

# Gravity Chair



**CLINICAL BENEFITS  
AND CASE STUDIES;**

Why this chair is more than what it looks to be!

# Assessment of proof of medical use

## 1. Test Object

Tested: Gravity Chair  
Tested by: Heinrich-Piepmeyer-Haus, Münster  
Time period: January 2010 - May 2010

## 2. Operating Institution

The Heinrich-Piepmeyer-Haus offers comprehensive care for children with disabilities and their families: The Parent-Child-Course offers parents more than 12 three-week rehabilitation sessions per year for their children with disabilities or children threatened by a disability. Children up to the age of 12 with varying physical or developmental delay disabilities, and children who are challenged by a disability respectively, will be cared for. Within the Parent-Child-Course, families will be looked after by a multi-professional team.

They will be supported by professionals from non-medical healthcare backgrounds, as well as professionals from custodial, medical and educational backgrounds, to form interdisciplinary teams. These will consist of: paediatricians, children's neurologists, neuro-orthopaedists, manual therapy, nursing, nutrition consulting, physiotherapy, occupational therapy, speech therapy, social and special education.

The interdisciplinary practicing disciplines include physicians. The aim of the course is to:

- Help provide the children with maximum independence in everyday life
- Promote children's motor skills as effectively as possible
- Facilitate the compensation of skills through the use of appropriate tools
- Provide cognitive resources
- Alleviate symptoms of sickness
- Avoid secondary damage

The parents will be:

- Relieved of caregiving
- Trained in the giving of assistance
- Advised of everyday issues

## 2. Operating Institution (cont.)

Therapy concepts will be developed and built upon holistic diagnostics to support children in their individual development. Parents will be shown day to day care options. Tools for all areas of everyday life can be thoroughly tested before they are enacted. Occupational therapists, physiotherapists and physicians operate primarily with the provision of care.

In the Children's Daycare, children with and without disability will be cared for and nurtured together. The therapeutic measures are an integral part of everyday life in the day care. Individual measures of support will be embedded into the everyday life of the children, group situations can be created and used to facilitate living and learning together; and the transfer from therapy to everyday life, and vice versa, is possible. A meaningful and effective use of resources plays an important role in the lives of children, who have to rely on the use of tools to replace or support physical functions.

## 3. Test Duration and Implementation

The Gravity Chair was tested in its intended everyday use in the Heinrich-Piepmeyer-Haus by therapists and parents over several months.

## 4. Indications

Children with varying disabilities and symptoms will be cared for in both departments. From our conception, the Gravity Chair can be successfully utilised by children with the following symptoms:

- Cerebral Palsy
- Hypotensive Syndrome (origin unclear)
- Myopathy Syndrome disorders
- Multiple disabilities
- Metabolic Disease
- Post concussion

The test was carried out by an Occupational Therapist

## 5. Results

### Functionality

The Gravity Chair can be utilised by many different patients due to its construction feature of five available sizes. Regardless of body weight or physical needs, patients will be safely accommodated and can be supported in a physiologically safe position. The Gravity Chair provides a favourable microclimate.

### Medical-therapeutic use

The Gravity Chair serves sitting and bearing purposes for children and adolescents with moderate to severe motor restrictions. It can be used as part of various therapies and in diverse everyday situations. The chair is suitable for use at home as much as at the facility.

### Safety

The chair is constructed safely and stably

### Operation

The chair is easily tailored to the needs of different children. The covering can be easily washed.

### Risk Indicator

The users should refer to the specifics of the chair.

### Conclusion

The concept of the Gravity Chair is to cater to the needs of children with various disabilities, for whom being able to freely and independently sit is not possible. The gravity chair provides a safe and supported position, which leads some patients to learn to sit independently. Our patients and their parents have given the Gravity Chair an overall positive evaluation. The good feedback relates to the functionality as well as the look. The chair offers a good growth potential regarding profitability and longevity as well as a reasonable provision in children and adolescent areas.



# Clinical Testing of the Gravity Chair

## Child 1 - Ilayla (7 years)

### Symptoms

Ilayla suffers from a **global developmental delay** of an unknown origin. She has not developed sufficient core stability or steady head control. She shows **dystonic movement patterns** of the extreme.

The likelihood and preparation for a focal seizure can be assisted with medication, however, seizures occasionally still occur.

She has a severe receptive and expressive development disorder, and currently relies on communication via eye contact. Support with a communication device has been introduced.

### Therapeutic Goal

Ilayla's current sitting support consists of an adjusted seat shell upon a combined frame. This is effectively adjusted so that skeletal damage could be avoided.

Because she cannot be expected to remain in the same sitting position all day, she will be supported in a standing device as well as on the floor. Standing for Ilayla is very important, but can only be extended to a maximum of 30 minutes per session.

The problem that arises with the floor support, is that the possibilities of communication via eye contact is made difficult, because of her weak head control, where she is unable to raise and steadily steer her head. For this reason, an alternative floor support was searched for, which could:

- Allow her to sit in a relaxed position, like in the seat shell, and at the same time provide good physical guidance and support
- Give her the opportunity to follow what is happening around her and to facilitate stimuli that encourage her cognitive skills
- Allow her the means of communication through eye contact and further social interaction

### Experience Report

The alternative that the Gravity Chair offered to Ilayla, was warmly accepted. She could adopt a relaxed position, and was able to switch positions to a certain extent. Her body was at the same time well supported and the pressure was relieved. In the upright positions, eye contact could be maintained. At the institution, the Gravity Chair was installed on a creeper dolly, a pedestal and a swing, so that Ilayla could receive additional stimulus, which she would not have received without assistance, i.e. her scope for communication was enhanced.

### Therapeutic Uses and Risks

- The Gravity Chair offers Ilayla a physiological and relaxed alternative to active positions, which had previously been made available to her.
- The operation of this tool, in respect to activation, is best suited to floor use.
- Ilayla has for the first time, the opportunity to perceive and communicate with her environment over an extended period of time.
- Risks could not be identified.



## Child 2 - Ricardo (3 years)

### Symptoms

Ricardo suffers from **triparesis**, where his left arm is easier to control than his right arm. Additionally, **seizures** were present, which were addressed one year ago, resulting in him since then, only experiencing occasional episodes. Since then, his degree of awareness has greatly improved, especially his visual awareness. The consequence is that Ricardo has become **very restless**, and appears as if he is overwhelmed by having to process so many stimuli. By day, he shows many signs of disturbance in the form of shouting, wailing and whining.

### Therapeutic Goal

A supporting position is searched for, which:

- Alleviates his tendency to extend,
- Allows Ricardo to sit safely and comfortably, allowing him to calm down and sit independently,
- Allows him to occupy himself and encourage his concentration capability.

### Experience Report

Ricardo felt spontaneously very much at ease in the Gravity Chair. The flexion position of the hips that the chair encourages, inhibits extensor tone, which seems to facilitate relaxation. The high edges of the chair and the influence of gravity provides a relaxed supine position which nearly always helps him to calm down. We combined the positioning in the Gravity Chair with a heavy sand blanket. This combination always provided reassurance for Ricardo, so that he could simply sit contently in his chair or—depending on the conditions—also make contact with other children.

### Therapeutic Uses and Risks

- The Gravity Chair seems indeed to alleviate Ricardo's restlessness
- His whining has distinctly decreased whilst he has been sitting in the Gravity Chair
- His social interactions with other children is promoted in this position
- His tendency to extend has been alleviated
- Risks could not be identified

## Child 3 - Ahmed (5 years)

### Symptoms

Ahmed suffers from a **global developmental delay** of an unknown origin. He can walk, but always displays toe walking. His visual perception is normal, and his hearing is so limited that he uses a hearing aid, which he however does not accept. Ahmed has developed good fine-motor skills, loves to play with threads, dismantle things, and likes to examine everything he can get his hands on with his fingers. His **behaviour is restless**, and he constantly turns his attention from one thing to another, with nothing maintaining his attention for a long period of time. Therefore, he needs a constant caregiver, a role, which for the mother, who also has a one and half year old son, is hard to manage. Since Ahmed is mobile, it is not possible to leave him unattended, as he could inflict damage to himself or others because of his compulsive explorative nature.

### Therapeutic Goal

A safe position is searched for, in which Ahmed can calm down and occupy himself with a toy for about 30 minutes.

### Experience Report

We put Ahmed with his favourite toy, threads, in the Gravity Chair and could observe that he felt at ease (perhaps due to the restrictions of the padding) and that he was so confined that he could contain his restlessness over a longer period of time than usual and persevere in the chair. His mother was very much relieved, as she could look after the younger brother in that time. Ahmed will not be able to spend more than 30 minutes at a time in the chair, because his compulsion to move seems too overpowering.

### Therapeutic Uses and Risks

Due to the form of the Gravity Chair, it seems to be able to:

- Provide a restless child with a 'shelter', allowing them to find quiet and to occupy themselves for a short period of time.
- Reduce potential dangers for a restless child and their environment. Risks could not be identified through the relaxed position.
- Risks could not be identified.

## Child 4 - Naemi (4 years)

### Symptoms

Naemi has a **metabolic disease**, that results in **extreme spasticity** in all extremities.

The hips, knee joints and feet are almost always out-stretched, the arms are also tensed, and the hands are almost always formed in fists. Relaxation can only be achieved through a reflex inhibiting position, which is usually only done through the intervention of a supervisor. Respective to her physical tension, Naemi is also mentally under pressure. She is often discontent and whines or cries or shouts. This is an exhausting condition for all involved.

### Therapeutic Goal

A means of support is searched for, which:

- Facilitates the inhibition of spasticity
- Facilitates a relaxed position for N., to alleviate her anxious condition
- Reduces the considerable need for support

### Experience Report

The Gravity Chair was initially—like everything new—rejected. She only accepted the position very slowly, and required encouragement from a trusted person in order not to immediately want to flee from the position. She seems to only realise very slowly, that the form of the chair and the large support surface does not restrict her but rather supports her.

### Therapeutic Uses and Risks

It is evident that the possibilities of the Gravity Chair address Naemi's problems well and are indeed able to provide a position that reduces her stretch spasticity, relaxes her and at the same time allows her to sit without potential danger.

- The mental pressure that weighs on her, is alleviated through the relaxed position.
- Risks could not be identified.

## Child 5 - Dana (3.9 years)

### Symptoms

Dana has a very **rare chromosome anomaly**, which is accompanied by a very **severe case of hypotonia and causes ataxia**. Additionally, she is extremely short sighted and displays a strong case of strabismus. Due to motor disorders, she is constantly moving and restless, seems to always be in search of the opportunity to play, without coming to satisfying result.

### Therapeutic Goal

For Dana to be brought to a position, that facilitates calmness, and enables her to play independently.

### Experience Report

The Gravity Chair facilitates and provides Dana, through a low centre of gravity, into which she sinks, adequate safety, and through the directional control, adequate sensory information about the position of her body within space, which calms her considerably. It even succeeds in bringing her hands together to manipulate a toy.

It is important for Dana, that her feet also encounter resistance, so that she is also aware of the boundaries of her body in that area.

### Therapeutic Uses and Risks

- Dana experiences an amount of resistance through the form of the Gravity Chair, that allows her to calm down and not constantly be on the search for sensory information.
- The high directional control facilitates her hand-to-hand coordination.
- No risks could be identified.



## Child 6 - Lennart (4 years)

### Symptoms

Lennart suffers from a **malformation of the cerebral cortex** from birth, resulting in him developing **dystonic athetosis**. It is expected that the movement disorder, categorised by its involuntary and sweeping movement patterns, will worsen in the coming years. Part of this movement disorder is a severe hypertonia, that makes core stability and head control impossible.

The head falls to the sides, and threatens contractures and bony deformities from this constant dysfunction. His movement disorder also causes him to not accept a prone position, constantly having to look for other means of support to avoid dysfunction and deformities.

### Therapeutic Goal

The possibilities to support Lennart in conventional support systems are few. An uncomplicated and effective means of support needs to be found, which:

- Supports his torso,
- Allows him a degree of head control
- Generates more cognitive impulses from him.

### Experience Report

Lennart enjoys sitting in the Gravity Chair, and experiences adequate support to be able to take up a symmetrical and physiological safe posture. For him, the wedge, with which the tilt of the seat can be adjusted, is especially important, because the position can be adjusted to his stability. His greatest strength, observing his surroundings, is supported by the Gravity Chair, he can lean his head and move his head optimally. The form of the directional control allows for a simple and situation-specific-adjustable padding, so that the head can be guided according to the conditions.

### Therapeutic Uses and Risks

- The Gravity Chair offers Lennart a position, in which his torso receives lateral support and his head is able to move accordingly.
- He can observe well, so that his mental development is nurtured better than without aid
- He can participate better this way in life around him.
- No risks could be identified through the relaxed position.
- Risks could not be identified.

## Child 7 - Ben (1.9 years)

### Symptoms

Ben suffers from a birth trauma of a **severe developmental delay**. He is still very young and very delicate, it is however foreseeable, that he will suffer from severe motor and cognitive disabilities. His mother is very much occupied with the disability processing. She places great importance on Ben looking like a normal baby.

### Therapeutic Goal

Ben is in need of a sitting aid, that does not look like a therapy chair, but nevertheless functions as well as a therapy chair, so that he no longer has to be fed on his mother's lap.

### Experience Report

Ben accepted the Gravity Chair after three 'trial sittings' as an acceptable sitting position. From a therapeutic perspective, a more upright position for feeding would be desirable, and for this purpose, the Gravity Chair has to also be placed on a piece of chair base. The mother can accept the sitting support, because the chair does not look "disabled". The easy handling also facilitates acceptance as initial treatment.

### Therapeutic Uses and Risks

- The Gravity Chair offers Ben a satisfactory sitting position, that is necessary for detachment from the mother.
- The unusual form facilitates the acceptance of the aid.
- No risks could be identified.



## Child 8 - Silvana (11 years)

### Symptoms

Silvana suffers from a **severely distinct athetosis**. The movement disorders have worsened in the last few years, she accepts for a short time her fitted seat shell, otherwise she wants to lie on the sofa. It seems as if she perceives position changes and confinement as threatening. All attempts to facilitate other positions have so far failed, and she reacts with intense resistance to the standing board that was made specially for her, and struggles until she is taken out.

### Therapeutic Goal

A sitting position has to be found for Silvana, that:

- She can accept and
- Nevertheless facilitates a physiological posture that prevents bony deformities or decelerates their progression.

### Experience Report

Silvana struggled through multiple attempts and therapy sessions away from the unfamiliar sitting position. Within about ten attempts, the length of her stay was extended, and Silvana accepted the positioning in the chair, finally after 45 minutes, distracted by her favourite toy, occupying herself even when approached.

### Therapeutic Uses and Risks

- Silvana can accept the relatively informal position with some settling in time.
- The position is suitable for preventing bony deformities
- In the spectrum between a strongly corrective and activating seat shell and the deactivating positioning on the sofa, the Gravity Chair is a good compromise for the therapy of children like Silvana

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