnel on the effects of RPRs. The introduction of this packet took place during an in-service event. The in-service event took place during the fourth week of the placement with eight attendees (seven teachers and one OT). The product was well received by the educators who attended, as it contained brand new information for the majority of attendees. Many educators approached this author the weeks following the in-service and reported they noticed symptoms in their children and nieces/nephews and even found some had RPRs after screening them using the information from the packet. They shared that the informational packet was helpful and provided just enough information, which wasn't overwhelming. (Refer to Appendix A)

- Screening Tool: The information regarding screening for RPRs is in the informational packet and used as a reference point for the screening tool. The screening tool is meant to be used by an OT or early childhood educator in conjunction with other baseline screening tools in early childhood education to detect any RPRs. An educator would need to be trained by an OT to use the screening tool. The educators would not diagnose any students with RPRs but instead, refer to OT if they suspect they may have RPRs after using the screen. This tool was created based on the research recommending early screening for RPRs as early as preschool to integrate RPRs early and reduce symptoms/behaviors (Goddard Blythe et al., 2021; Hickey & Feldhacker, 2021; Pecuch et al., 2021). (Refer to Appendix B)
- Observation Sheet: This tool was created for both educators and OTs to use. This tool includes a list of several RPR symptoms that a teacher or OT can check off if they observe a student displaying them (i.e., poor balance and coordination, difficulty crossing

midline, demonstrates emotional dysregulation, slow at copying tasks, irregular handwriting, etc.). (Refer to Appendix C)

- Brain Break Cards: This tool was created following the in-service event after observing several classrooms/grade levels and learning more about the culture of the school (i.e., student behaviors, classroom routines, class schedules, etc.). The intention behind the brain break cards is to provide easy-to-grab, fun, and relevant reflex integration activities that can be incorporated into the school day. A classroom schedule/routine can be modified to incorporate these activities into short brain breaks throughout the day. These brain break cards include a variety of reflex integration activity ideas for each elementary school grade level that will establish higher motor and cognitive skills through reflex integration. The resource also contains an educational handout that consists of a synopsis of what brain breaks are, why they are essential, and how they relate to reflex integration. (Refer to Appendix E)

The development of *The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting* was based upon the Ecology of Human Performance (EHP) model (Dunn, 2017). EHP was chosen because it analyzes the components of the three constructs: person, context, and task, to determine one's performance range ("the range of tasks a person has capacity for relative to their contexts, skills, and ability") (Dunn, 2017, p. 212). The model also features an interdisciplinary aspect observed in a school setting where there are many different professions present (administrators, social workers, teachers, psychologists, physical therapists, occupational therapists, speech-language pathologists, etc.). Additionally, EHP uses commonly used terms to eliminate confusion which is helpful in a setting that includes many different professions (i.e., "task" instead of "occupation") and entails

specific intervention approaches (establish/restore, adapt/modify, alter, prevent, and create) (Dunn, 2017). In a school setting there are many different contexts and tasks. The EHP model provides a framework for determining how the effects of RPRs may interfere with academic performance/success (required classroom tasks, classroom environment, etc.). The following chart describes each intervention approach and illustrates how the create, establish/restore, adapt/modify, and prevent intervention approaches were used to create the resources/tools for this project.

EHP Intervention Approaches	
Create	Address either the person, context, or task construct but not assume a problem exists
Establish/Restore	Establishing or restoring a person's skill(s)
Adapt/Modify	Targets the context and task by changing aspects or adjusting either construct
Alter	Completely changing the context
Prevent	Addresses the person, context, or task construct and takes place before a problem exists

(Dunn, 2017)

Product Information in Relation to EHP Intervention Approaches	
Informational Packet for Educators	**Establish/Restore** • The informational packet provides information on primitive reflexes (PR)/retained primitive reflexes (RPR) and integration activities that can be used in the classroom to establish higher-level motor and cognitive skills. **Adapt/Modify** • The informational packet contains integration activities and suggests that the activities can be implemented through brain breaks. The classroom schedule/routine could be modified to include short brain break activities or any of the activities listed in the packet. **Prevent**

	• The intention behind this informational packet is to educate teachers on PRs and RPRs so they can identify them in students. This identification will then lead to occupational therapists being able to work with them and prevent a further gap in their academic performance and participation in school.
Screening Tool	**Establish/Restore** • The screening tool detects students with RPRs and informs OTs and/or educators so reflex integration can start to be implemented into the students' school days to establish higher motor and cognitive skills. This could be through school-based occupational therapy services if they qualify, their teacher incorporating reflex integration activities from the informational packet or brain break cards into the classroom, etc. **Prevent** • The purpose of this screening tool is for the early detection of RPRs. The detection of RPRs in students will allow the occupational therapist and teacher(s) to incorporate reflex integration into the school day to prevent further developmental delays caused by RPRs.
Observation Sheet	**Prevent** • The observation sheet was created to be utilized by educators or OTs. This tool is used to identify specific symptoms/effects of RPRs that may be observed in school. If any symptoms/effects are identified, the OT or teacher can incorporate reflex integration activities into the students' day to prevent further delay or disruption in the student's performance range.
Brain Break Cards	**Create**

	• These brain break activities were created for any classroom and does not assume a problem exists. **Adapt/Modify** • The brain break cards incorporate specific reflex integration movements in the activities. The classroom schedule/routine can be modified to include these breaks into the school day.

(Dunn, 2017)

The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting was created to promote an awareness of RPRs in a school-based setting, provide resources for school-based OTs to use, and detect/integrate RPRs to increase students' performance range and school experience. These goals were met by providing school-based OTs resources to use, educate, empower, and give teachers the resources to understand, identify, and help integrate retained primitive reflexes to improve students' academic performance.

CHAPTER V

Summary

The purpose of this scholarly project, *The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting*, was to create a program that provided resources and tools for occupational therapists (OT) and educators to use with students who have retained primitive reflexes (RPRs). Through *The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting*, this author hopes to educate staff and improve students' school experience by integrating RPRs, promote awareness of the effects of RPRs in a school setting, and help integrate RPRs to enhance students' academic performance/performance range.

The literature review in Chapter II indicated that RPRs could be a potential risk for future motor and cognitive-emotional developmental problems (Gieysztor, Choińska, et al., 2018; Pecuch et al., 2020). These developmental problems prompted researchers to recommend early childhood screening for RPRs (as early as preschool) and resources for educators and school personnel regarding education/information on primitive reflexes (Bilbilaj et al., 2017; Melillo et al., 2020). There is a lack of knowledge among educators on what RPRs are and how they affect students academically. The lack of knowledge is problematic as research has found that many elementary school-aged children (specifically students in preschool, kindergarten, and first grade) tend to have at least one RPR (Feldhacker et al., 2021; Gieysztor, Choińska, et al., 2018).

The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting was created using the Ecology of Human Performance model (EHP) (Dunn et al., 1994). EHP was chosen as it is designed to be interdisciplinary, uses common, everyday language, and includes concrete intervention approaches (Dunn, 2017).

These intervention approaches (establish/restore, adapt/modify, and prevent) were used to create the resources/tools; an informational packet for educators, a screening tool, an observation sheet, and brain break cards that incorporate reflex integration activities (Dunn, 2017). The three constructs of EHP (person, context, and task) were also considered when creating the four resources/tools to improve students' performance range (Dunn, 2017).

Much research is available on how RPRs affect specific classroom tasks (i.e., reading, writing, sitting still, etc.) (Chandradasa & Rathnayake, 2020; Desorbay, 2013). However, there was a lack of available information regarding reflex integration activities that can be incorporated into the classroom routine. Based on the literature findings, it was evident that school-based OTs and educators would benefit from these resources and tools to improve students' performance range and outcomes across school contexts.

This research was taken into consideration, and pre-and post-surveys were sent out to the attendees of the in-service. The questions in the surveys pertained to the information in the informational packet (i.e., had you heard about primitive reflexes before, what education/information have you received on RPRs, etc.). There were eight total attendees, and the demographics found in the survey indicated that while 75% of attendees had heard about PRs before, only 62.5% had received education/information on the effects of RPRs. The post-survey results found that many attendees were still very likely to implement reflex integration activities in their classrooms. Additionally, every attendee indicated they were very likely to implement the reflex integration activities in their classroom. Many attendees also shared that they thought the in-service and information should be shared with every elementary school teacher. While this wasn’t considered a research study, the data helped determine what knowledge was had on RPRs at the elementary school and helped receive buy-in from educators.

Implementation

The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting was designed to be implemented in an elementary school with students of all abilities. At a formal or informal in-service event, the informational packet for educators, brain break activity cards, and observation sheets would be introduced/shared with educators, administrators, and paraprofessionals. This time would allow the OT to explain the products and answer questions. The OT would then meet with preschool teachers at a different time to introduce the screening tool, explain the purpose, and practice using the screen. The intent of the screening tool would be implemented with other baseline screening tools at the beginning of the school year for early detection of RPRs. However, OTs would also use the screening tool with any students they work with whom they suspect have RPRs. The preschool teachers would refer to occupational therapy if they detected any signs of RPRs or had any concerns.

Implications for Occupational Therapy

This scholarly project intends to provide practical, easy-to-use resources for OTs and educators to implement in a school-based setting. If these products are implemented in the classroom, especially starting at lower elementary school grades, it would allow for early detection of RPRs and promote the scope of practice for occupational therapy practitioners. The feasibility of the resources/tools allows school-based OTs to approach this specific occupation area and provide a more holistic approach to improve students' performance range and ensure the students' needs are met.

Limitations and Recommendations

The Effects of Retained Primitive Reflexes on Students' Occupational and Academic Performance in the School Setting was created to be used in both general and special education classrooms. While an in-service was held, not all elementary school teachers attended, and feedback regarding the resources and tools was only received by the ten individuals who attended. Another limitation to this product is that no research was conducted on the effectiveness of the resources/tools. Additionally, the project does not provide specific reflex integration exercises like those provided in a reflex integration program or seen in a clinic-based setting. Recommendations for this project include research conducted on the effectiveness of the resources/tools that were created. It is also important to note that it is recommended an OT would introduce the resources/tools to educators and educate them on the purpose of each resource and tool before they are used/implemented in the classroom. Additionally, it would also benefit the OT to follow up with educators after the in-service to keep the information relevant and answer any questions.

Conclusion

Overall, the project was created with evidence-based research and through the lens of the EHP model. These resources facilitate an OTs role in addressing RPRs in a school-based setting and educating educators, administrators, and other stakeholders and the effects of RPRs. The products also provide an overview of a holistic approach to occupational therapy to meet the unmet needs of the students with detected and undetected RPRs. OTs have a unique skill set that allows them to build strong therapeutic relationships with their students and discuss all the factors that may be impeding the students' participation and performance in school. Additionally, OTs are well-equipped to provide further education concerning RPRs and reflex integration that may instill confidence in the students and educators.

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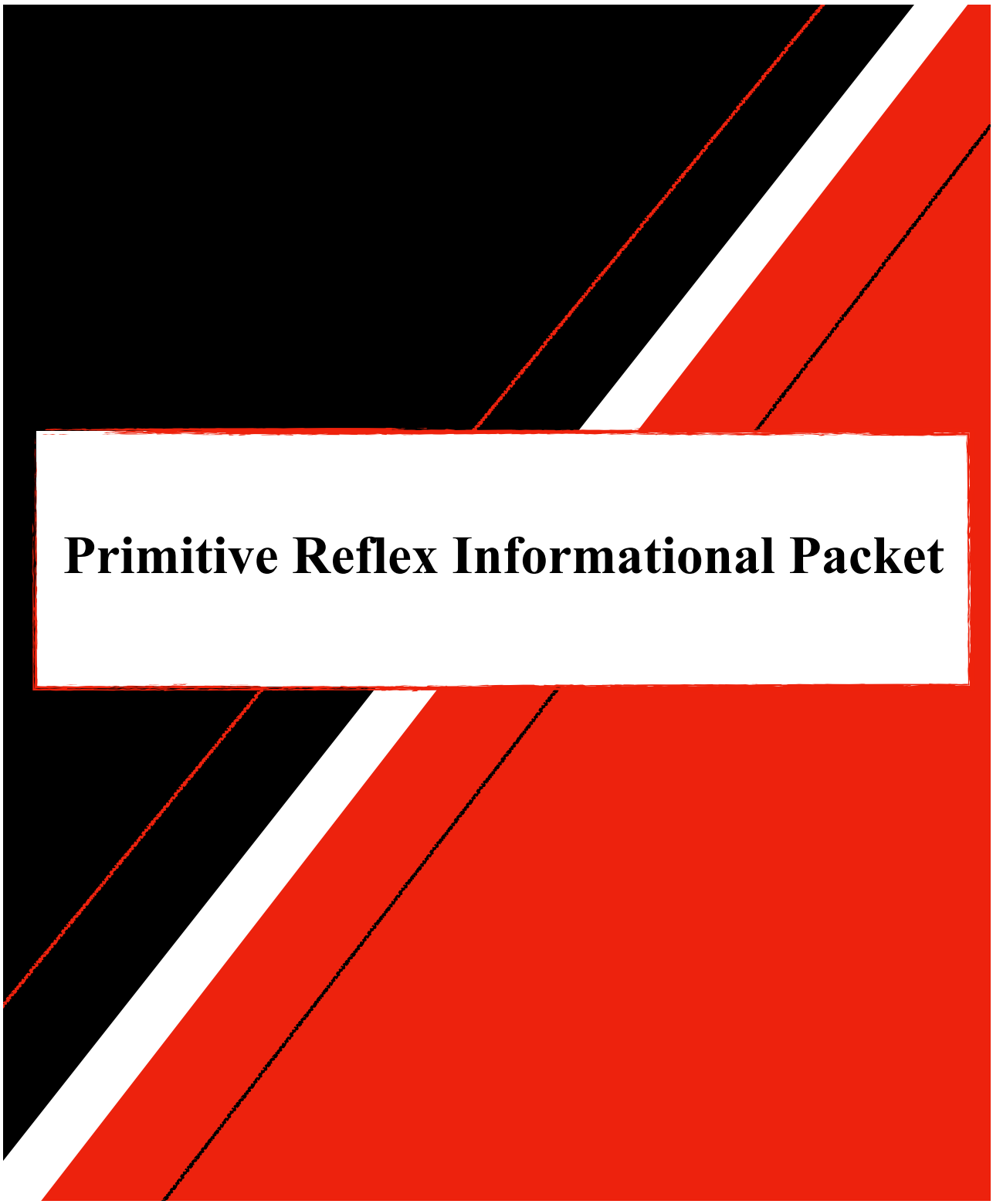
APPENDICES

APPENDIX A

PRIMITIVE REFLEX INFORMATIONAL PACKET FOR EDUCATORS



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Introduction

What are Primitive Reflexes?

Primitive reflexes are *survival responses* that are *designed for infants' health and safety*. They help facilitate child delivery, the first movements after birth, and provide the foundation for future voluntary motor skills. The onset and inhibition of each reflex are related to age, but most primitive reflexes will spontaneously integrate one year after birth as higher motor skills start to develop. However, when they do not fully integrate, there is a potential risk for future motor and cognitive-emotional developmental problems for the child.

(Desorbay, 2013; Pecuch et al., 2020)

Reasons for Retainment

There are several reasons why primitive reflexes may not integrate or resurface. One possible cause is *not having enough movement in early childhood*. While devices such as plastic carriers, propping carriers, and swings can be convenient, they can also restrict movement. If a child spends a great deal of time in those types of devices, they do not have the opportunity to move independently. Retainment can be detrimental as brain development needs physical activity. Other possible causes may include *stress from pregnancy, chronic stress, illness, trauma, missing the crawling stage, or an injury* (i.e., a traumatic brain injury). However, this is still an area that needs more research.

(Chandradasa & Rathnayake, 2020; Story, n.d.)

Primitive Reflex Chart

Name of Reflex	When it appears	When it typically integrates
Asymmetrical Tonic Neck Reflex (ATNR)	At birth	**3-9** months after birth
Symmetrical Tonic Neck Reflex (STNR)	**6-9** months after birth	**9-11** months after birth
Tonic Labyrinthine Reflex (TLR)	At birth	**4-6** months after birth
Spinal Galant Reflex (SGR)	At birth	Approximately **6** months after birth
Moro Reflex	At birth	Approximately **4-6** months after birth
Palmar Reflex	At birth	Approximately **6** months after birth

(Chandradasa & Rathnayake, 2020; Pecuch et al., 2021)

What Primitive Reflexes Look Like in Infancy and Their Purpose

ATNR

- When a baby's head turns to one particular side, the arm on the same side straightens while the arm on the other side bends
- Precursor for **cross pattern movements**

STNR

- When a baby's head extends upward, the upper limbs will extend and the lower limbs will flex; the opposite will occur when the head flexes downward
- Precursor for **crawling by promoting head control**

TLR

- When a baby looks up (chin towards ceiling), their back arches, legs straighten, and arms bend at the elbows and wrist.
- Precursor for **neck and head control, and improves balance and muscle tone**

SGR

- When a particular side of a baby's back is stroked, they flex to that same side
- Assists with the **birthing process** and also helps with **balance and coordination of the body for creeping/crawling**

Moro Reflex

- When a baby experiences a sudden movement or a sudden sensory stimulus (loud noise or bright light) their arms and legs extend and the baby will often also cry
- Also known as the "startle reflex" as it is a **survival instinct** & **helps alert/get assistance** when needed

Palmar Reflex

- When a child flexes their fingers around an object to grab it when it's placed in their palm
- Precursor for **voluntary grabbing and holding objects**

(Chandradasa & Rathnayake, 2020)

The Effects of Retained Primitive Reflexes

Children who have retained primitive reflexes spend a great deal of energy and concentration trying to control the effects of the retained reflex(es). This in turn has a direct effect on their learning ability and behavior. The effects of retained primitive reflexes may present in different ways depending on the reflex, which impacts specific classroom tasks and academic performance.

(Desorbay, 2013)

**Bolded terms indicated symptoms that interfere with academic performance*

ATNR

Symptoms of a retained ATNR include:

- **Poor hand-eye coordination**
- **Difficulty crossing the visual midline**
- **Difficulty with eye tracking** (convergence impairments)
- **Difficulty learning how to read and write**
- **Impaired handwriting**
- **Difficulty telling time**

(Chandradasa & Rathnayake, 2020)

Research has also indicated that postural deformities may be due to a retained ATNR as well. Gieysztor, Sadowska, et al. (2018) found that retained primitive reflexes (specifically ATNR and SGR) impacted trunk rotation and scoliosis. The detection and integration of those specific PRs may help prevent scoliosis and other possible physical developmental setbacks.

STNR

Symptoms of a retained STNR include:
- **Poor posture** ("slumped" when sitting)
- **Impaired hand-eye coordination**
- **Slow at copying tasks**
- **Difficulty writing with a writing utensil**
- **Difficulty focusing on a task and sitting still**
- May dislike games that involve catching a ball
- Difficulty learning how to swim

(Chandradasa & Rathnayake, 2020; Bilbilaj et al., 2017; Gieysztor, Choińska, et al., 2018)

TLR

Symptoms of a retained TLR include:
- **Poor balance and coordination** (looks like careless mistakes and clumsiness)
- **Poor posture**
- **Disorientation** (difficulty with organization and sense of time)
- **Emotional dysregulation**
- Motion sickness
- **Visual-perceptual difficulties**
- **Weak or tight muscle tone**
- **Difficulty following directions**

A retained TLR has been associated with difficulties in **reading** and **mathematics.**

(Andrich et al., 2018; Chandradasa & Rathnayake, 2020)

SGR

Symptoms of a retained SGR include:
• **Fidgeting while sitting**
• Bedwetting
• Dislike of tight clothing around the waist
• **Poor concentration and short-term memory**
• **Uneven gait**

(Desorbay, 2013; Story, n.d.)

Moro Reflex

Symptoms of a retained Moro Reflex include:
• **Sensitivity to noise and light**
• **Lack of concentration**
• **Anxiety**
• **Mood swings**
• **Hyperactivity**
• **Poor stamina**
• Poor sports skills
• Lowered immunity
• Timidity

(Harsanyi et al., 2020; Story, n.d.)

Palmar Reflex

Symptoms of a retained Palmar Reflex include:
• **Difficulty with tying shoelaces**
• **Poor hand-eye coordination**
• **Irregular handwriting**
• **Poor pencil grip**
• **Manual dexterity challenges**
• **Poor speech articulation**
• Movements of mouth when writing

Most often associated with handwriting challenges.

(Desorbay, 2013; Story, n.d.)

Name of Reflex	Symptoms when Retained
ATNR	• Poor hand-eye coordination • Difficulty crossing the visual moline • Difficulty with eye tracking (convergence impairments) • Difficulty learning how to read & write • Impaired handwriting • Difficulty with telling time (Chandradasa & Rathnayake, 2020)
STNR	• Poor posture (“slumped” when sitting) • Impaired hand-eye coordination • Slow at copying tasks • Difficulty wiring with a writing utensil • Difficulty focusing on a task and sitting still • May dislike games that involve catching a ball • Difficulty learning how to swim (Chandradasa & Rathnayake, 2020; Bilbilaj et al., 2017; Gieysztor, Choińska, et al., 2018)
TLR	• Poor balance and coordination (looks like careless mistakes and clumsiness) • Poor posture • Disorientation (difficulty with organization and sense of time) • Emotional dysregulation • Motion sickness • Visual-perceptual difficulties • Weak or tight muscle tone • Difficulty following directions • Associated with difficulties in reading and mathematics (Andrich et al., 2018; Chandradasa & Rathnayake, 2020)

Name of Reflex	Symptoms when Retained
SGR	• Fidgeting while sitting • Bedwetting • Dislike of tight clothing around the waist • Poor concentration and short-term memory • Uneven gait (Desorbay, 2013; Story, n.d.)
Moro Reflex	• Sensitivity to noise and light • Lack of concentration • Anxiety • Mood swings • Hyperactivity • Poor stamina • Poor sports skills • Lowered immunity • Timidity (Harsanyi et al., 2020; Story, n.d.)
Palmar Reflex	• Difficulty with tying shoelaces • Poor hand-eye coordination • Irregular handwriting • Poor pencil grip • Manual dexterity challenges • Poor speech articulation • Movements of mouth when writing (Desorbay, 2013; Story, n.d.)

School Contexts and Affected Tasks Chart

School Contexts	Tasks Affected by Retained Primitive Reflexes
Physical (*the classroom, gym, playground, lunchroom, etc.)*	• May fidget or slouch in a chair at a desk or at the lunch table • May observe the child demonstrate poor balance and incoordination in various school settings • May appear to have an uneven gait when walking in the hallways or in the classroom
Social (*family, friends, classmates, teachers, etc.)*	• May dislike playing games with peers that involve throwing or catching a ball in gym or at recess • May dislike swimming with peers/doesn't want to learn how to swim • May have difficulty following the teacher's directions and appear to have a short-term memory
Temporal (*chronological ages, developmental stage, time of year, time of classes/class schedule, length of classroom breaks, etc.*)	• May not be reading at their grade level • May have difficulty writing compared to their classmates/peers (i.e., illegible handwriting, poor pencil grip, etc.) • May be slow at copying tasks and unable to keep up with the classroom schedule/routine • May have difficulty with sense of time and organization (i.e., knowing where homework is, keeping a clean/organized desk/locker/backpack, etc.)
Cultural (*teacher's classroom management techniques, teaching strategies, family expectations, school expectations, etc.*)	• May not be able to meet classroom expectations • May not be able to meet academic expectations • May appear to be hyperactive or anxious and unable to follow classroom rules/directions • May dislike tight clothing around their waist

Observation Sheet for Retained Primitive Reflexes

Name of Student: Grade:

Name of Teacher: Date:

- ☐ Poor hand-eye coordination
- ☐ Difficulty crossing the visual midline
- ☐ Difficulty with eye tracking
- ☐ Difficulty writing/irregular handwriting
- ☐ Poor pencil grip
- ☐ Poor posture when sitting ("slumping")
- ☐ Slow at copying tasks
- ☐ Difficulty focusing on a task
- ☐ Difficulty sitting still
- ☐ Dislikes games that involve catching a ball
- ☐ Movements of mouth when writing
- ☐ Poor balance and coordination
- ☐ Is seen as "clumsy"
- ☐ Demonstrates emotional dysregulation
- ☐ Fidgets while sitting
- ☐ Dislikes tight clothing around the waist
- ☐ Poor concentration and short-term memory
- ☐ Sensitive to noise and light
- ☐ Hyperactive
- ☐ Poor stamina
- ☐ Difficulty with tying shoelaces after peers have mastered this skill

Primitive Reflexes and their Associated Symptoms When Retained

Asymmetrical Tonic Neck Reflex (ATNR)

- Difficulty crossing the visual midline
- Difficulty learning how to read and write
- Difficulty with eye tracing (convergence impairments)
- Impaired handwriting

Symmetrical Tonic Neck Reflex (STNR)

- Difficulty focusing on a task and sitting still
- Difficulty writing with a writing utensil
- Impaired hand-eye coordination
- May dislike games that involve catching a ball
- Poor posture ("slumping" when sitting)
- Slow at copying tasks

Tonic Labyrinthine Reflex (TLR)

- Disorientation (difficulties with organization and sense of time)
- Emotional dysregulation
- Poor balance and coordination (careless mistakes and clumsiness)
- Poor posture

Spinal Galant Reflex (SGR)

- Fidgets while sitting
- Dislikes tight clothing around the waist
- Poor concentration and short-term memory

Moro Reflex

- Sensitive to noise and light
- Lack of concentration
- Hyperactive Poor stamina

Palmar Reflex

- Difficulty tying shoelaces
- Irregular handwriting
- Movements of mouth when writing
- Poor hand-eye coordination
- Poor pencil grip

**** Refer to an Occupational Therapist if you have any concerns***

Retained Primitive Reflexes and Disorders

ADHD

Several symptoms of some retained primitive reflexes closely align with symptoms of ADHD. ADHD is marked by continuous inattention and/or hyperactive/impulsive behaviors, that negatively affect functioning and development. While this may not be the case for every diagnosis of ADHD, the ADHD deficits may be due to retained primitive reflexes or the resurface of primitive reflexes. According to the CDC, approximately 9.4% of children aged 2-17 years old (6.1 million) have been diagnosed with ADHD.

The correlation between retained primitive reflexes and ADHD may also stem from research supporting the delay in brain maturation, which affects the ability of reflexes to integrate and may cause ADHD symptoms to arise. The delay in brain maturation and developmental stages causes certain motor and cognitive functions to develop regularly and others not to, which likely is compensated by symptoms of retained primitive reflexes. Konicarova and Bob (2013) studied the correlation between retained primitive reflexes and ADHD and found that a persisting ATNR was linked closely to ADHD.

(Bob et al., 2021; Centers for Disease Control and Prevention, 2021a; Konicarova & Bob, 2013; National Institute of Mental Health, 2021; Sripada et al., 2014)

Learning Disabilities

Children with a diagnosed learning disorder (Autism Spectrum Disorder (ASD), dyslexia, ADHD, or an oral disorder) or cerebral palsy are more likely to have higher levels of retained primitive reflexes compared to children without a diagnosed learning disorder. Children with ASD may have retained primitive reflexes as their cortical top-down inhibition is reduced in the brainstem (where primitive reflexes often are found). Grzywniak (2016) found that primitive reflexes did not spontaneously integrate in children with learning difficulties, but instead increased with age.

STNR has been linked to dyslexia as this reflex involves difficulties with accommodation (the eye's ability to focus). It is not uncommon for children with a retained STNR to experience tunnel vision, convergence problems, and have eye strain when reading. However, research has also shown that a reduction in retained primitive reflexes is likely to increase academic performance, specifically in mathematics and listening compression, and reduce symptoms in diagnoses.

(Bilbilaj et al., 2017; Grzywniak, 2016; Melillo et al., 2020; Shaw & Soto - Garcia, 2021; Sigafoos et al., 2021)

Sensory Disorders

Sensory disorders may also correlate to retained primitive reflexes as each primitive reflex corresponds to at least one of the senses (taste, touch, smell, vision, hearing, and proprioception). Therefore if a primitive reflex is active, there is a chance the student could experience a sensory issue as well (i.e., fidgeting while sitting (touch) is a symptom of SGR). Pecuch et al. (2020) researched what types of sensory disorders (if any) noticed by parents were present along with any retained primitive reflexes. They found that high retained reflex activity was strongly associated with sensory disorders, including dyspraxia, sensory-vestibular disorders, and postural disorders.

(Bilbilaj et al., 2017; Pecuch et al., 2020)

Comparison of ADHD and Retained Primitive Reflex Symptoms

Inattention

- Often fails to give close attention to details or makes careless mistakes
- Often has trouble holding attention on tasks or play activities
- Often does not seem to listen when spoken to directly
- Often does not follow through on instructions
- Often has trouble organizing tasks
- Often avoids, dislikes, or is reluctant to do tasks that require mental effort or a long period of time
- Often loses things
- Often easily distracted
- Often forgetful in daily activities

ATNR

- Poor hand-eye coordination
- Difficulty with eye tracking
- Difficulty learning how to read & write
- Impaired handwriting

STNR

- Poor posture ("slumped" when sitting)
- **Difficulty focusing on a task**
- **Difficulty sitting still**
- Slow at copying tasks

TLR

- Poor posture
- Poor balance and coordination (careless mistakes and clumsiness)
- **Disorientation**
- Emotional dysregulation
- **Difficulty following directions**

Hyperactivity and Impulsivity

- Often fights or squirms in seat
- Often leaves seat
- Often runs about or climbs in situations where it is not appropriate
- Often unable to play quietly
- Is often "on the go"
- Often talks excessively
- Often blurts out an answer before a question has been completed
- Often has trouble waiting their turn
- Often interrupts or intrudes on others

(American Psychiatric Association, 2013; Centers for Disease Control and Prevention, 2021b)

SGR

- **Fidgeting while sitting**
- **Poor concentration and short-term memory**

Moro Reflex

- **Lack of concentration**
- Anxiety
- Mood swings
- **Hyperactivity**
- Poor Stamina

Comparison of Sensory Processing Issues and Retained Primitive Reflex Symptoms

Over Sensitive

- Can't tolerate bright lights and loud noises
- Be distracted by noises that others can't seem to hear
- Fearful of surprise touch and avoids hugs
- Often have trouble knowing where their body is in relation to objects/people
- Appears clumsy
- Have extreme meltdowns when overwhelmed

Under Sensitive

- constantly touch people or textures
- No concept of personal space
- Often fidget and unable to sit still

(Child Mind Institute, n.d.)

STNR

- Difficulty focusing on a task
- Difficulty sitting still
- Slow at copying tasks

TLR

- Poor posture
- Poor balance and coordination (careless mistakes and clumsiness)
- Emotional dysregulation
- Difficulty following directions

SGR

- Fidgeting while sitting
- Poor concentration and short-term memory

Moro Reflex

- Sensitivity to noise & light
- Lack of concentration
- Anxiety
- Mood swings
- Hyperactivity
- Poor Stamina

How to Screen for Retained Primitive Reflexes

ATNR

Have the child start on all fours crawl forward. Next have the child turn their head side to side while still crawling.

Integrated if the child:

- Is able to crawl and turn their head without any problems or concerns

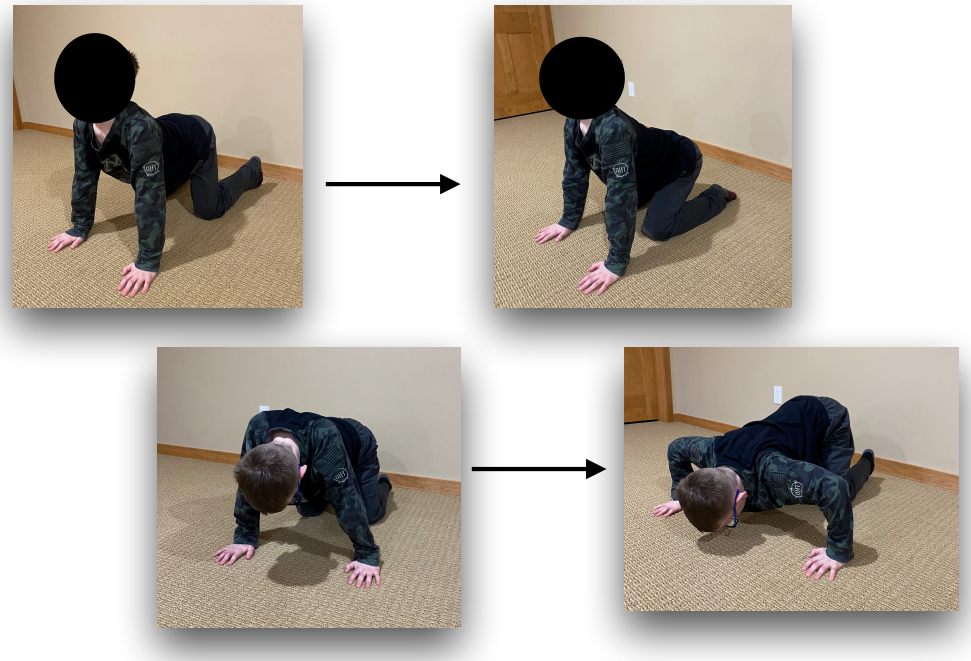
May be retained if the child:

- Demonstrates a bent or flexed elbow on the opposite side their head is turned

(Harkla, 2021)

STNR

Have the child start on all fours. Next have the child look up to the ceiling and then down towards the floor.



Integrated if the child:

- Is able to easily complete movements

May be retained if the child:

- Shifts their weight back when looking up
- Shifts their weight forward and/or bends their elbows when looking down

(Harkla, 2021)

TLR

Have the child simultaneously lay on their stomach and lift their arms and legs straight off the ground. (This is also known as the "Superman" pose/exercise)

Integrated if the child:

- Is able to symmetrically lift arms and legs and hold the pose
- Is able to easily complete the movement

May be retained if the child:

- Can't hold the position very long
- Demonstrates an excessive amount of movement in both arms and legs
- Is unable to lift arms and/or legs

(Harkla, 2021)

SGR

Have the child start by sitting on their bottom with their legs straight out in front of them. Next have the child "walk" by using their bottom, while holding their arms to their chest and keeping their legs straight.

Integrated if the child:

- Demonstrates no other associated movements
- Finds the movement easy to complete

May be retained if the child:

- Demonstrates trunk rotation and twisting side to side
- Demonstrates poor posture during the movement and unable to maintain the original position

(Harkla, 2021)

Moro Reflex

Have the child lay upside down over a yoga or therapy ball.

Integrated if the child:
- Finds the movement easy to complete

May be retained if the child:
- Is startled by the motion
- Refuses to lay upside down
- Appears uncomfortable

(Harkla, 2021)

Palmar Grasp Reflex

With both hands, have the child touch their thumb to each finger simultaneously.

Integrated if the child:

- Is able to complete the movements with no problem

May be retained if the child:

- Demonstrates other movements in the body and/or mouth (i.e. moving the tongue, head, or opposite hand)
- Appears confused or unable to complete the movements

(Harkla, 2021)

Screen for Retained Primitive Reflexes

Asymmetrical Tonic Neck Reflex (ATNR)	When the child's head was turned (right or left) did the child maintain the original position? YES ☐ NO ☐	If NO was checked, did you observe: The child's elbow bend or flex on the opposite side their head turned? ☐
Symmetrical Tonic Neck Reflex (STNR)	When the child looked up and then down where they able to maintain the original position? YES ☐ NO ☐	If NO was checked, did you observe: The child shifts their weight back when looking up? ☐ The child shift their weight forward and/or bend their elbows when looking down? ☐
Tonic Labyrinthine Reflex (TLR)	Was the child able to maintain the position by keeping their arms and legs symmetrical while lifted and hold the pose? YES ☐ NO ☐	If NO was checked, did you observe: The child unable to hold the position very long? ☐ The child demonstrate lots of movement in their arms and legs? ☐ The child unable to lift their arms/legs? ☐

Spinal Galant Reflex (SGR)	Was the child able to easily complete the "sit walk" movement? YES ☐ NO ☐	If NO was checked, did you observe: The child demonstrate trunk rotation and twisting side to side? ☐ The child demonstrate poor posture? ☐ The child unable to maintain the original position? ☐
Moro Reflex	Was the child able to lay upside down easily with no problems? YES ☐ NO ☐	If NO was checked, did you observe: The child startle? ☐ The child refuse to lay upside down? ☐ The child looking uncomfortable? ☐
Palmar Reflex	Was the child able to complete the finger movements with no problems? YES ☐ NO ☐	If NO was checked, did you observe: The child demonstrate other movements in the body and/or mouth? ☐ The child appear confused? ☐

***If any boxes were checked in the 3rd column please refer to Occupational Therapy for further testing and evaluation** (Harkla, 2021)

Reflex Integration Activities

These are integrative activities that can be used with *one student* or the *whole class*. These integrative activities benefit every student, regardless of whether a child has a retained primitive reflex. Research has shown that many elementary school-aged students have at least one retained primitive reflex. However, retention does not indicate that every child is experiencing motor or cognitive impairments.

The following activities are beneficial to students as physical activity, especially through play, helps integrate RPRs and enhances students' physical health. It aids with healthy brain development, learning how to work in groups, resolve conflicts, learn self-advocacy skills, and practice decision-making skills.

(Ginsburg et al., 2007)

Activity Ideas

Specific Reflex Integrative Ideas:

ATNR

- Keep the balloon(s) off the floor
  - Use one or multiple balloons for this activity (this activity is great for visual tracking)

- Mummy or Zombie walks
  - Have the students walk with their arms in front of them and slowly look from one side to the other, while keeping their arms straight in front of them
  - What students should NOT be doing: swinging their arms from left to right while they're turning their head

STNR

- Keep the balloon(s) off the floor
  - Have the students lay on their stomach or be on hands and knees in a circle. With one or several balloons have the students keep the balloons off the floor by using their hands to hit them up while also using their head to track the balloon(s)
  - What students should NOT be doing: lifting their feet or sitting on their ankles

- Any type of activity that involves crawling on hands and knees with hands flat and fingers facing forward

- Bag Toss (have eyes follow the bean bag and exaggerate the looking down and looking up movements)

TLR

- Superman
  - Have the students lay on their stomachs and complete the superman pose; lifting their arms and legs simultaneously (the test for TLR on p. 18). Have fun with it and distract them by asking who their favorite superhero is, what their superman outfit would look like, etc.
  - What students should NOT be doing: rocking, rolling, or waving arms

(Harkla, 2021)

SGR

- "Sit Walk"
  - Have the child sit in a long leg sit position on the floor and "walk" with their bottom one cheek at a time (lift a cheek and slide), while holding their arms to their chest (the test for SGR on p. 19)
  - What students should NOT be doing: using their arms to help "walk" or not keeping their legs straight

- Any types of movements that involve rolling, belly crawling, sliding on the back; obstacle courses are a great opportunity to involve many of these movements

(Harkla, 2021)

›

Moro Reflex

- Popcorn
  - While laying flat on their back (arms and legs extended), have the child bring their knees to their chest and wrap their arms around their legs. Their head should be lifted too, keeping their eyes close to their knees. After holding the position for about 20 seconds have them POP (and return to the original position). Repeat 3 times.
  - What students should NOT be doing: not flexing their neck before they "pop", sitting on hips, or rolling back onto their neck or shoulders

Palmar Reflex

- Making paper snowballs
  - See how many "snowballs" students can make in 1 minute by crumpling and uncrumpling a piece of paper
- Squeezing a ball
  - This could be incorporated into the game bag toss by having the student squeeze the bag before tossing it

(Chandradasa & Rathnayake, 2020; Hill & Harrington, 2021; Murphy, n.d.)

Activity: Simon Says

**Examples of phrases that could be used*

- "Simon says act like a bird"; pretend to act like a bird by spreading your arms out to the side and looking around
  - This is helpful for integrating **ATNR**
- "Simon says to give yourself a big hug"
  - This is helpful for integrating **ATNR**
- "Simon says to howl at the moon like a wolf"; demonstrate this movement by getting on your hands and knees and lifting your head up to the ceiling; while in the same position (on hands and knees) say "Simon says look at the ground"
  - This is helpful for integrating **STNR**
- "Simon says to kick like a donkey"; demonstrate this movement by getting on your hands and knees while pressing palms and fingers into floor kick one leg up to the group (use discretion with this movement in terms of space)
  - This is helpful for integrating the **Palmar Reflex**
- "Simon says to roll on the floor"
  - This is helpful for integrating **SGR**
- "Simon says slither like a snake"
  - This is helpful for integrating **SGR**
- "Simon says do 5 jumping jacks" (number of jumping jacks can be adjusted)
  - This is helpful for integrating **ATNR**
- "Simon says act like a monkey"; pretend to be a monkey by flexing your legs, scratching your head and armpits, and jumping around
  - This is helpful for integrating **ATNR**
- "Simon says SLOWLY make a snow angel"
  - This is helpful for integrating **SGR**
- "Simon says fly like superman or superwoman" (lay on stomach and lift legs and arms off the ground)
  - This is helpful for integrating **TLR**

Hand Clapping Activities

Hand clapping activities are a great way to incorporate concentration, visual-perceptual skills, crossing midline, eye tracking, and hand-eye coordination (symptoms of ATNR, STNR, TLR, & SGR) into a game. To find the songs for Stella Ella Ola, Miss Mary Mack, and Rockin' Robin look up the *Hand Clapping Songs* playlist on Spotify (under banksmolly). Scan the corresponding QR codes with your phone to view a tutorial video for each activity.

**the following hand clapping activities range from easy to more complex*

"Stella Ella Ola"

Lyrics:

Stella Ella Ola clap clap clap

singing es Tiga, Tiga, Tiga, Tiga Shack Shack

Es Tiga, Tiga, Baloa Baloa, Baloa Lo-a-Lo

1 - 2 - 3 - 4 - 5

“Miss Mary Mack”

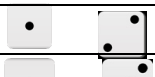
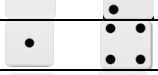
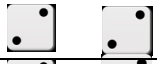
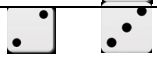
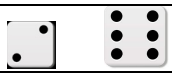
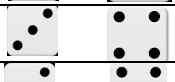
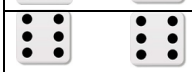
Lyrics:
Miss Mary Mack Mack Mack
All dressed in black black black
With silver buttons buttons buttons
All down her back back back
She asked her mother mother mother
For fifty cents cents cents
To see the elephants elephants elephants
Jump over the fence fence fence
They jumped so high high high
They reached the sky sky sky
And never came back back back
Til the fourth of July ly ly

“Rockin’ Robin”

“Slide”

Activity: Exercise Dice

Roll a pair of dice to determine which exercise the class will complete. Each exercises incorporates a specific movement designated for reflex integration, but is beneficial for each student as it involves physical activity.

	Stand on 1 foot for 30 seconds; switch
	Bear crawl for 30 seconds
	Do the flutter kick for 1 minute
	Crab walk for 30 seconds
	Run or jog in place for 1 minute
	Do the bicycle kick for 30 seconds
	Do 10 heal/toe raises
	Do 10 squats
	Do 15 jumping jacks
	Do 10 seated or regular push ups
	Skip in place for 30 seconds
	10 twists each way
	10 frog jumps
	Extend & hold legs out for 30 seconds
	Touch your toes 15 times
	Side bends 10 each side
	Do arm circles for 30 seconds (forward & then backward)
	Knee raises for 30 seconds
	Do 10 lunges
	Hold a plank position for 30 seconds
	Do 10 crunches

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APPENDIX B
RETAINED PRIMITIVE REFLEX SCREENING TOOL

Screen for Retained Primitive Reflexes

Asymmetrical Tonic Neck Reflex (ATNR)	When the child's head was turned (right or left) did the child maintain the original position? YES ☐ NO ☐	If NO was checked, did you observe: The child's elbow bend or flex on the opposite side their head turned? ☐
Symmetrical Tonic Neck Reflex (STNR)	When the child looked up and then down where they able to maintain the original position? YES ☐ NO ☐	If NO was checked, did you observe: The child shift their weight back when looking up? ☐ The child shift their weight forward and/or bend their elbows when looking down? ☐
Tonic Labyrinthine Reflex (TLR)	Was the child able to maintain the position by keeping their arms and legs symmetrical while lifted and hold the pose? YES ☐ NO ☐	If NO was checked, did you observe: The child unable to hold the position very long? ☐ The child demonstrate lots of movement in their arms and legs? ☐ The child unable to lift their arms/legs? ☐

Spinal Galant Reflex (SGR)	Was the child able to easily complete the "sit walk" movement? YES ☐ NO ☐	If NO was checked, did you observe: The child demonstrate trunk rotation and twisting side to side? ☐ The child demonstrate poor posture? ☐ The child unable to maintain the original position? ☐
Moro Reflex	Was the child able to lay upside down easily with no problems? YES ☐ NO ☐	If NO was checked, did you observe: The child startle? ☐ The child refuse to lay upside down? ☐ The child looking uncomfortable? ☐
Palmar Reflex	Was the child able to complete the finger movements with no problems? YES ☐ NO ☐	If NO was checked, did you observe: The child demonstrate other movements in the body and/or mouth? ☐ The child appear confused? ☐

***If any boxes were checked in the 3rd column or you have any concerns please refer to Occupational Therapy for further testing and evaluation**

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APPENDIX C
OBSERVATION SHEET FOR RETAINED PRIMITIVE REFLEXES

Observation Sheet For Retained Primitive Reflexes

Name of Student: Grade:

Name of Teacher: Date:

- ☐ Poor hand-eye coordination
- ☐ Difficulty crossing the visual midline
- ☐ Difficulty with eye tracking
- ☐ Difficulty writing/irregular handwriting
- ☐ Poor pencil grip
- ☐ Poor posture when sitting ("slumping")
- ☐ Slow at copying tasks
- ☐ Difficulty focusing on a task
- ☐ Difficulty sitting still
- ☐ Dislikes games that involve catching a ball
- ☐ Movements of mouth when writing
- ☐ Poor balance and coordination
- ☐ Is seen as "clumsy"
- ☐ Demonstrates emotional dysregulation
- ☐ Fidgets while sitting
- ☐ Dislikes tight clothing around the waist
- ☐ Poor concentration and short-term memory
- ☐ Sensitive to noise and light
- ☐ Hyperactive
- ☐ Poor stamina
- ☐ Difficulty with tying shoelaces after peers have mastered this skill

Primitive Reflexes and their Associated Symptoms When Retained

Asymmetrical Tonic Neck Reflex (ATNR)

- Difficulty crossing the visual midline
- Difficulty learning how to read and write
- Difficulty with eye tracing (convergence impairments)
- Impaired handwriting

Symmetrical Tonic Neck Reflex (STNR)

- Difficulty focusing on a task and sitting still
- Difficulty writing with a writing utensil
- Impaired hand-eye coordination
- May dislike games that involve catching a ball
- Poor posture ("slumping" when sitting)
- Slow at copying tasks

Tonic Labyrinthine Reflex (TLR)

- Disorientation (difficulties with organization and sense of time)
- Emotional dysregulation
- Poor balance and coordination (careless mistakes and clumsiness)
- Poor posture

Spinal Galant Reflex (SGR)

- Fidgets while sitting
- Dislikes tight clothing around the waist
- Poor concentration and short-term memory

Moro Reflex

- Sensitive to noise and light
- Lack of concentration
- Hyperactive Poor stamina

Palmar Reflex

- Difficulty tying shoelaces
- Irregular handwriting
- Movements of mouth when writing
- Poor hand-eye coordination
- Poor pencil grip

**** Refer to an Occupational Therapist if you have any concerns***

APPENDIX D
BRAIN BREAK CARDS THAT INCORPORATE REFLEX INTEGRATION

Brain Breaks and Reflex Integration Activities

Brain breaks are small breaks that last for a couple of minutes and occur throughout the school day. Brain breaks allow the brain time to process and store information that has been absorbed throughout the day. Research has found that small breaks taken throughout the school day lead to some great benefits for the students. Taking a break that lasts even just a few minutes is essential because the part of the brain that plays a role in learning and memory can only process so much information at a time (Kiser, 2020).

Benefits of brain breaks include:

- Improved behavior
- Increased productivity
- Enhanced comprehension
- Increased attention
- Increased retention

Brain breaks do not necessarily mean they must involve physical activity. They could be a breathing or mental health break. However, movement-based brain breaks can incorporate reflex integration movements! The following brain break activities were included because they incorporate specific movements and actions used for reflex integration.

The following reflex integrative activities/brain breaks **work on** and **enhance** several skills that include:

- crossing midline
- coordination
- balance
- motor control
- motor planning
- visual perceptual skills
- bilateral coordination
- fine and gross motor skills
- core strength
- eye tracking

*The following pages contain brain break activity cards designed for different grade levels. Cut out and use whichever cards/activities work with your classroom. A few activity cards refer to videos that students can watch and mimic the movements shown. Scan the QR codes to access the YouTube videos and play on your CleverTouch or SmartBoard. A larger picture of the exercise dice guide can be found in the Primitive Reflex Informational Packet on page 34.

Brain Break Ideas for the Classroom that Incorporate Reflex Integration!

Animal Walks

Frog: start in a squatting position and leap
Duck: waddle like a duck by keeping your knees together & flap your arms
Elephant: use your arm as a trunk and swing it side to side
Horse: gallop like a horse
Bear: walk on your hands and feet
Snake: lay on your stomach and without using your arms "slither" on the floor
Crab: crab walk across the room forwards and backwards

(Chanda, n.d.)

Stretching

- Child's pose
- Side lunge
- Overhead shoulder stretch
- Seated toe touch
- Butterfly stretch
- Arm across the chest
- Overhead arm stretch
- Ear to shoulder (both sides)

Let's Get Moving!

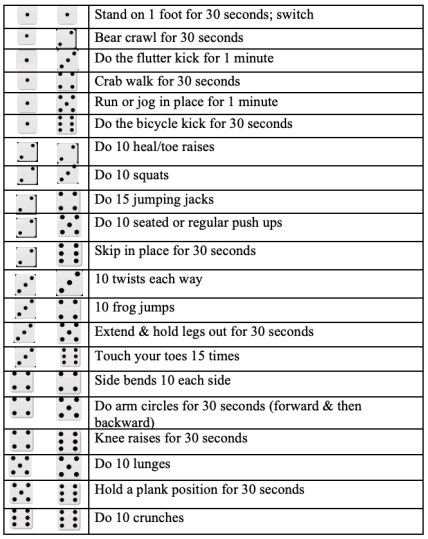
Set a timer for 15-30 seconds and have students complete the following exercises:

- Bicycle crunch
- Superman
- Jumping jacks
- Push ups
- Elbow to knee
- Spin around
- Push-up against the wall
- Jog or run in place

Exercise Dice

Roll a pair of dice to determine which exercise the class will do!

*See page 34 of the Primitive Reflex Informational Packet for a larger image of the Exercise Dice activity



1 & 1	Stand on 1 foot for 30 seconds; switch
1 & 2	Bear crawl for 30 seconds
1 & 3	Do the flutter kick for 1 minute
1 & 4	Crab walk for 30 seconds
1 & 5	Run or jog in place for 1 minute
1 & 6	Do the bicycle kick for 30 seconds
2 & 2	Do 10 heal/toe raises
2 & 3	Do 10 squats
2 & 4	Do 15 jumping jacks
2 & 5	Do 10 seated or regular push ups
2 & 6	Skip in place for 30 seconds
3 & 3	10 twists each way
3 & 4	10 frog jumps
3 & 5	Extend & hold legs out for 30 seconds
3 & 6	Touch your toes 15 times
4 & 4	Side bends 10 each side
4 & 5	Do arm circles for 30 seconds (forward & then backward)
4 & 6	Knee raises for 30 seconds
5 & 5	Do 10 lunges
5 & 6	Hold a plank position for 30 seconds
6 & 6	Do 10 crunches

3 Minutes Fitness Count Down

- 12 Jumping Jacks
- 11 Rise the Roofs
- 10 Knee Lifts
- 9 Side Stretches
- 8 Side Twists
- 7 Giant Air Punches
- 6 Kicks to the Front
- 5 Air Squats
- 4 Jumps
- 3 Muscle Arm Curls
- 2 Scissors
- 1 High-five a neighbor

Spiderman Workout

Follow along and copy the exercises Spiderman is doing!

(GET KIDS MOVING, 2018, April 16-a)

Captain America Workout

Follow along and copy the exercises Captain America is doing!

(GET KIDS MOVING, 2018, April 16-b)

Yoga with Multiplication

Copy the yoga moves shown in the video and answer the multiplication problems to find out how long you hold the position!

(Move and Groove Math, 2019, September 2)

It's time to LIMBO!

Have the students line up and take turns doing the limbo! All you need is a long stick and two students willing to hold it.

Mirror Mirror

Have one student be the "leader" and have them stand in front of the the other students. The "leader" positions her body and the other students mimic the position.

How to make it challenging:

- make the position change more rapidly (set a timer for 30 seconds) or use more challenging body positions (e.g., standing on one leg)

(Drobnjak, 2013)

Obstacle Course

Create a small obstacle course that involves movements such as crawling, walking on a "tight rope", hopping, skipping, jumping, galloping, jumping jacks, backwards walking, crossing midline, etc.

This can be as small or as large as you would like it. Have students go one at a time or simultaneously.

Keep the Ball Off the Floor

Use balloon(s) or beach ball(s) to play this classic game.

Change it up by having students:

- use only their right or left hand to keep the ball off the floor
- be on all fours (hands and knees) during the activity
- lay on their stomachs in a circle & try to keep the ball(s) in the circle

Shoulder to Shoulder

Say two body parts (e.g., “hand to knee”, “Elbow to foot”, etc.). Students must find a partner and put those body parts together. Call out as many pairs as you want and students must find a new partner each time.

(Brain Break Ideas, n.d.)

Simon Says

**Examples of phrases to use*

- Simon says act fly like a bird
- Simon says give yourself a big hug
- Simon says to act like a wolf and howl at the moon (start on hands and knees)
- Simon says to roll on the floor like a log
- Simon says to slither like a snake
- Simon says do __ (insert a number) jumping jacks
- Simon says act like a monkey
- Simon says to make a snow angel
- Simon says to fly like superman (lay on stomach and simultaneously lift arms and legs)

Human Knot

Divide the students into groups of 5 or 6 and have each group stand in a circle. In each group the students will first raise their right hand and grab another group member's right hand. Repeat this action again, but with the left hand. Make sure a student is not holding hands with a group member right next to them. After everyone is connected try to detangle without letting go of anyone's hands!

Alphabet Dance Along

Follow the movements that go along with each letter of the alphabet!

(GoNoodle | Get Moving, 2022, January 17)

Poppin' Bubbles

Follow along and mimic the movements in the video!

(GoNoodle | Get Moving, 2020, March 13)

Dance Party: The Learning Station's Brain Breaks song

Follow along and mimic the movements in the video!

(TheLearningStation – Kids Songs and Nursery Rhymes, 2014, June 21)

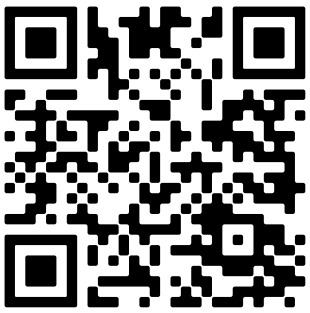
Dance Party: Just Dance Kids - ABC

Follow along and mimic the movements in the video!

(Family Friendly Gaming, 2014, December 3-a)

Dance Party: Just Dance Disney Party 2 - Time of Our Lives

Follow along and mimic the movements in the video!



(Family Friendly Gaming, 2015, November 11)

Dance Party: It's Time to Slime

Dance along and mimic the movements in this Nickelodeon video!

(GoNoodle | Get Moving, 2021, March 3)

Side Hustle kidDING!

(from Side Hustle on Nickelodeon)

Follow along and help complete the jobs by mimicking the movements the best you can! Inspired by the show Side Hustle on Nickelodeon

(GoNoodle | Get Moving, 2021, March 10)

YMCA

Sing and dance along to the Y-M-C-A video!

(DJ Raphi, 2021, March 18)

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APPENDIX E
POWERPOINT USED DURING IN-SERVICE WITH INFORMATIONAL PACKET FOR EDUCATORS

Primitive Reflexes in a School-Based Setting

Molly Banks

What are Primitive Reflexes?

- Survival responses designed for infants' health and safety
  - Help with child delivery, first movements after birth, and future voluntary motor skills
- Normally will spontaneously integrate one year after birth as higher motor skills start to develop
- If they do not integrate there is potential risk for future motor and cognitive-emotional developmental problems for the child

(Desorbay, 2013; Pecuch et al., 2020)

Reasons for Retainment

- Not having enough movement in early childhood
  - Spending a long periods in devices such as swings, propping carriers, etc.
- Stress from pregnancy
- Chronic stress
- Illness
- Trauma
- Injury (i.e. TBI or stroke)

(Chandradasa & Rathnayake, 2020; Story, n.d.)

Types of Primitive Reflexes

Asymmetrical Tonic Neck Reflex (ATNR)

Symmetrical Tonic Neck Reflex (STNR)

Tonic Labyrinthine Reflex (TLR)

Spinal Galant Reflex (SGR)

Moro Reflex

Palmar Reflex

Name of Reflex	When it appears	When it typically integrates
Asymmetrical Tonic Neck Reflex (ATNR)	At birth	**3-9** months after birth
Symmetrical Tonic Neck Reflex (STNR)	**6-9** months after birth	**9-11** months after birth
Tonic Labyrinthine Reflex (TLR)	At birth	**4-6** months after birth
Spinal Galant Reflex (SGR)	At birth	Approximately **6** months after birth
Moro Reflex	At birth	Approximately **4-6** months after birth
Palmar Reflex	At birth	Approximately **6** months after birth

What The Reflexes Look Like & Their Purpose

ATNR

- When a baby's head turns to one particular side, the arm on the same side straightens while the arm on the other side bends
- Precursor for **cross pattern movements**

(Chandradasa & Rathnayake, 2020)

What The Reflexes Look Like & Their Purpose Continued

STNR

- When a baby's head extends upward, the upper limbs will extend and the lower limbs will flex; the opposite will occur when the head flexes downward
- Precursor for **crawling by promoting head control**

(Chandradasa & Rathnayake, 2020)

What The Reflexes Look Like & Their Purpose Continued

TLR

- When a baby is laying on their back and their head is tilted back (chin towards ceiling), their back arches, legs straighten, and arms bend at the elbows
- Precursor for **neck and head control, and improves balance and muscle tone**

(Chandradasa & Rathnayake, 2020)

What The Reflexes Look Like & Their Purpose Continued

SGR

- When a particular side of a baby's back is stroked, they flex to that same side
- Assists with the **birthing process** and also helps with **balance and coordination of the body for creeping/crawling**

(Chandradasa & Rathnayake, 2020)

What The Reflexes Look Like & Their Purpose Continued

Moro Reflex

- When a baby experiences a sudden movement or a sudden sensory stimulus (loud noise
  or bright light) their arms and legs extend and the baby will often also cry
- Also known as the "startle reflex" as it is a **survival instinct** & **helps alert/get assistance** when needed

(Chandradasa & Rathnayake, 2020)

What The Reflexes Look Like & Their Purpose Continued

Palmar Reflex

- When a child flexes their fingers around an object to grab it when it's placed in their palm
- Precursor for **voluntary grabbing and holding objects**

(Chandradasa & Rathnayake, 2020)

The Effects of Retained Primitive Reflexes

ATNR

- Poor hand-eye coordination
- Difficulty crossing the visual midline
- Difficulty with eye tracking (convergence impairments)
- Difficulty learning how to read and write
- Impaired handwriting
- Difficulty telling time

(Chandradasa & Rathnayake, 2020)

The Effects of Retained Primitive Reflexes

STNR

- Poor posture ("slumped" when sitting)
- Impaired hand-eye coordination
- Slow at copying tasks
- Difficulty writing with a writing utensil
- Difficulty focusing on a task and sitting still
- May dislike games that involve catching a ball
- Difficulty learning how to swim

(Chandradasa & Rathnayake, 2020; Bilbilaj et al., 2017; Gieysztor, Choińska, et al., 2018)

The Effects of Retained Primitive Reflexes

TLR

- Poor balance and coordination (looks like careless mistakes and clumsiness)
- Poor posture
- Disorientation (difficulty with organization and sense of time)
- Emotional dysregulation
- Motion sickness
- Weak or tight muscle tone
- Difficulty following directions

*Often associated with difficulties in reading and math

(Andrich et al., 2018; Chandradasa & Rathnayake, 2020)

The Effects of Retained Primitive Reflexes

SGR

- Fidgeting while sitting
- Bedwetting
- Dislike of tight clothing and the waist
- Poor concentration and short-term memory
- Uneven gait

(Desorbay, 2013; Story, n.d.)

The Effects of Retained Primitive Reflexes

Moro Reflex

- Sensitivity to noise and light
- Lack of concentration
- Anxiety
- Mood swings
- Hyperactivity
- Poor stamina

(Desorbay, 2013; Story, n.d.)

The Effects of Retained Primitive Reflexes

Palmar Reflex

- Difficulty with tying shoelaces
- Poor hand-eye coordination
- Irregular handwriting
- Poor pencil grip
- Manual dexterity challenges
- Poor speech articular
- Movements of mouth when writing

*Often associated with handwriting challenges

(Desorbay, 2013; Story, n.d.)

The Effects of Retained Primitive Reflexes in School Contexts

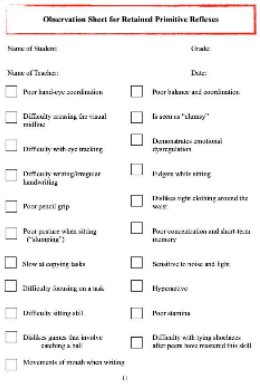
Physical (*the classroom, gym, playground, lunchroom, etc.*)	• May fidget or slouch in a chair at a desk or at the lunch table • May observe the child demonstrate poor balance and incoordination in various school settings (gym, classroom, hallway, etc.) • May appear to have an uneven gait when walking in the hallways, gym class, or in a classroom
Social (*family, friends, classmates, teachers, etc.*)	• May dislike playing games with peers that involve throwing or catching a ball in gym or at recess • May dislike swimming with peeres/doesn't want to learn to learn how to swim • May have difficulty following the teacher's directions and appear to have a short-term memory

The Effects of Retained Primitive Reflexes in School Contexts

Temporal (*chronological age, developmental stage, time of year, time of classes.class schedule, length of classroom breaks, etc.*)	• May not be reading at their grade level & have difficulty reading • May have difficulty writing compared to their classmates/peers (i.e., illegible handwriting, poor pencil grip, etc.) • May be slow at copying tasks and unable to keep up with the classroom schedule/routine • May have difficulty with sense of time and organization (i.e., knowing where homework is, keeping a clean/organized locker, desk, etc.)
Cultural (*teacher's classroom management techniques, teaching strategies, family expectations, school expectations, etc.*)	• May not be able to meet classroom expectations • May not be able to meet academic expectations • May appear to be hyperactive or anxious and unable to follow directions • May dislike tight clothing around their waist

Observation Sheet

- This resource could be used by teachers if they feel it is appropriate for a student



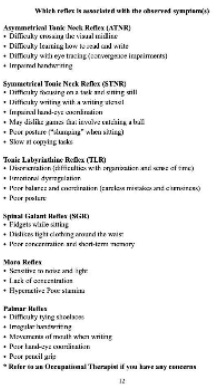
Observation Sheet for Retained Primitive Reflexes

Name of Student: Grade:

Name of Teacher: Date:

- ☐ Poor hand-eye coordination
- ☐ Difficulty crossing the visual midline
- ☐ Difficulty with eye tracking
- ☐ Difficulty writing/irregular handwriting
- ☐ Poor pencil grip
- ☐ Poor posture when sitting ("slumping")
- ☐ Slow at copying tasks
- ☐ Difficulty focusing on a task
- ☐ Difficulty sitting still
- ☐ Dislikes games that involve catching a ball
- ☐ Movements of mouth when writing
- ☐ Poor balance and coordination
- ☐ Is seen as "clumsy"
- ☐ Demonstrates emotional dysregulation
- ☐ Fidgets while sitting
- ☐ Dislikes tight clothing around the waist
- ☐ Poor concentration and short-term memory
- ☐ Sensitive to noise and light
- ☐ Hyperactive
- ☐ Poor stamina
- ☐ Difficulty with tying shoelaces after peers have mastered this skill

11



Which reflex is associated with the observed symptom(s)

Asymmetrical Tonic Neck Reflex (ATNR)
- Difficulty crossing the visual midline
- Difficulty learning how to read and write
- Difficulty with eye tracing (convergence impairments)
- Impaired handwriting

Symmetrical Tonic Neck Reflex (STNR)
- Difficulty focusing on a task and sitting still
- Difficulty writing with a writing utensil
- Impaired hand-eye coordination
- May dislike games that involve catching a ball
- Poor posture ("slumping" when sitting)
- Slow at copying tasks

Tonic Labyrinthine Reflex (TLR)
- Disorientation (difficulties with organization and sense of time)
- Intentional dysregulation
- Poor balance and coordination (careless mistakes and clumsiness)
- Poor posture

Spinal Galant Reflex (SGR)
- Fidgets while sitting
- Dislikes tight clothing around the waist
- Poor concentration and short-term memory

Moro Reflex
- Sensitive to noise and light
- Lack of concentration
- Hyperactive Poor stamina

Palmar Reflex
- Difficulty tying shoelaces
- Irregular handwriting
- Movements of mouth when writing
- Poor hand-eye coordination
- Poor pencil grip

*** Refer to an Occupational Therapist if you have any concerns**

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(pages 11-12 in packet)

Retained Primitive Reflexes & Disorders

ADHD

- Correlation between primitive reflexes and ADHD comes from the delay in brain maturation, which affects the ability of reflexes to integrate and may cause ADHD symptoms to arise

Learning Disorders

- STNR has been linked to dyslexia; symptoms of retained STNR include tunnel vision, convergence problems, and eye strain when reading

Sensory Disorders

- Each primitive reflexes corresponds to at least one of the senses

(Bilbilaj et al., 2017; Melillo et al., 2020; Pecuch et al., 2020; Shaw & Soto - Garcia, 2021; Sigafoos et al., 2021)

Screening for Retained Primitive Reflexes

(Refer to pages 18-25 in the packet)

Integrative Activities

- Can be used with all students regardless if they have retained primitive reflexes or not
  - 5 minute brain break!
- Many benefits of physical activity, movement, & play
  - Improves physical health
  - Healthy brain development
  - Learning how to work in groups
  - Resolving conflicts
  - Learning self-advocacy skills
  - Practicing decision-making skills

(Ginsburg et al., 2007)

Specific Reflex Integrative Activities

- ATNR
  - Mummy or Zombie walks
  - Keep the balloon(s) off the floor
- STNR
  - Keep the balloon(s) off the floor
  - Any type of activity that involves crawling on hands and knees with hands flat and fingers facing forward
  - Bag Toss
- TLR
  - Superman

Specific Reflex Integrative Activities

- SGR
  - "Bottom walking"
  - Any types of movements that involve rolling, belly crawling, sliding on the back
- Moro Reflex
  - Popcorn
- Palmar Reflex
  - Making paper snowballs
  - Squeezing a ball

More Activities!

- Simon Says (refer to page 29 for specific examples)
- Hand Clapping Activities
  - Stella Ella Ola
  - Miss Mary Mack
  - Rockin' Robin
  - Slide
- Exercise Dice (refer to page 32)
- Stretching
- Tag
- Hopscotch
- Jump rope
- Obstacle courses

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Questions?

APPENDIX F
MEDIA CONSENT FORM AND RELEASE FOR MINOR CHILDREN

MEDIA CONSENT FORM AND RELEASE FOR MINOR CHILDREN

I am the parent/guardian of Cameron Manke (print full name of the child) ("My Child"). I hereby grant The University of North Dakota ("University"), The University of North Dakota School of Medicine and Health Sciences ("SMHS"), and their agents the absolute right and permission to use photographic portraits, pictures, digital images or videotapes of My Child, or in which My Child may be included in whole or part, or reproductions thereof in color or otherwise for any lawful purpose whatsoever, including but not limited to use in any University publication or on the University websites, without payment or any other consideration.

I hereby waive any right that I may have to inspect and/or approve the finished product or the copy that may be used in connection therewith, wherein My Child's likeness appears, or the use to which it may be applied.

I hereby release, discharge, and agree to indemnify and hold harmless the University, SMHS and their agents from all claims, demands and causes of action that I or My Child have or may have by reason of this authorization or use of My Child's photographic portraits, pictures, digital images or videotapes, including any liability by virtue of any blurring, distortion, alteration, optical illusion, or use in composite form, whether intentional or otherwise, that may occur or be produced in the taking of said images or videotapes, or in processing tending towards that completion of the finished product, including publication on the internet, in brochures, or any other advertisements or promotional materials.

I represent that I am at least eighteen (18) years of age and am fully competent to sign this Release.

THIS IS A RELEASE OF LEGAL RIGHTS.
READ IT CAREFULLY AND BE CERTAIN YOU UNDERSTAND IT BEFORE SIGNING

(Both parents, if possible)

PLEASE CHECK ONE OF THE BOXES BELOW THEN SIGN YOUR NAME(S)

☒ CONSENT: We/I hereby certify that We/I are/am the parent(s) or guardian(s) of the above-named child and do hereby give our/my consent without reservation to the foregoing on behalf of My Child.

☐ NON-CONSENT: We/I hereby certify that We/I are/am the parent(s) or guardian(s) of the above-named child and do not hereby give our/my consent without reservation to the foregoing on behalf of My Child.

Jamie Manke 3/12/22

(Mother/Guardian's Signature) (Date)

Jamie Manke

(Mother/Guardian's Printed Name)

3/12/22

(Father/Guardian's Signature) (Date)

RYAN MANKE

(Father/Guardian's Printed Name)