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Case report – Nora in Sweden

Observational research conducted March – July 2022

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Background and objective with Case report

Background

- This report is based on in-depth interviews with Nora's parents and therapist during the time period March 2022 – July 2022.
- Nora has tried Explorer Mini at the clinic since autumn 2021 and received her own device to use at home in March 2022.
- The information in this material was collected and compiled by Scientific & Medical affairs, R&D, Permobil:
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  - *Jennith Bernstein, PT, DPT, ATP/SMS, Clinical Affairs Manager*
  - *Carla Nooijen, PhD, Senior Researcher*

In cooperation with

- *Anna Hägerström, Occupational therapist, Habiliteringsmottagning Örnsköldsvik, Sweden*

The objective of this report

- ICF BASED OVERVIEW: Present a ICF based overview of the client
- USAGE: Present how one of our clients is using and is helped in her everyday life when using Explorer Mini
- USER EXPERIENCE: Present the client's and her parents 'user experience.
- OUTCOMES and CLINICAL EVIDENCE: Presentation of outcomes and clinical evidence related to the information that Nora's parents and therapist has shared with us

Contents

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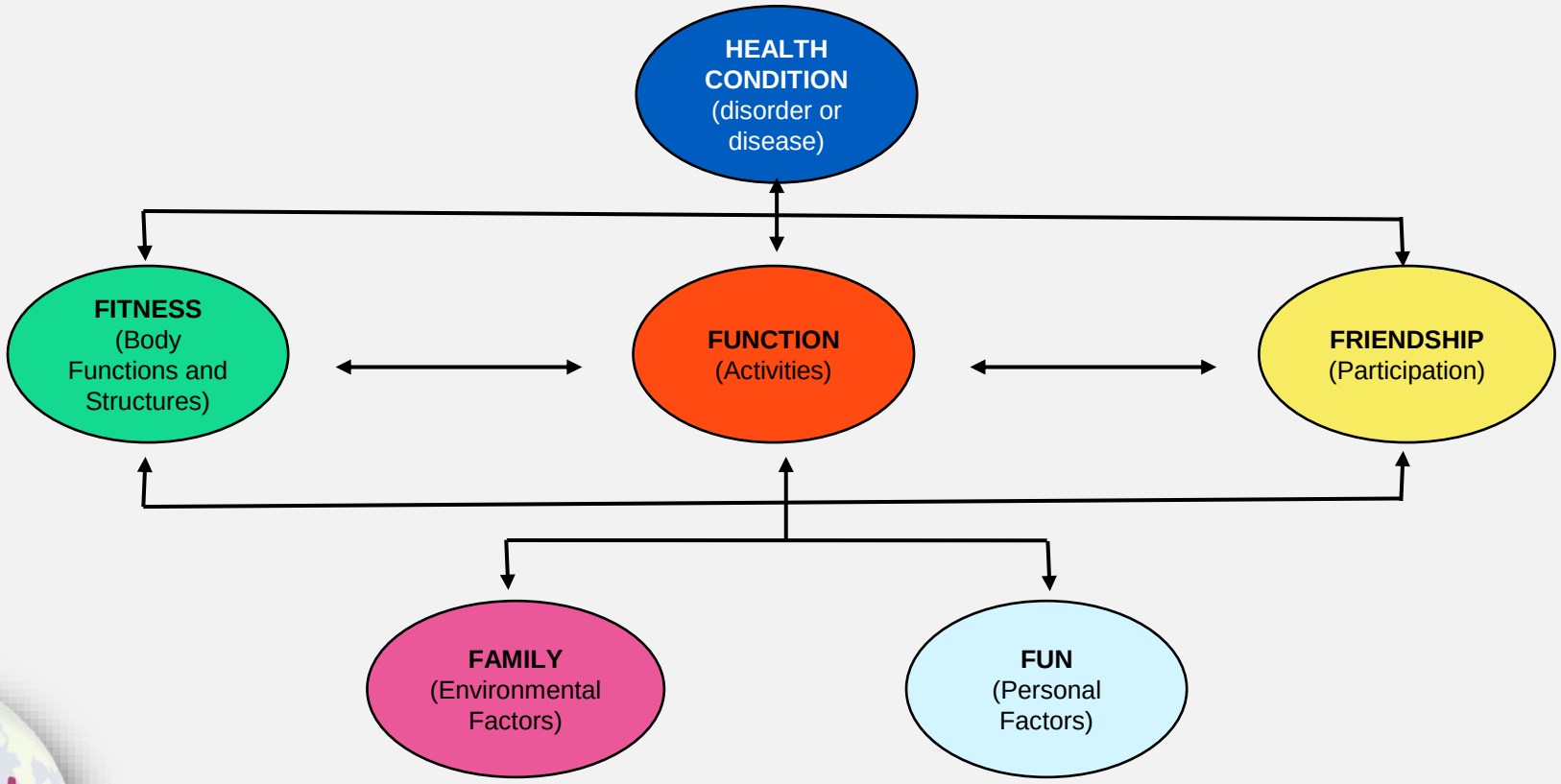
1: Overview:
Contextual factors & Medical condition

User portrait based on CanChild's pediatric interpretation of the ICF model approach

This report is inspired on the CanChild interpretation of the (ICF) Framework.

These 6 F-words are important to all children's development and remind us to focus on what children CAN do.

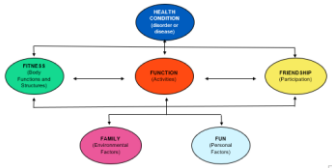
ICF: International Classification of Functioning, Disability and Health
ICF is a framework for describing and organizing information on function and disability. It provides a standard language and conceptual basis for the definition and measurem health and disability (WH



http://canchild.ca/en/research-in-practice/f-words-in-childhood-disability

Nora Overview – Explorer Mini user since March 2022

Client case with applied ICF structure (International Classification of Functioning, Disability and Health)



Health condition

- Dyskinetic cerebral palsy
- Epilepsy – currently rarely occurring due to medicine.

Fitness (Body function and structures)

Represents Body function and structures about how to stay healthy even if it is in a different way than others.

- Motor dysfunction: All four limbs are affected by her condition. However, the legs are more affected than the arms. Able to reach and grab with her arms. She can support her legs when standing but her core is currently preventing her to be able to walk or sit independently. Partial ability to grip at time of intervention: Able to grip for things with each hand but tends to only use the left hand. She is weaker in the right hand.
- Able to role and prop on her forearms.
- Spasticity with dyskinetic movement. Triggered by excitement.
- Speech: Making sounds in a melodic way. Parents feel she is attempting to talk/make words even if meaning is not yet understood by them. Potentially saying “Dad”.
- Cognition: Status uncertain, age equivalent of 9 months at age 1.5 years. Parents finds her cognitively able and that she understands, but she is restricted from her body.
- GMFCS: No information

Outcome

- Nora is getting physical and cognitive training as a joyful bonus from play.
- Motor function: During the test period Nora preferred to use her weaker right hand for driving which has improved her ability to open her hand and grip the joystick. She has also improved her overall ability to grip with both hands e.g when sitting on a rocking horse.
- More aware and noticing, visually looking around the room.
- Improved endurance and body strength.

Function (Activities)

Represents Activities how a child can do things by letting them try in a more kid-friendly and playful way.

- Parents want Nora to be able to be as active as possible in the daily activities around the home.
- Meets regularly with Occupational and Physio therapist for therapy including swimming sessions.
- Siblings and parents working with Nora at home with coordination activities like clapping hands and reaching.

Outcome

- With the Explorer Mini she is able to independently explore around the home, able to get to where she wants to be, and do things that she wants to
- Participates in daily activities while sitting in Explorer Mini or working chair.
- Increased level of purposeful looking, focusing on things she wants to have.
- Vocalizing more, communicates more.

Family (Environmental factors)

Represents Environmental factors where the family is who the child knows and trusts.

- Living together with Mom and Dad and 3 older siblings in a house in northern part of Sweden.
- Attends an inclusive public daycare, provider. Extra resources are supporting Nora during the day.

Outcome

- Increased participation i.e., more included in activities with family and other around her.
- Able to drive independently 700 meters to her grandparents

Friendships (Participation)

Represents Participation in developing and having childhood friendships.

- Nora has siblings at home and cousins in similar ages in her near network which she regularly plays with.
- At pre school she is participating in the activities using various devices including her own sledge.

Outcome

- Nora can be more included and participate in the play in a different way when being in the Explorer Mini e.g., playing hide and seek or play with toys on the tray.
- With the Explorer Mini she is hanging out with her peers on the school-yard. They follow her around while driving.

Fun (Personal factors)

Represents Personal factors in terms of growing through fun and play.

- Birth data: Girl born in April 2020, currently 2 years old
- Height: 81 cm / 32 inches
- Weight: 10 kg / 22 lb
- Interests: Loves her jump swing and speed, enjoys going on slides and skiing down hill.
- Using the Explorer Mini at home since March 2022 and in clinic since Autumn 2021.

Outcome

- Nora is content and expressing happiness driving around in the device.
- Exploring and experiencing the room and the environment around her, learning spatial skills. More interested about what is going on around her.

Evidence-based lived experiences

This is a summary slide of key take-aways to bring together Nora's self-report with established clinical evidence

"It was when she was in it driving around and then she suddenly noticed her jump swing and she drove to it and really wanted to have it, and somethings when she drives and accidently hits the joystick while driving, she has gone back to reach what she wanted, and then it really felt as if she had really got to where she wanted to." – Dad

Research shows that on-time mobility:

- Allows for self directed mobility[12]
- Proportional drive control provides direction-specific exploratory movement for motor and sensory development[6]
- Aids in the development of visual perception[4]
- Provides midline position for joystick control to promote visual coordination[5]

"Nora can be more involved now when they play, before they would sit on the mat and play or train to make her move toward them in the walker, but now with this they have a more playful and fun interaction. It feels more like playing even if it is still actually training." Mom

Research studies show that on-time mobility:

- Allows the user to participate with increased frequency in desired activities and life roles[18]
- Aids in the development of psychosocial skills[16]
- Aids in the development of verbal and non-verbal communication[17]
- Aids in the development of functional activities including play[14]

"She tries to reach for things more, for example she grabs the papers on the fridge. I think oh, that is great, but at the same time oh, that is so wrong."

-Mom

Research studies show that on-time mobility:

- Promotes safe, stable, and upright postures, thereby providing opportunities to develop strength, sitting tolerance and postural control[1]
- Aids in the development of motor skills[2]
- Provides midline position for joystick control to encourage bilateral integration, allowing upper extremities to be used together in a coordinated way[3]
- Aids in the development of cognition[7]

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How does Nora's experience compare to a global consensus?

As described in "A Guideline to Introducing Powered Mobility to Infants and Toddlers" – Feldner, Plummer & Hendry

Driving to learn

- Learning group: Operational (requires close adult supervision, training occurs in more than one environment, engage in specific play activities)
- ALP: Beginner ↔ **Advanced beginner** ↔ Sophisticated beginner
- Intermediate learning stage: beginning goal-directed movement, incorporating toys and familiar trusted adults for motivation, greater attention to the environment

Communication & Language

- Shared attention is evidenced by smiling facial gestures, increased awareness and attentiveness, vocalizations are increased
- Previously expressed frustration with inability to mobilize when laying down or in a static device, she is more content when in the Explorer Mini
- Shows discontent when parents try to help or when she has to get out of the device
- Expressing more sounds and mimicking words

Motor and sensory development

- Translating to skills outside of Explorer Mini: She is now able to use both hands with stronger grip on therapeutic riding horse
- Increasing use of weaker hand for tasks
- She can spend longer time upright or standing when using the Explorer Mini, which allows increased time to explore, take in her surroundings, touch and interact with her surroundings

2: Meet Nora

Meet Nora

- **Name:** Nora
- **Born:** April 2020
- **Age:** 2
- **Height:** 81 cm / 32 inches
- **Weight**: 10 kg / 22 lbs
- **Family**: Mom, Dad and 3 older siblings
- **Interests:** Loves her jump swing and speed, enjoys going on slides and skiing down hill.
- **Diagnosis/condition:** Dyskinetic cerebral palsy resulting in tensions/high tone when trying to reach something. Legs more affected than the arms. Right hand weaker than the left.
- **Day care:** Attends an inclusive public daycare during the weeks with extra resources to support Nora during the day.
- **Therapy:** She visits the pediatric rehab clinic every week meeting with the Physio therapist and occupational therapist. Also has swim lessons
  - **Other assistive devices:** Working chair (static activity chair with saddle seat), Standing shell, Stander, Walker, Crawling board, Hand orthrosis.
- **Main purpose to introduce Explorer Mini:** Independent mobility, learn about spatial perception and ability to explore the environment around her**.**

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3: Parents' experience

Independent mobility, freedom of choice and participation

Expectations before using Explorer Mini at home

Expectations before using the device at home

Independent mobility and freedom of choice

- To be able to steer and drive by herself.
- To have the freedom of choice to be where she wants without assistance from family members.
- Reduce level of frustration when willing to communicate and/or move but the body doesn't do what she wants to.

Expected usage situations

- At home, indoors and outdoors.
- At the preschool – at least outside on the yard.
- On vacation: Would be nice to bring this along on a caravan holiday so Nora can use this when the kids are biking.

Goals

- **Initial goal:** At the clinic and at home the parents are trying to get her to sit upright in a more midline position, they are not setting up a specific route or directional goal. The goal with the driving is more to get familiarize her about the room and to make her learn that if she touches the joystick she will get somewhere.
- **Long term goal:** To get spatial understanding and independent mobility and participation. At home the parents are planning to hang up things around the house to motivate Nora to drive to that, like a giant baby gym at home.

"My expectations is that she will be able to drive independently, not having to go to her and help her out, but it might take some time. It would be really great if she could get to where she wants, to have that freedom without us having to be there and help her move." Mom

"When we don't understand her or sometimes when she wants to do something specific and she doesn't really succeed, then she can be really upset, and it is probably because she has started to become aware about that the body doesn't function as she wants to." Mom

"We go a lot with the caravan, imagine bringing this along! And when the kids are biking, she can join with this! It is great that we are allowed to drive outside on asphalt!" Dad

Nora is using the Explorer Mini in versatile environments

Experiences after using Explorer Mini at home

Usage situations

- Around the home: Approximately 30 min per session/ at least 1 hour per day
  - *In the morning when the rest of the family is getting ready for school*
  - *Play with siblings e.g., catch or just hanging out together.*
  - *Family time – just hanging out in the social area.*
  - *In the afternoon when mom/dad is preparing dinner.*

- Outdoors: On walks outdoor – up to 700-meter, independent driving. The parents say that Nora is clearly very happy driving outdoors, it is as if she knows she can drive more freely without so many things in the way.

- At pre-school: Nora uses the Explorer Mini at outdoors on the preschool yard. Her peers are really interested to follow Nora around when she is driving it. Parents waited a while before bringing the device to the pre-school. They wanted to make sure that she had got more experience of acknowledging the environment around her when driving since there are so many more things and persons to drive into at the preschool like chairs, desks and other children.

"When I am preparing the others for school, she can be in it, and she is driving around in the hallway doing her thing while I am making everything ready and helping the other children. " Mom

"She drives around here while we are doing other things. Sometimes just sitting driving in circles, but we have a jump swing that she has had since she was little, and she usually drives to that to grab it." Mom

"We took a 700-meter walk to my parents' home and Nora drove by herself almost the whole way. We helped her a bit toward the end where the streets is going upwards, and we realized that she had been driving for a long time." Mom

"It has worked really well at the pre-school. She uses it outdoors. Her friends are very interested in it and thinks it is fun when Nora is driving, they follow her around.." Mom

Nora on her way to her grandparents. A 700-meter-long drive.

Directional driving and activation of her weaker hand

Experiences after using Explorer Mini at home

- Nora is working hard, both mentally and physically when she is in the device, initially, she slept more than usual after the sessions. Parents say that it is more exercise physically and cognitively for Nora than they had anticipated.
- In the beginning it would take some time before she initiated to start driving, but after two months of regular use she initiates to start driving quicker after being placed in the device.
- A positive surprise to the parents and therapist is that she primarily drives with her weaker hand, which gives her extra training for that when being in the device. Uses occasionally both hands or mouth/head to drive.
- Nora conducts purposeful directional driving forward to reach things she wants. At times she ends up just driving around in a circle. After one month of use, moms says she has understood that she can move independently, but she has not yet fully understood that she can't continue forward when bumping into things.
- Pays attention and looks over her shoulder and to the side during reversing. She is generally better in paying attention to what is on the sides vs in front of her when driving.
- When sitting still, she is looking around her, taking in the room and what is going on around her.
- Needs assistance when driving against a wall to reverse and continue her drive. She has not fully understood that she cannot continue forward when driving into something.

A highlight moment:
"It was when she was in it driving around and then she suddenly noticed her jump swing and she drove to it and really wanted to have it, and somethings when she drives and accidently hits the joystick while driving, she has gone back to reach what she wanted, and then it really felt as if she had really got to where she wanted to." Dad

"In everything else she does she uses her left hand, but when driving this she uses the right hand more." Mom

Nora is able to interact in a more relaxed and playful way with her family

Experiences after using Explorer Mini at home

Less feelings of guilt and less stress on the parents

- Nora is content and happy for longer period of time when being in the device. This is helpful because it relieves some stress and feelings of guilt from the parents when they need to do other things like preparing the siblings to go to school or when doing housework.

"I don't feel as guilty placing her in it compared to when I out her into the working chair, because I feel in the working chair, I am still in charge regardless if I am cooking food or folding laundry which are things I really do have to do." Mom

A new way to interact with the siblings and cousins – a more playful and equal interaction

- The siblings already played and interacted a lot with Nora before the EM, but they easily got tired and then Nora become frustrated and calling for the parent's attention which sometimes causes stress for them when trying to do housework like cooking. In the device Nora and her siblings can play in a different way and when they do not want to play, Nora can be with mom while preparing a meal.
- New ways of playing has been enabled with the EM where Nora can participate in a more active way in the actual play since she can move around more independently.
- Parents feels like Nora is getting a better interaction with her peer cousin compared to when being in the walker. Nora is in a better position, a more upright position in the Mini vs the walker in which she is more in a hanging position. This enables them to interact more on the same level even if the cousin is running around, she can now always follow him around.

"It has meant a lot. I think I am calmer now because I know she can move if she wants to and choses to do so. Before she would typically be in the working chair when I had to do something and I would have to steer her around where I was, and she would not be satisfied if. With this she is more content, she is still secured but freer than in the chair. I can tell from her sounds that she is happier." Mom

"Nora can be more involved now when they play, before they would sit on the mat and play or train to make her move toward them in the walker, but now with this they have a more playful and fun interaction. It feels more like playing even if it is still actually training." Mom

"The children have played some "drive and catch" with it where Nora drives toward her siblings and then she gets to chase them." Mom

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Summary of reported outcomes from the parents

Experiences after using Explorer Mini at home

Psychosocial

- More independence, freedom of choice and being mobile to do what she wants even if the body is not always listening.
- Nora is content and happier when in the device. When the parents tries to put her on the mat or in the working chair, she will easily be unhappy and annoyed, and then when they then try and put her in the Explorer Mini, she becomes content. She is often unwilling to get out of and show discontent or gets angry.
- Increased participation i.e., more included in play with family and peers.
- Experiencing the environment around her more - more interested about what is going on.

"She is able to choose by herself, able to feel free and mobile and do want she wants even if the body doesn't always listen. She cannot walk or move by herself, and this feels easier to move with compared to the walker." Mom

"She is happier. It is funny because sometimes she gets in a really bad mood when we try placing her in the working chair or on the mat, and she has not been pleased until she is placed the Permobil [read: Explorer Mini]…when she is in it, even when not driving and we try to lift her up she will object, if you put your hand on it, she will show her discontent and get angry. She is really showing 'NO don't touch!' so I interpret that as she is very happy and content being in it." Mom

Functional

- Exploring the room and the environment around her, learning spatial skills.
- Prefers her weaker hand when driving which overall has improved her ability to use the right hand and grabbing or holding on to things.
- Right hand more open now when reaching for the joystick.
- Increased attempts to reach and grab things e.g., papers on the fridge.
- Able to be more actively involved during play and hang-outs with peers.
- Communication: More verbal, making a more melodic mimic sounds when trying to vocalize. Parents think she tries to speak only they don't really understand it. Might have said "dad".

"Even if they are still training on the same things, the interaction has a more playful characteristic vs before when sitting on a lap or on the matt training." Mom

Clinical

- More aware and noticing, visually looking around the room.
- Improved endurance and body strength.
- Physical and cognitive training as a joyful bonus from play.

"She tries to reach for things more, for example she grabs the papers on the fridge. I think oh that is great, but at the same time oh that is so wrong. ☺" Mom

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Training is an extra bonus from joyful play

Reported benefits when comparing other assistive devices used at home

The main difference between the Explorer Mini vs the working chair:

- **Independent mobility**: *She can move around in the room/change rooms by herself.*
- **Freedom of choice:** *She is more free and able to move to where she wants to be.*
- **Happiness**: *Nora is happier and overall and more content for longer times.*
- **Awareness**: *She is more interested in what is around rather than only of what is in front of her.*
- **Participation***: increases Nora's inclusiveness and interaction during play, more part of the actual activity.*
- **Less feelings of stress and guilt for the parents***: Nora is more content and willing to stay in the device when parents need to do other things.*

The main difference between the Explorer Mini vs the walker:

- **Ease of use**: *It is easier for Nora to move around in the Explorer Mini because it is easier for her to use her hands than her legs. She is even able to use her head* [by placing her mouth on the joystick] *to move the Explorer Mini if she wants to.*
- **Participation:** *The Explorer Mini increases Nora's inclusiveness and interaction during play. Nora has a more upright position in the EM which makes it easier to be included during play vs a more hanging position in the walker which makes that more difficult.*

"She is more interested about what is around her when in it [read the Explorer Mini] compared to the working chair. In the working chair she is more focused on what is in front of her on the tray." Mom

"In the Permobil [Explorer Mini] *she has a choice but when in the working chair it is still me deciding what she shall do." Mom*

The design of the device is appealing and it easy to handle

Experiences of the design of the Explorer Mini

Playful design

- Overall playful design – looks nice
- Appealing for other children and easy to have among other children.

"Other children find is really appealing. Her cousin said, 'wow can I try it' It does look really nice.!" Mom

User interface and driving performance

- Joystick attention catcher and motivating to be explored due to the big and yellow in the middle.
- Independent use - Nora is in charge of the steering and driving.
- Nora is free in the chair and able to really look around her.
- Relatively small and neat – she gets close to objects
- The device works well on different kind of floor surfaces and matts.

Handling

- Easy to bring a long in the car. A bit on the heavy side for lifting for the mother. The device has been brought along during visits at grandparents and relatives.
- Easy to charge
- Easy to wipe off and clean
- The weight is acceptable for the father but on the heavy side for the mother e.g. to lift in and out of the car.

Additional devices used at home

At home and at pre-school Nora has the following assistive devices

Type of product: Crawling device
Purpose: To train crawling, prone assisted mobility

Type of product: Stander
Purpose: Standing training with abducted legs, range of motion, weight bearing

Type of product: Walker
Purpose: To walk and move around, lower and upper extremity weight bearing

Type of product: Working chair with saddle seat,
Purpose: Sitting on larger sitting support incl help to stretch the back. Universal assistive device training spatial perception, learn from experience and to influence the environment around you and motor skills.

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It the Explorer Mini was taken away - what would we take away from Nora?

The Explorer Mini is providing Nora with the freedom of choosing by herself

I would say No! Stay away from it! If you took it away, you would limit her own will and freedom to do what she wants to do." - Mom

Therapist’s experience

The therapist is using Explorer Mini in her training at the clinic since 2021

Using the device as a training tool during therapy sessions at the clinic for cognitive and physical purposes

General purpose of use at the clinic

- Used primarily as a cognitive rehab or training device: To make the children aware of the environment around them and potentially convey that to other activities. Allows them to be standing still for shorter moments but tries to focus on driving due to the limited time at hand.
- Trigger motivation to learn and initiate activities of purposeful mobility: To be able to learn that they can go where they want to more independently i.e., learn that they can go from one place to another to grab or look at something they chose.

Functional prognosis: At the time of the intervention with the Explorer Mini, children are working on all forms of mobility. There is not a determination if a child will be ambulatory or use a wheelchair in the future.

Specific to Nora for home use:

- For Nora, being able to try the Explorer Mini at home the therapist values that it will allow her to spend longer periods of time in the device also when standing still to have time and possibility to explore or take in the room, feeling the walls and touching things.

At the clinic – therapist's steps when introducing the device

- Letting the children familiarize themselves with the joystick and noticing that something happens if they touch it.
- The speed is initially set at quite high speed in order for the child to notice with their whole body that something happens. If it set too slow the child will not get instant feedback of "oh something is happening".
- Therapist lets the children taste the joystick and drive with the mouth or chin in order to explore before guiding them back to the joystick with the hands.
- Some of the children seems to listen to the clicking sound and when the wheels touch the mat in the exercise room – receiving feedback on that something is happening.
- The therapist allows the children to drive against a wall and carefully bump into it if that is where the drive takes them because that can help the children to get a sense of spatial perception, it helps them recognize the room. It is an important part of the learning curve since it is important to know how that feels.
- A sign of progress or understanding can be when the children shows signs of frustration of really wanting to go somewhere but doesn't really manage to do it e.g., can see they kick with the legs a bit.
- The therapist has used the Explorer Mini with four children at the clinic and approximately about in 50 sessions in total.

"They figure out quite quickly, even if they are at a low cognitive level, that it is the joystick that is the magical thing and something about it makes something happen. So, they learn from time to time and remembers to utilize the knowledge they got last week in their next session and to learn that if they press a little bit harder on the Joystick it will move faster. That is knowledge that they acquire and actually do something with. " OT

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Explorer is used for both exploration and development

Reported clinical benefits of the Explorer Mini for children in general

Motor skills

- Exercises posture, how to sit in the chair and how to straighten yourself up if you slide out of position.
- Learn how to position yourself in order to reach things you want to reach.

Coordination & gripping

- Learn how to manipulate the joystick.
- Learn eye-hand coordination - what you want to go to and where to you are driving.
- Learn to calibrate how much force is needed for the joystick and that different force gives different results.

Energy (mental focus and physical) to drive longer times

- Increasing stamina enabling longer driving time. In the beginning maybe only for 10 minutes and then up to 15 or even 30 minutes.
- Longer sessions over time helps them overcome physical barriers of tiering out.
- Train to maintain tempo in the driving i.e., reduce the time from letting go of the joystick to start driving again.

Spatial understanding

- Search for and localize something, how to navigate in the room to find their way around and notice and explore doors, windows and items.
- Driving into something several times to really notice, acknowledge/consolidate what is happening. This is perceived as an important part of the learning curve in recognizing spatiality of the room and how that feels.

Practice / Use acquired skills

- To remember and use knowledge learned from one visit to the next session. How to problem solve and how focused you are to try to get to where you want to go or reach. i.e. knowledge the acquires and utilize further on.

Acquire skills which can be practiced out of the device

- The joy of exploring the environment around you might trigger the child to try to move from one place to another also when not in the Explorer Mini. To learn that you can move yourself from one place to another.
- Cognitively leaning about mobility in the device may trigger children taking a few steps on their own or start crawling.

Other observed positive outcomes

Training as extra bonus from just hang-out:

- The child is training by itself when using the device i.e., the child can hang-out or play in the device while parents are cooking a meal. The training is seen as an extra bonus from usage.

Easier to socialize with peers and siblings.

- When being in the EM they can play with her in a different way compared to when she is In the working chair or on a mat. Now they can move around and do more things around the house.

"For a parent to have less stress or feelings of guilt, it helps them to notice that the child is happy and content while they are doing other things like cooking food AND at the same time know that the child is actually training on skills without them needing to be actively part of the training is a great benefit with this." OT

Therapist appreciate the design being developed based on research, its playful and the easy-to-use design

Ergonomic design

- The children are very well positioned in the device which also makes it easy to reach for the joystick and get it moving. The therapist says that she really likes the fact that it has been developed based on research to get an optimized seating.
- The relationship between the seat and the joystick is constant, the seat "follows" when adjusting. It is optimized to suit the larger group of children.
- The big round ball in the middle is an attention catcher and the children quickly understands that it is something magical about that i.e., when touching it something happens.

Ease to transport

- It is very easy to bring along

Aesthetics and overall design

- Appealing design, also welcomed by parents which conveys this positive attitude to toward the device onto the children.
- Designed so that other children are not able to climb onto or into it and join the ride which is positive.
- Stickers may take too much focus form some of the children, so the therapist has removed them from the device used in the clinic.

"Maybe it is the design of the seat, how they are sitting a bit leaning forward that makes it easier for them to move their arms, it becomes easier to reach the joystick. It is easier to get it moving compared to e.g., the Tiro chair." OT

It is really easy to bring along which is great! " OT

Exploration of the room, improved motor skills and increase vocalization

Therapist has observed positive development areas for Nora

Observed development from March to May 2022

- Nora is experiencing independence, the joy of exploring her environment, to move forward.
- Nora has started to use her weaker hand more. She uses her weaker arm/hand to drive the Explorer Mini which is very good since it both gives her training to use that hand more and it makes it possible for her to use her other arm for other things.
- Nora has improved her grabbing skills, to hold on to things e.g., when being on a rocking horse.
- Nora has started to talk more/making more sounds and tries to mimic/repeat words.

If Explorer Mini was taken away from Nora – what would we take away from her?

"The independence that she has discovered, the ability to explore her surroundings, to move forward… there is nothing that is available that can fully replace what the Explorer Mini does. If it was taken away, I would prescribe a Koala so that she could continue explore her surroundings outdoor" OT

"It was very nice to see is using her weaker hand to drive! Nora has a hand that is weaker and uses the other more, but in the Explorer Mini so it is really nice to see that she has begun to use the other hand more, this also gives her an opportunity to use her other hand for other things." OT

"It is of course difficult to know what abilities she would have developed anyway but I put her on a rocking horse yesterday and then she was able to grab on to it much better than what she has done before. Before she tended to be careful of her hands and let go of it. Yesterday she grabbed it much better." OT

"She is also talking a little bit more than before, she mimics in a different way now, yesterday on the rocking horse I said Giddy-up and then it seemed as if she was trying to say that, so she is at least mimicking." OT

She started training with the device at the clinic when she was 1.5 years. At that time, she did very few attempts to crawl or grip, she was not willing to grip when sitting on the rocking horse." OT

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Outcomes and clinical evidence

Evidence-based Lived Experiences

- The next section will connect pre-established clinical evidence that have been completed for Permobil Explorer Mini and connect them to Nora’s lived experiences.
- Outcomes not highlighted here may not yet substantiated by peer-reviewed publications; however, are still of value to understand the impact on Nora’s everyday life.
- References are provided in groups with a correlating appendix

Nora's Outcomes + Clinical Evidence: Fitness (Body Functions & Structures)

How do Nora's experiences match the evidence?

Increased strength & endurance (trunk)

- Promotes safe, stable, and upright postures, thereby providing opportunities to develop strength, sitting tolerance and postural control[1]

Increased strength (grip)

- Mobility in an early stage of life aids in the development of motor skills(developmental)[2]
- Provides midline position for joystick control to encourage bilateral integration, allowing upper extremities to be used together in a coordinated way[3]

Purposeful looking

- Mobility at an early stage of life aids in the development of visual perception[4]
- Provides midline position for joystick control to promote visual coordination[5]
- Proportional drive control provides direction-specific exploratory movement for motor and sensory development[6]

Increased awareness and attention

- Mobility at an early stage of life aids in the development of cognition[7]
- Mobility at an early stage of life aids in the development of visual perception[4]
- Provides midline position for joystick control to promote visual coordination[5]

Nora's Outcomes + Clinical Evidence: Fitness (Body Functions & Structures)

How do Nora's experiences match the evidence?

Using both hands together

- Mobility at an early stage of life aids in the development of visual perception[4]
- Provides midline position for joystick control to allow self-selection of hand dominance[8]
- Provides midline position for joystick control to encourage bilateral integration, allowing upper extremities to be used together in a coordinated way[3]

Lower body weight bearing

- Provides the ability for lower extremity weight-bearing in abduction which may support hip development[9]
- Provides lower extremity weight bearing/ loading conditions, which may promote bone health*[10]

*based on amount of standing

Increased strength & endurance with supportive standing

- Provides ability for lower extremity weight bearing in abduction which may support hip joint development[9]
- Provides lower extremity weight-bearing/loading conditions which may promote bone health*[10]
- Provides adjustability of sit to stand position, thereby allowing opportunities to develop strength, standing tolerance, and standing postural control[11]

*based on amount of standing

Nora's Outcomes + Clinical Evidence: Function (Activities)

How do Nora's experiences match the evidence?

Independence and autonomy

- Provides self directed mobility[12]
- Mobility at an early stage of life aids in the development of motor skills (power mobility driving)[13]
- Mobility in an early stage of life aids in the development of functional activities including play[14]

Used for daily activities at home and school

- Mobility in an early stage of life aids in the development of functional activities including play[14]
- Ergonomic position for caregiver to assist with transfers and daily care[15]

Happy and content: expressing joy, melodic mimic sounds

- Mobility in an early stage of life aids in the development of psychosocial skills[16]
- Mobility in an early stage of life aids in the development of verbal and non-verbal communication[17]

Nora's Outcomes + Clinical Evidence: Function (Activities)

How do Nora's experiences match the evidence?

Clapping & Reaching

- Mobility in an early stage of life aids in the development of functional activities including play[14]
- Provides midline position for joystick control to encourage bilateral integration, allowing upper extremities to be used together in a coordinated way[3]
- Mobility in an early stage of life aids in the development of motor skills(developmental)[2]

Freedom of choice to explore

- Mobility at an early stage of life aids in the development of cognition[7]
- Proportional drive control provides direction-specific exploratory movement for motor and sensory development[6]
- Provides self directed mobility[12]

Improvement with therapeutic activity (rocking horse)

- Mobility in an early stage of life aids in the development of motor skills (developmental)[2]
- Provides ability for lower extremity weight bearing in abduction which may support hip joint development[9]

Nora's Outcomes + Clinical Evidence: Friendships (Participation)

How do Nora's experiences match the evidence?

Being present with family while getting ready in the morning

- Ergonomic position for caregiver to assist with transfers and daily care[15]
- Allows the user to participate with increased frequency in desired activities and life roles[18]

Playing with toys and siblings (↑ time compared to other devices)

- Mobility in an early stage of life aids in the development of functional activities including play[14]
- Mobility in an early stage of life aids in the development of psychosocial skills[16]
- Promotes safe, stable, and upright postures, thereby providing opportunities to develop strength, sitting tolerance and postural control[1]

Being a leader with her peers

- May allow users to engage in fun experiences[19]
- Mobility in an early stage of life aids in the development of psychosocial skills[16]
- Mobility in an early stage of life aids in the development of verbal and non-verbal communication[17]

Nora's Outcomes + Clinical Evidence: Family (Environment)

How do Nora's experiences match the evidence?

Visiting with grandparents

- Allows the user to participate with increased frequency in desired activities and life roles[18]
- May allow users to engage in fun experiences[19]

Parents can take device with them and 3 other siblings

- Ergonomic design provides ease of transport to support exploration and learning both in home and community environments[20]
- Allows the user to participate with increased frequency in desired activities and life roles[18]

Used at daycare and home, indoor and outdoor

- Allows the user to participate with increased frequency in desired activities and life roles[18]
- Ergonomic design provides ease of transport to support exploration and learning both in home and community environments[20]

Less parental stress and guilt

- Ergonomic position for caregiver to assist with transfers and daily care[15]
- Ergonomic design provides ease of transport to support exploration and learning both in home and community environments[20]

Nora’s Outcomes + Clinical Evidence: Fun (Personal factors)

How do Nora’s experiences match the evidence?

Playful design

- May allow users to engage in fun experiences[19]
- Mobility in an early stage of life aids in the development of functional activities including play[14]
- Mobility in an early stage of life aids in the development of psychosocial skills[16]

Inclusive play- draws peers to her

- Mobility at an early stage of life aids in the development of psychosocial skills[16]
- Mobility in an early stage of life aids in the development of functional activities including play[14]
- Allows the user to participate with increased frequency in desired activities and life roles such as playing with peers[18]

Evidence-based lived experiences

This is a summary slide of key take-aways to bring together Nora's self-report with established clinical evidence

"It was when she was in it driving around and then she suddenly noticed her jump swing and she drove to it and really wanted to have it, and somethings when she drives and accidently hits the joystick while driving, she has gone back to reach what she wanted, and then it really felt as if she had really got to where she wanted to." – Dad

Research shows that on-time mobility:

- Allows for self directed mobility[12]
- Proportional drive control provides direction-specific exploratory movement for motor and sensory development[6]
- Aids in the development of visual perception[4]
- Provides midline position for joystick control to promote visual coordination[5]

"Nora can be more involved now when they play, before they would sit on the mat and play or train to make her move toward them in the walker, but now with this they have a more playful and fun interaction. It feels more like playing even if it is still actually training." Mom

Research studies show that on-time mobility:

- Allows the user to participate with increased frequency in desired activities and life roles[18]
- Aids in the development of psychosocial skills[16]
- Aids in the development of verbal and non-verbal communication[17]
- Aids in the development of functional activities including play[14]

"She tries to reach for things more, for example she grabs the papers on the fridge. I think oh, that is great, but at the same time oh, that is so wrong."

-Mom

Research studies show that on-time mobility:

- Promotes safe, stable, and upright postures, thereby providing opportunities to develop strength, sitting tolerance and postural control[1]
- Aids in the development of motor skills[2]
- Provides midline position for joystick control to encourage bilateral integration, allowing upper extremities to be used together in a coordinated way[3]
- Aids in the development of cognition[7]

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How does Nora's experience compare to a global consensus?

As described in "A Guideline to Introducing Powered Mobility to Infants and Toddlers" – Feldner, Plummer & Hendry

Driving to learn

- Learning group: Operational (requires close adult supervision, training occurs in more than one environment, engage in specific play activities)
- ALP: Beginner ↔ **Advanced beginner** ↔ Sophisticated beginner
- Intermediate learning stage: beginning goal-directed movement, incorporating toys and familiar trusted adults for motivation, greater attention to the environment

Communication & Language

- Shared attention is evidenced by smiling facial gestures, increased awareness and attentiveness, vocalizations are increased
- Previously expressed frustration with inability to mobilize when laying down or in a static device, she is more content when in the Explorer Mini
- Shows discontent when parents try to help or when she has to get out of the device
- Expressing more sounds and mimicking words

Motor and sensory development

- Translating to skills outside of Explorer Mini: She is now able to use both hands with stronger grip on therapeutic riding horse
- Increasing use of weaker hand for tasks
- She can spend longer time upright or standing when using the Explorer Mini, which allows increased time to explore, take in her surroundings, touch and interact with her surroundings

APPENDIX:
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