

Johdatus kehityspsykologiaan

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# **The retained primitive reflexes and their impact on the development of autism spectrum and learning disorders viewed via one case study**

- **Introduction**

Earlier the autism was a very rare condition. Nowadays there is a huge variation of its incidence, the worldwide median being about one in 160 people. (Elsabbagh et al, 2012); Kalat 2016). Mc Kaye et al (2017) found out in their comparative study that based on several research most credible estimate of the occurrence of autism spectrum disorders is 1,04% of the world's population.

The rate of autism and sensory and neurological disorders is in a rise around the world at an alarming rate. According to Stephanie Seneff, senior research scientist at the Massachusetts Institute of Technology MIT, at today's rate by 2025 one in two children will be autistic. (Brandes 2015, 189). It is a scary estimate.

So the question arises, what causes autism spectrum disorders? The single cause of autism is not known but it is generally accepted that it is caused by abnormalities in brain structure or function (Boucher 2009, 211-231)

If the cause of autism is abnormalities in the brain structure and function, why do these abnormalities in the brain arise in the first place? According to several studies to which I will refer to later in this study, there seems to be quite a lot of research and clinical findings from practitioners that the retained non-integrated primitive reflexes are one of the reasons for

various neuro-psychological disorders including autism spectrum disorders, dyslexia, learning disabilities. This has also been noticed by several different modalities for therapies and development programs around the world that are assigned to help children who suffer from autism spectrum disorders and other neurological challenges to integrate the primitive reflexes. In this study, I will discuss both of the research and methods.

The research questions that this study focuses on area to understand the role of primitive reflexes on the development and find out if they when not integrated properly have impact on the occurrence of autism spectrum disorders and the different challenges that are normally associated with it. This study first focuses on finding out what are primitive reflexes, and if the scientific evidence supports the understanding that retained primitive reflexes can cause challenges and be one reason for autism spectrum disorders. This happens via screening the existing research as well as via a case study.

If this is true, I would have a strong willingness to do something about this, and perhaps start spreading this information even more to the people that are unaware of these possibilities to support children's development in a more effective way.

- **What are primitive reflexes?**

Early in life and in the womb our brainstem has several reflexes called primitive reflexes. After we have been born they help us to grow properly and safely, such as in the birthing process, with breast feeding and with gripping onto things. As we mature these reflexes are no longer needed and when the normal development occurs the higher brain takes over. However, because of birth trauma or developmental restrictions these reflexes might remain dominant, which leads that our nervous system will automatically react inappropriately and undiserably in certain situations and they may affect our ability to learn, develop and behave. (Walker)

A reflex is an unlearned involuntary response, action or movement that responds to a particular stimulus. The Brazelton Neonatal behavioural Assessment Scale (NBAS) is a test that measures newborn's responsiveness and records 46 behaviors, including 20 reflexes. Newborns have three sets of primitive reflexes that are necessary for survival and they are

reflexes that maintain oxygen supply (the breathing reflex), reflexes that maintain body temperature and reflexes that manage feeding (the sucking, rooting, and swallowing reflexes) There are other reflexes that signify the state brain and body functions, but are not necessary for survival, such as, Babinski, stepping, swimming, palmar grasping reflex and moro reflex. (Berger 2011, 113). It is interesting and strange that having primitive reflexes are essential to childs' development, and many of them are checked by the doctor after the birth but after that here is so little attention paid to them after that.

It is also interesting that Berger (2011), states that it is not true that babies must crawl to develop normally. This is totally opposite what Dr. Melillo, the founder of Brain Balance Achievement centers state. According to him the brain does not develop in a random way, since the senses pick up the stimulation and lead it to the brain in a very methodical way to create specific parts of the brain, and that is why the childhood milestones are so important. All the development should happen in a planned sequence. This becomes more apparent when there are symptoms of ADHD, Autism and other neurological disorders. (Melillo, 2009, 27-28)

Melillo (2009, 43) also states that children should outgrow their primitive reflexes by the end of the last year. Also problems performing primitive reflexes, like challenges in suckling or inability to feed at the breast, are according to him also signs of improper brain development.

Also Brandes (2015, 237) point out that timing and duration is very important in the development of reflexes, since each reflex has its own distinct timing and duration. If these are not happening as they should it may cause direct damage to the nerve nets and immature connections resulting in developmental delays. Various factors influence reflex retention and disrupt the neurological system's harmony, such as birth, diet, toxins, movement, toxic environmental factors, accidents, disease.

- **Research of the impact of retained primitive reflexes**

There are already a several studies that have found out that the retained or not integrated primitive reflexes have impact on the proper development of a child

In the study by Bilbilaj et al. was found that children with learning disorders have a high level of retained primitive reflexes compared to other children. The findings of this study suggest

the need for scientific research to inhibit the primitive reflexes at a young age, but also when they are present beyond their biological age. These children often experience difficulties and suffer from the increased presence of instinctive movements and their cognitive development is not happening as it should be because of the reflexive movements for the creation of new nerve pathways and schemes. They also found that children who have retained primitive reflexes have low school achievement and various concentration as well as behavior problems. In their study they also found that all children have unwanted reflexes regardless of the type of disorder that they carry: autism, hyperactivity, dyslexia, or disruption of communication. All children saw an overlap of the primitive reflexes with two or more reflexes. The data from the parents' interviews were almost the same as neuropsychiatric data from the measurement of primitive reflexes. The researchers also notice that there is a lack of theoretical and practical information from the family and the school about primitive reflexes and their impact on the individuals. (Bilbilaj et al 2017, 296)

Konicarova and Bob (2012, 135-137) found out in their study that children with ADHD have higher ratings of primitive reflexes (they focused on Moro Reflex and Galant Reflex) than healthy children who had lower scores in primitive reflexes. They suggest that “these persisting developmental stages related to certain motor and cognitive functions may indicate that ADHD present a compensation of unfinished developmental stages related to diminishing of primitive reflexes that may occur as a response to various stimuli.” According to Bloomberg (2012, 92) children with ADHD have always non-integrated primitive reflexes.

In the study by [Dutia et al.\(1981\)](#) the relationship between a normal intact cerebellum and primitive reflexes was researched.” Tonic labyrinth and neck reflexes were studied separately and in combination in the decerebrate cat before and after acute cerebellectomy. The investigators noted clear changes in these reflexes both before and after surgery. They concluded that the presence of the cerebellum is required for the occurrence of the normal asymmetric labyrinth reflexes. Decreased size and immaturity as well as dysfunction of the cerebellum and the inferior olive are seen in almost all children with neurobehavioral disorders and these factors are thought to play a critical role in the development of normal coordination and synchronization of the motor system and the brain”. ([Melillo, 2011](#); [Leisman et al., 2013](#)).

McPhillips et al (2000) found in their study that “there is a link between reading difficulties and control of movement in children and specifically the educational functioning of children may be linked to interference from an early neurodevelopmental system (the primary-reflex system).

According to Branders (2015) when one or more reflexes are not maturing and will not integrate as they are supposed to with the nervous system, neurological conditions eg. Autism spectrum disorder, cerebral palsy or ADHD will develop. Unintegrated reflexes can cause a constant stress on the nervous system and the brain needs to work harder.

[Teitelbaum et al. \(2002\)](#) suggested that “movement disturbances in infants can be interpreted as “reflexes gone astray” and may be early indicators of autism. They noted that in the children they reviewed, some had reflexes that persisted too long in infancy, whereas others first appeared much later than they should. The asymmetric tonic neck reflex is one reflex that they noted may persist too long in autism. Head verticalization in response to body tilt they noted is a reflex that does not appear when it should in a subgroup of “autistic-to-be” infants They suggested that these reflexes may be used by pediatricians to screen for neurological dysfunction that may be markers for autism”. ([Melillo, 2011](#); [Leisman et al., 2013](#))

Melillo and Leisman also state that persistent primitive reflexes have been noted in a number of neurobehavioral disorders and are thought to be related to delayed or absent developmental milestones in these children. Very often there is also clumsiness, incoordination, awkward posture, gait and other motor disturbances amongst these children. “Also cognitive dysfunction seems to be related to the motor incoordination. Almost all neurodevelopmental disorders such as ADHD, autism, dyslexia have been associated with anatomical and functional effects that correlate with the motor incoordination, motor disturbance, cognitive delays and the presence of persistent primitive reflexes. For some time researchers have debated if the structural anatomic and volumetric differences in disorders such as ADHD and autism represent deviant developmental changes or whether they reflect a maturational delay. In this paper we review the literature that clearly demonstrates that these disorders and the structural differences represent cortical maturational delays not deviant development. They also stress that persistent primitive reflexes are the earliest markers for this delay and that this delayed maturation will eventually lead to the presence of

autism, ADHD, and other neurobehavioral disorders. They also note that these disorders and their recent reported increased incidence is related to a combination of genetic and epigenetic factors mostly driven by environmental and lifestyle changes affecting early motor development, sensory stimulation and activity dependent synaptogenesis and neuroplasticity. Symptom variations between these neurobehavioral disorders may be related to asymmetrical maturational differences resulting from different rates of maturation of the right and left hemisphere. Asymmetric persistent primitive reflexes may also be an early marker related to this maturational imbalance. This abnormal pattern of hemispheric asymmetry may lead to desynchronization, underconnectivity, and ultimately a functional disconnection between regions of the brain and cortex. They also suggest that exercises can inhibit and remediate persistent primitive reflexes as one possible target for early treatment of these disorders.” (Melillo & Leisman, 2011).

According to Branders (2015, 168) reflexes are one of the most important aspects of keeping the nervous system in shape. Branders is originally a teacher who has researched primitive reflexes and supported the development of children for several decades and has developed her own methodology. According to Brandes (2015, 255) the following conditions indicate the presence of reflexes that are not yet integrated: sensory integration disorders, vision and hearing challenges, extreme shyness, lack of confidence, autism, ADHD, learning challenges, developmental delays disorganization, fidgeting, decreased concentration.

- **The introduction of few primitive reflexes and a case study reflecting the impact of primitive reflexes**

In this chapter, I will present a few most important primitive reflexes that based on studies and practitioners are when not properly integrated are impacting autism spectrum disorders and learning disabilities, and also view the theory in connection to the development journey of a boy suffering from autism spectrum disorder and the state of his primitive reflexes and what kind of impact it has had on his development.

## 4.1 Case study introduction

Let me introduce a boy, whose name is Onni (name changed). He was born to his parents as their first child. He was very much expected and the mother was very cautious during the pregnancy to support the development of the child in the best possible way. The only things that might have an impact on the development, where a mild stress the mother was experiencing at her work as well as eating candies. At the birth hospital the boy had hard time sucking the milk from the breast and it took a lot of practice and external help during the first days of his life to succeed in that. Therefore, it was evident that his sucking reflex did not work properly. He was also very crying and had a lot of stomach problems, and eg. Reflux after breastfeeding.

He pretty much developed normally except for he almost passed the crawling phase since he started crawling on his knees. All of these above mentioned challenges were signs of still active primitive reflexes, which no one in the public healthcare ever brought up. He has developmental delay since he was very little and still has challenges to concentrate and learn. Onni done multitude of the therapies and programs in Finland both in the public sector and also in the private sector since he was three he has received different interventions, assessment, therapies, sessions by the public healthcare.

When he was 8 years old he was assessed at Brain Balance center in USA ([www.brainbalancecenters.com](http://www.brainbalancecenters.com)) and the boy took a 3 month program there. Based on the initial tests back then he had multiple primitive reflexes active such as Rooting, Moro, Grasping, ATNR, TLR, Landau and Spinal Galant, which were said to cause him all the troubles. The brain balance program which is a holistic non-drug program focusing on motor sensory stimulation, interactive metronome, clean eating (gluten-free, dairy-free and sugar free), music, smell, and home exercises for many years. One of the most important part of the brain balance center program is the assessment and integration of the primitive reflexes. It included motor sensory exercises to integrate the primitive reflexes and strengthen the weaker area of the brain (left/right) done both in the center as well as 1-3 times a day at home. The primitive reflexes can be very persistent and the older the child gets and stronger the impact of the reflexes still is, the more repetitions and longer time it requires to integrate them.

The family had not ever heard about these primitive reflexes before from the public sector professional in Finland – and there are amount 20-30 professionals throughout the years, while he has done many different tests, therapies and interventions.

Today at the age of 13 and after persistent exercising of these specific exercises with the aim of integrating the primitive reflexes, he no longer have rooting, grasping, TLR, or Spinal Galant reflexes active, which is great. The long and persistent work has paid off.

In this chapter I explore more these primitive reflexes that he has already integrated (eg. Grasping, TLR, Landau and Spinal Galant) and those that still are active according to latest test results (Moro reflex, Assymmetrical Tonic Neck Reflex and Symmetrical Tonic Neck Reflex).

- [Spinal Galant Reflex](#)

One of the first reflexes to appear along with moro reflex is a spinal reflex, known as the spinal Galant reflex. It develops already in utero and its purpose is to facilitate the development of anatomy, physiology of the auditory processing system, as well as creating the proper position for birth. It remains active during the first three to six months of life. Retaining this reflex may be shown in difficulties in controlling legs, unbalanced gait, scoliosis, hypersensitivity to tactile stimulation. The children might have hard time sitting still and quietly and requesting to do that might lead to noise-making. Also challenges with focus, concentration, and school performance, delayed cognition, poor short-term memory, and mental fatigue. There also seems to be impairment in fine motor coordination, notably handwriting. (Brandes 2015, 643-660)

In Onni's case the spinal Galant reflex has been present earlier, but according to the tests not any more. However, he still has hard time sitting quietly, and he still makes quite a lot of noise and unrelevant comments at school. Also his concentration skills could be better as well as his handwriting. It might be that the spinal galant is still active a bit.

### 4.3 Grasping reflex

The grasping reflex emerges at the eleventh week in the utero and by the end of the first year the reflex should be integrated. The purpose of the reflex is to govern the baby's ability to grasp and hold objects and has impact on oral motor movement eg. Sucking. The mouth movements are important both in feeding and in speech. Grasping reflex is important in handwriting, drawing and using of scissors as well as feeding and dressing himself eg. Using buttons and tightening shoes. The reflex also influences oral motor movements. If the grasping reflexes are retained it will result in a range of challenges in manual dexterity, upper gross motor skills and speech eg. in the form of stuttering and articulation challenges . It also has impact on crawling, swimming and crasping a ball. (Brandes 2015, 1011-1045)

What comes to Onni he started growling late and still at the age of 8 he could not crasp a ball. He learned to tie his shoes when he was 9 years old. Now all of those activities goes very fluently. However, handwriting is still poor.

### 4.4 Tonic Labyrinth Reflex (TLR)

Tonic labyrinth Reflex has impact on the correct head alignment, contributing to balance, visual tracking, auditory processing and muscle tone. This reflex comes into play at three to four months in utero. Retention of TLR causes developmental delays or neurological abnormalities. These are e.g. weak or tense muscle tone, tires easily, motion sickness, fear of hights, toe walking, balance problems, poor posture, disliking physical activities, spatial orientation. Also auditory processing is often impaired and the child may have hard time blocking out irrelevant stimuli, reading, eye movement, and visual perception, copying from the black board. What is also often present is incomplete left-right brain dominance, which means that that the child uses the left and right hand, foot or ear interchangeably for the same job. Brandes 2015, 1255-1327)

When Onni was a baby he hated to be in the car seat travelling back towards to where the car was driving. At some point he used to walk on his toes and his posture was not correct. He has always had a tremendous amount of energy and becoming fatigued happens only with

school work. He has always loved sports. He still has incomplete left-right brain dominance and has challenges in blocking out irrelevant stimuli.

#### 4.5 Landau reflex

From three months until the child is three or three and a half years old Landau reflex is present. The purpose of Landau reflex is to contribute to the development in several ways, such as vestibular skills, ocular skills (ability to distinguish horizontal and vertical lines), and capacity for three dimensional vision, development of posture and muscle tone. It also helps to develop the other primitive reflexes. Retained Landau reflex may cause challenges in adjusting he muscle tone, self-denial, not asking what he needs, difficulty being assertive, concentrating on details, poor organisational skills, and may lead to depression. It also has been called a joy reflex since it contributes to peaceful and happy feelings. (Brandes 2015, 1160- 1195)

What comes to Onni and how these challenges have been present in him, it must be noted that not so much. Only organisational skills and concentration on details are not his biggest strengths but he has developed in these areas.

#### 4.6 Moro reflex

Moro reflex is along with the Fear Reflex the first reflex that develops. It produces an automatic response to sudden stimuli like loud noises, changes in lighting, movement in the visual field, or tactile contact. It's purpose is to guard that child with a physical reaction to the reflex stimulus before the higher brain center develops. It also helps in learning how to breath and it pumps adrenaline to move in the birth canal. It also creates avoidance response to possible danger, supports in eg. curling, breathing and crying for help. Moro reflex should disappear and integrate to the system about 4-6 months old. If the reflex continues to stay, it can be an indication of neurodevelopmental delays. This may show as child being very attentive to all the sounds and have difficulty falling asleep. The baby may cry a lot and be

difficult to comfort. The child may have hard time sustaining visual attention. He might have hard time catching the ball. Also motion sickness, avoidance of amusement park rides, and poor balance as well as aggressive outbursts are signs of these. A retained Moro can be present in the following conditions: ADHD, Autism, central auditory processing disorders, cerebral palsy, dyspraxia, dyslexia, visual processing disorders, along with other neurological conditions. (Brandes, 2015, 489-552)

When Onni was younger he had hard time falling asleep. It normally took 2 hours to get him asleep. He was crying a lot already in the birth hospital which did not remain unnoticed by the nurses one of them saying that his parents have got a very challenging baby. As a baby he hated sitting in the car chair and he was screaming even the shortest journeys, he most probably had motion sickness. He has since 3 years old been defined as a child with special needs by the experts in the public sector. He has been overly active and hard to focus, hard to learn things, and low impulsive control. Still at the age of 8 it was impossible for him to catch the ball, which he then learned after the first brain balance program.

At the age of 13 his ability to concentrate at school has improved but could still be better, he still has learning challenges, and he at times has poor impulse control as well as emotional immaturity compared to his peers at the same age level. These are typical signs of the non-inhibited Moro Reflex.

#### *4.7 Asymmetrical Tonic Neck Reflex (ATNR)*

ATNR stimulates the baby's kicks in the womb and movement in utero and helps to develop muscle tone. ATNR is reinforced by the birth process. ATNR supports the baby in developing motor skills, eg. rolling over and crawling, early hand coordination, vision vestibular system and its mechanism for balance. ATNR should integrate at 6-7 months old. If not it is known to lead into many developmental delays, or neurological abnormalities, eg. difficulties in movement, coordination, balance, cognition, learning challenges, and serious joint and bone misalignment creating challenges in crawling, walking, reading, handwriting, sports and behavior. It makes it hard for a child to normally develop, impairing the fundamental processes

of balance, hand-eye coordination, eye tracking, binocular vision and bilateral movement. (Brandes, 2015, 806-896) "Onni" has had challenges and still has in all of these except for sports and joint and bone misalignment.

In case the ATNR is not inhibited, the hand and eye want to move together, making it difficult to look up at a blackboard or at the computer while writing. It also effects on how well the child can catch a ball. The person with ATNR still appropriately retained the person can be easily distracted by anything that they see around them. (Walker) This is also true with Onni. As well as he has very bad handwriting, difficulty in reading and writing, and copying from the black board, hard to focus, which are normally a sign of ATNR being still active.

#### *4.8 Symmetrical Tonic Neck Reflex (STNR)*

Between 6-9 months, the symmetrical tonic neck reflex (STNR) comes to the picture, and it integrates very soon after that, which is between 9-11 months of age. This reflex support eg. visual accommodation, binocular vision and binaural hearing, processing of the information in both the left and right hemispheres of the brain, as well as crawling in a cross-lateral manner developing both the fine and gross motor coordination. If the STNR is retained hypotonicity may be present, as well as poor standing and sitting posture, changing focus from near to far which lead to slowness is copying from the blackboard and becoming tired easily. Also poor hand writing, reading difficulties are also typical as well as challenges with concentration and short-term memory and wandering around the class room. In addition poor impulse control is typical. In one study many children who had ADHD had a retained STNR along with a retained ATNR. (Brandes, 2015, 1202-1253)

The STNR is shown especially just prior to crawling as the baby rocks forward and backward when on all fours. When lying on his/her belly with straight legs and bent elbows, they flex their neck forward and their eyes focus on the floor. Then the baby can straighten their arms, which immediately tilts their head back and they start focusing their vision to the distance, while their knees bent. (Walker)

Onni use to wander a lot in the class room, but that is no longer the case. However he still has hard time reading, challenging copying from the board at the school as well as

concentration challenges, and according to the latest test results he still have STNR mildly active. What I have learned from the Brain Balance center from DR. Goldenberg is that even the mildest presence of retaining primitive reflexes can impede the brain to develop at its fullest.

The work integrating the few left primitive reflexes remaining in Onni's body continues and the parents are looking forward and confident in seeing the even better results in the future.

- **Therapies and modalities to integrate the primitive reflexes**

There are many different therapies around the world which aim to integrate primitive reflexes which are based on movement, and many combine it with motorsensory stimulation, light/laser and music. Most of the practitioners seem to be osteopaths, chiropractors, motor sensory therapists. Most of these practitioners and modalities are relying on highly planned movement as method to integrate the reflexes. According to the DR. Carla Hanaford, movement is essential to learning, because it integrates and anchors new information into our neural networks. When we move in an organized manner, full brain activation and integration occurs, the increased blood vessels carry water oxygens and nutrients to the brain, and makes learning possible. (Hanaford, in Brandes 2015, 413)

According to dr Gerken "the origins of neurological disorders are many and they are complicated in nature. Professionals working in neurosensory integration are making a tremendous stride at recovering and rebuilding the nervous system". According to him understanding the primitive reflexes and the role they play in neurological and social development is the key to healing this newest generation." (Dr. Gerken; Brandes, 2015)

Here is one list of the practitioners in this field:

- Dr. Robert Melillo, Brain Balance Achievement Center  
<https://www.brainbalancecenters.com/>
- Quantum Reflex Integration, Brandes, B. <https://reflexintegration.net/>,

- Institutes for Human Potential, <https://iahp.org/contact-info>, Kerstin Linde.
- Dr Harald Blomberg and Moria Dempsey: Rhythmic RTM Training: <http://www.rhythmicmovement.com/>
- Masgutova -MNRI ® Method, Svetlana Masgutova: Neuro-sensory-motor reflex integration method <http://masgutovamethod.com/>
- Method Bobath. Berta Bobath: TNZ (Neuro-Developmental Treatment) <http://www.ndta.org/ndt-certification.php>
- Method Doman: Glenn Doman • INPP Method: Peter Blythe and Sally Goddard-Blythe: <http://www.inpp.org.uk/contact-us/inpp-licentiates/>
- Suur-Helsingin Sensomotorinen keskus, Nina Alopaeus. <http://www.thalamusoy.com/>

One very interesting therapy method to be mentioned here is quantum reflex integration (QRI) which is a method in which acu-reflex points which are linked to primitive reflexes are stimulated by the QRI, harmonic cold laser and sound system. It works in the cellular level to repair nerve cells and stimulate integration of the reflexes. (Brandes 2015, 237)

Many of these web pages share descriptive client stories about how these have helped people with eg. autism spectrum disorders, which of course is not valid as such for any research purposes. There are also many books (eg. Melillo, Bloomberg, Brandes) written with home programs including the assessment of if the reflexes are still unintegrated as well as different exercises to integrate the reflexes.

- **Conclusion**

As we can see there is already many research done related to the impact of primitive reflexes on the existence of autism spectrum disorders and a shared view on this amongst various

practitioners who help children to get primitive reflexes integrated around the world. Even though these individual stories are necessarily not academically valid, but the existence of different modalities and methods working for the same purpose to address the non-integrated primitive reflexes, confirms to me that this is an area that should be focused among other things when helping the development of people suffering from autism spectrum disorders.

There is also a widespread understanding that the brain change and the concept of neuroplasticity throughout the lifespan of a human being. In the neuroplasticity is meant “the brain's ability to reorganize itself by forming new neural connections throughout life”. Neuroplasticity allows the neurons (nerve cells) in the brain to compensate for injury and disease and to adjust their activities in response to new situations or to changes in their environment.

Even though there seems to be knowledge about this, it remains to be a huge question mark why this knowledge does not spread here in Finland to the public healthcare. Eg. even though the boy in this case study has gone through all the possible therapies and interventions no one except the osteopath and Suur-Helsingin Sensorismotorinen keskus that was found by the family less than a year ago, has mentioned the retention of primitive reflexes as a critical area to be worked on. I wonder what more is needed for the public health care to become interested in this. Is it because there is not yet enough of validated studies, or is it because of the lack of trust who has done them, or is it because people are just unaware of the existent of these studies or rigidly believing what they have learned as part of their own studies. I will continue my journey to find it out and perhaps there opens new ways to release the true potential of people suffering from autism spectrum disorders in Finland even more as well.

- **Suggestions for further studies and next steps**

After doing this study, one thing is clear and that is that this is an area that needs and deserves more exploration especially in terms of what modalities and therapies are most

effective to integrate the primitive reflexes. Based on this study working with these can help people suffering from ever increasing autism spectrum disorders.

I would personally like to explore even more the different studies done about this as. There are also interesting conference coming up, where there is more research about the impact of primitive reflexes coming up already in May in Europe.

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Mom of Onni (interview 20.2. and 14 March, 2017, and several assessment reports of “Onni”.