



Improving attention among children with retained primitive reflex: A systematic review

Namrata¹, Neha Jain², S K Meena³

¹ Research Scholar, Department of Occupational Therapy (Paediatrics), Mahatma Gandhi Occupational Therapy College, MGUMST, Jaipur, Rajasthan, India

² Associate Professor, Department of Occupational Therapy, Mahatma Gandhi Occupational Therapy College, MGUMST, Jaipur, Rajasthan, India

³ Principal, Department of Occupational Therapy, Mahatma Gandhi Occupational Therapy College, MGUMST, Jaipur, Rajasthan, India

Abstract

Background: Attention difficulties can have far-reaching consequences for a child's development. Occupational therapy, based on the premise that retained primitive reflexes might contribute to attention challenges, has emerged as a potential intervention. This systematic review aims to critically evaluate the existing literature on the effectiveness of occupational therapy in enhancing attention among children. Rigorous, well-designed randomized controlled trials (RCT) are essential to establish a more definitive understanding of occupational therapy's efficacy for attention improvement in children. Therefore, a systemic review was conducted to evaluate the association between Attention deficit and retained primitive reflexes in children to gather more information and evidence to reduce the risk of attention deficit in children.

Objectives: This systematic review aims to critically evaluate the existing literature on the effectiveness of Occupational therapy intervention on retained primitive reflex to improve attention among children.

Methods: A systematic literature search was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The search was done on databases (PubMed, Scopus, Research Gate, Web Science, Open-Access) & Google Scholar and the relevant article date 2000 to date 2023. The included articles were Randomized control trials (RCT), Attention problem, Retained primitive reflex, academic achievement, occupational therapy. Articles with least amount of information with these topics, language other than English language and study with no access to full article were being excluded.

Results: The initial search included 131 potentially relevant articles out of which 25 studies were excluded as duplicates, 51 studies were excluded as they didn't meet inclusion and exclusion criteria, 47 articles didn't mention the intervention protocol and 08 studies were included for review. All the review articles were identified as RCT with total participants of 560 in total.

Conclusion: After going through all the reviews included in this literature the existing evidence tentatively suggests that occupational therapy might have a positive impact on attention improvement in children with retained primitive reflex, the overall quality of evidence is constrained by methodological limitations. Well-designed RCT with larger sample sizes and standardized intervention protocols are needed to establish a more conclusive understanding of the effectiveness of occupational therapy intervention for enhancing attention in children. Practitioners and researchers should interpret the findings with caution and prioritize rigorous investigation in this field. Therefore, it can be said that a thorough investigation will yield positive findings, point out gaps in the literature, and recommend directions for further investigation in this area.

Keywords: Retained primitive reflex, attention, occupational therapy, randomised control trial, academic achievement.

Introduction

In the womb, primitive reflexes are formed. They are regarded as a crucial component of a child's neurophysiological growth. The field of neurophysiology studies the physiology of the brain and other parts of the central nervous system. (Blomberg, 2015). Early in a child's existence, primitive reflexes are useful and are engaged during childbirth^[3]. Primitive reflexes are automatic movement patterns that begin throughout pregnancy and are fully present in term infants at birth. They are natural reactions that initiate a developmental process that results in the activation of a brain circuit for a certain purpose. To facilitate the development of natural motoric action, primitive reflexes should integrate and obstruct^[4]. These reflexes are triggered by a stimulus. They play a role in development, and some could even aid in the neonate's survival or ability to form a relationship with a parent. However, to allow for optimal motor development,

basic reflexes should diminish as the newborn develops and integrate into lifelong postural reflexes^[5].

Retained primitive reflex

Retained primitive reflexes are the outcome of a disruption in the process of integrating primitive reflexes (Goddard, 1996). Within the first year of life, in typically developing children, the primitive reflexes integrate or transform (McPhillips & Sheehy, 2004). Reflex integration interrupters have been identified as maternal, environmental, and birthing process stress (Blomberg & Dempsey, 2011; Goddard-Blythe, 2008; Holley, 2010; Hsieh et al., 2011; Thomson, 2007). Retained primitive reflexes have been linked to behavioural and learning problems^[3]. While retained primitive reflexes are recognized as indicators of disease in some circumstances, such as cerebral palsy, persistent primitive reflex activity in the absence of pathology has long been controversial, with some specialists denying their existence in the general

population. The general medical opinion for a long time was that if a patient still had primitive reflexes, it was a sign of disease and would not improve with treatment. The idea that abnormal primitive and postural reflex activity can occur in the general population is now being supported by an increasing number of research (Bender, 1976; Blythe & McGlown, 1981; Goddard Blythe, 2001; Gustafsson, 1971; McPhillips & Sheehy, 2004; Rider, 1972; Wilkinson, 1994). Additionally, the theory states that abnormal reflexes frequently react to particular kinds of remedial intervention (Bender, 1976; O'Dell & Cook, 1996; McPhillips, Hepper, & Mulhern, 2000^[6]).

Objectives: This systematic review aims to critically evaluate the existing literature on the effectiveness of Occupational therapy intervention on retained primitive reflex to improve attention among children.

Method

Eligibility criteria

Inclusion criteria

- RCT
- Attention problem
- Retained primitive reflex in children
- Occupational therapy to improve attention
- Academic achievement in children

Exclusion Criteria

- Articles with least amount of information with these topics
- Language other than English language
- Study with no access to full article

Information Source: The database searched: PubMed, Access open, Google Scholar, Research gate, Web of Science, Scopus

Search strategy: The following databases were thoroughly searched: PubMed, Scopus, Web of Science, Google Scholar, Access Open, Research Gate, and Online journals from (2000) to (2023). Attention, retained primitive reflex, occupational therapy and academic achievement were utilised as search terms or keywords. Additionally, all publications selected in the first phase's reference lists were personally searched. Additionally, it was ensured that all articles with a potential of making this judgement were taken into account. There were only English-language results available. Studies were identified by title and abstract and evaluated by the authors to determine whether they met the selection criteria given above. Additional references were searched for using the snowballing method in the reference lists of relevant systematic reviews to ensure that all relevant publications were located.

Selection process: The search results were downloaded with all titles and abstracts from electronic databases in Microsoft Excel software. We ran the search in electronic database and other resources and screened the titles and abstracts. Any irrelevant reports and duplicates during the initial screening were removed. Full text of the records identified for inclusion in the screening was retrieved, and we completed full-text screening. The results of the full-text screening were reviewed for eligibility assessment and final

inclusion. Any disagreement was resolved between us at all the stages of the review.

Data extraction: Title, abstract, and full-text screening of resulting articles was undertaken independently to confirm eligibility criteria were met. We extracted the data from full-text articles separately, and reviewed the data. Disagreements were resolved via discussion and expert consultation. The following information was extracted from each article: first author, year of publication, participants diagnosis, age range, sample size, aim and conclusion.

Result: We identified 08 articles that we have reviewed. The characteristics of the included studies are provided in Table 1.

Study selection: We examined references, (77) of which came from database searches and (54) from other sources. After eliminating duplicates, the total number of references for screening was (106). The first-level screening yielded (55) studies based on title and abstract. All (55) studies were subjected to second-level full-text screening. We removed (47) studies because they did not meet the research's qualifying criteria for participants, intervention, outcome evaluation, and study design. As a result, we included eight studies in the review. The search details are displayed in Fig 1 in the form of a PRISMA flowchart

Limitation: One of the primary limitations might be the scarcity of high-quality studies specifically investigating the effectiveness of Occupational therapy intervention on retained primitive reflex to improve attention among children. There were limited number of studies available, which could impact the strength of your review's conclusions. Numerous of the evaluated studies could have had small sample sizes, which would have limited the findings' generalizability and statistical power. Publication bias is another possibility that might distort the overall results since research with favourable outcomes are more likely to be published. The review's included studies range in quality; some lack a strict design and confounding variable control, which compromises the validity and reliability of the findings. Moreover, it is challenging to reliably compare the outcomes of different research due to differences in the end measures employed to evaluate increases in attention. Selection bias in the inclusion and exclusion criteria of the review might also be present, leading to the possible omission of pertinent research that offer a more thorough insight. Lastly, because the majority of research focuses on immediate results, it is difficult to determine the long-term impacts of occupational therapy treatments on children's attention spans. As a result, the long-term implications of these interventions are not fully explored.

Conclusion: It has been shown that functional development and performance are impacted when primitive reflexes continue after the typical time of integration^[15]. The child's normal psychomotor development is impacted by the persistence of primitive reflexes beyond the appropriate time period, even if there are only remains of them. Staff members may respond to patients' persistence more quickly and prevent further problems and consequences if they were aware of the typical time span for reflexes and how they

affect the development of healthy children^[16]. The research study mentioned above provides information on the prevalence, durability, and integration of the primitive reflex as well as the contribution of different therapeutic approaches to its integration. Since it is commonly known that a single programme or intervention can lead to a notable improvement in the integration of reflexes, it is now necessary to combine different treatment techniques in the

form of occupational therapy in order to maximize the integration of reflex improvement in children. The results of the mentioned article indicate that further study is necessary to determine whether occupational therapy may help children with retained primitive reflex to become more attentive.

Characteristics of the included studies

Table 1

Author (year)	Participants diagnosis	age	Sample	Aim	Conclusion
Arrin Christine Brummett et. Al 2022	Early childhood student	4-7 years	69	The goal of the study is to learn more about whether ATNR integration exercises can reduce inattentiveness, which is a symptom of ADHD.	The study found that although the treatment group improved more overall, there was no statistically significant difference between the treatment and control groups' detectability ratings.
Tessa Maude Grigg et. al 2018	School going children	6-9 year	98	The objective of the research was to examine RMT management in the classroom and any potential effects on learning objectives, student performance, or behavioral consequences.	RMT has been shown to be an effective, low-cost intervention with a limited likelihood for children to retain primitive reflexes. In addition, teachers and children may benefit from a minor investment in RMT.
Valentin Benzing (2017)	ADHD	8-12 year	66	The aim of the study is to examine the effects of a cognitively and physically demanding exergame on executive functions of children with ADHD.	This study sheds light on the efficacy of combining exergaming with cognitive and physical training. There is beneficial benefits on executive functioning, athletic motor performance, and symptoms of ADHD.
Meenaksi Batra (2017)	CP children	6 mon to 2 y	30	The study's goal is to determine if Neurodevelopmental Therapy (NDT) or Neurofacilitation of Developmental Reaction (NFDR) is more effective in integrating or changing early motor behaviors (primitive reflexes) in cerebral palsy.	Result shows NFDR is more successful in helping CP patients develop higher-level motor control and modulate or integrate their early motor behavior.
Hannah Kirk (2017)	children with IDD	4-11 year	76	This study investigated the effects of computerized attention training on untrained outcomes in children with intellectual and developmental impairments, including executive functioning, reading and numeracy skills, and behavioral/emotional issues.	When compared to the control group, children in the attention training group had a significantly greater improvement in their numeracy skills as evaluated by the TEMA-3.
Marthe van der Donk (2015)	Children with ADHD	8 -12 years	100	The purpose of this randomized controlled experiment was to replicate and expand on earlier research on Cogmed Working Memory Training (CWMT) in children with attention deficit/hyperactivity disorder (ADHD).	Findings indicated that the Spatial Span task's Forward condition was the only one where the treatment and interaction effects were noticeable, indicating that CWMT's superiority over the PAC intervention was limited to short-term memory.
Anett Kaale 2012	autism	24–60 month	61	This RCT evaluated, with a modified version of a specialist-mediated intervention created by Kasari et al. (2006), (2008), if a preschool-based JA-intervention would increase JA (Joint attention) and JE (joint engagement) in young autistic children.	The results demonstrated significant differences between the intervention and control groups. The intervention group exhibiting higher levels of JA initiation during interactions with preschool teachers.
M McPhillips 2000	children with persistent primary reflexes	8–11 years	60	The study shows how a child's early neurodevelopmental system—the primary-reflex system—may be interfering with their ability to acquire knowledge.	The findings support earlier research showing persistent primary reflexes, especially the ATNR, have consequences on cognitive domains in addition to the evident disturbance of motor development.

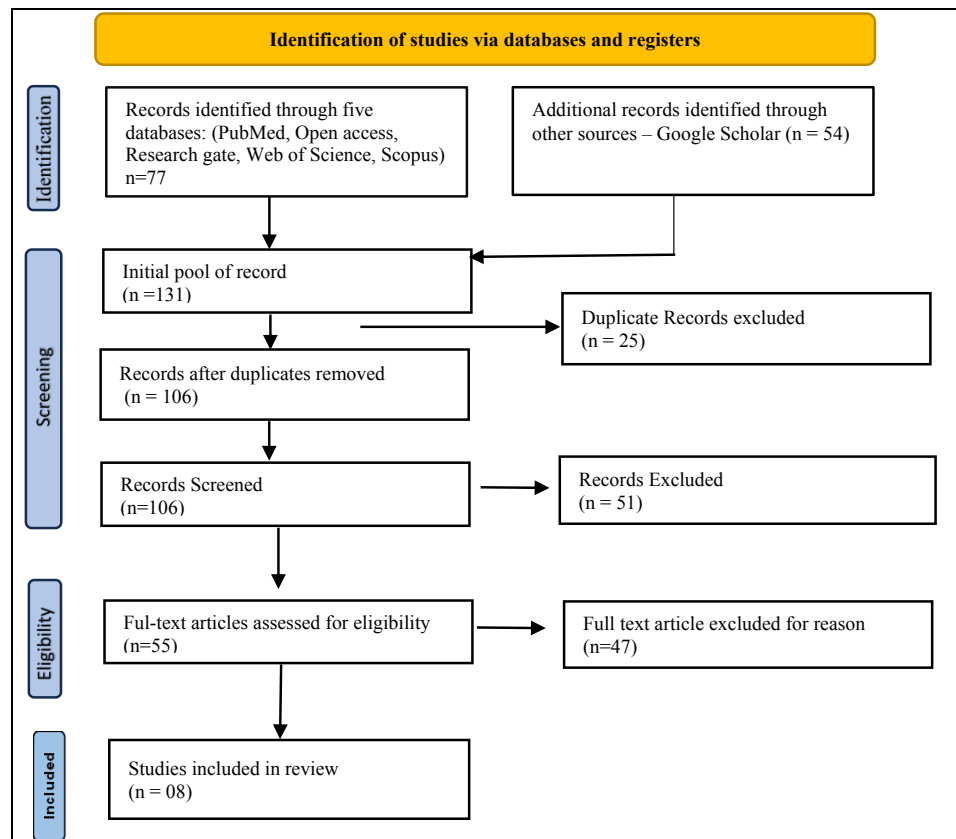


Fig 1: PRISMA Flowchart of the Search Process

References

- Hickey J, Feldhacker DR. Primitive reflex retention and attention among preschool children. *Journal of Occupational Therapy, Schools, & Early Intervention*, 2022;15(1):1-3.
- Suvarna BS, Kamath A. Prevalence of attention deficit disorder among preschool age children. *Nepal Med Coll J*, 2009;11(1):1-4.
- Grigg TM. The influences of a primitive reflex integration programme within the classroom: teacher/parent perspectives and student results. *Education: Theses and Dissertations* [706].
- Gieysztor EZ, Chojińska A, Paprocka-Borowicz M. Persistence of primitive reflexes and associated motor problems in healthy preschool children. *Archives of Medical Science*, 2018;14(1):167-73.
- Chandrasa M, Rathnayake L. Retained primitive reflexes in children, clinical implications and targeted home-based interventions. *Nursing Children and Young People*, 2024;36(2).
- Blythe SG. Releasing educational potential through movement: A summary of individual studies carried out using the INPP test battery and developmental exercise programme for use in schools with children with special needs. *Child Care in Practice*, 2005;11(4):415-32.
- Brummett AC. Improving Inattentiveness Through Asymmetric Tonic Neck Reflex Integration Exercises: A Quantitative, Quasi-Experimental Study.
- Grigg TM. The influences of a primitive reflex integration programme within the classroom: Teacher/parent perspectives and student results.
- Benzing V, Schmidt M. Cognitively and physically demanding exergaming to improve executive functions of children with attention deficit hyperactivity disorder: a randomised clinical trial. *BMC pediatrics*, 2017;17:1-8.
- Batra M, Sharma VP, Batra V, Malik GK, Pandey RM. Neurofacilitation of developmental reaction (NFDR) approach: a practice framework for integration/modification of early motor behavior (primitive reflexes) in cerebral palsy. *The Indian Journal of Pediatrics*, 2012;79:659-63.
- Kirk H, Gray K, Ellis K, Taffe J, Cornish K. Impact of attention training on academic achievement, executive functioning, and behavior: A randomized controlled trial. *American journal on intellectual and developmental disabilities*, 2017;122(2):97-117.
- van der Donk M, Hiemstra-Beernink AC, Tjeenk-Kalff A, Van Der Leij A, Lindauer R. Cognitive training for children with ADHD: a randomized controlled trial of cogmed working memory training and 'paying attention in class'. *Frontiers in psychology*, 2015;6:1081.
- Kaale A, Smith L, Sponheim E. A randomized controlled trial of preschool-based joint attention intervention for children with autism. *Journal of Child psychology and Psychiatry*, 2012;53(1):97-105.
- McPhillips M, Hepper PG, Mulhern G. Effects of replicating primary-reflex movements on specific

- reading difficulties in children: a randomised, double-blind, controlled trial. *The Lancet*, 2000;355(9203):537-41.
15. Feldhacker DR, Cosgrove R, Feiten B, Schmidt K, Stewart M. The correlation between retained primitive reflexes and scholastic performance among early elementary students. *Journal of Occupational Therapy, Schools, & Early Intervention*, 2022;15(3):288-301.
 16. Rashikj Canevska O, Mihajlovska M. Persistence of primitive reflexes and associated problems in children. Годишен зборник на Филозофскиот факултет/Annuaire de la Faculté de Philosophie, 2019.