Drivkraft

A description of the intensive wheelchair training method and its evidence base

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A description of the intensive wheelchair training method ‘Drivkraft’ and it’s evidence base.

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“Din rullstol rullar”

- Åke Norsten
Abstract

Objective: To explore and describe the intensive wheelchair training method ‘Drivkraft’, and describe the evidence base.

Method: Two wheelchair classes were both actively- and passively observed over a period of eight days. Based on these experiences, two semi-structured interviews were held with the developer of Drivkraft. Interviews were transcribed, coded and analyzed. Literature studies were conducted to find out what evidence could be found on the topics.

Results: The interviews led to the finding that the Drivkraft method is based on eight principles that either can be connected to wheelchair adjustments, wheelchair training, or patient education. These principles are: rolling and turning resistance, posture, ergonomics, basic skills, rear wheel balance, patterns, obstacles, and patient education. Supporting literature was found for the way Drivkraft uses these principles. It was also found how people could participate in the training, and what steps are taken in the initial assessment. Another finding was the specific components of training in groups and peer mentoring.

Conclusion: The Drivkraft method is an intensive training program in which not only wheelchair skills are trained, but the wheelchair will also be adapted to a participant’s physical measurements and capabilities, and participants will also learn relevant theory about the wheelchair. Characteristic of this training is that Drivkraft is taught by a peer mentor in groups of maximal five participants.

The literature seems to support the eight principles and the three characteristic components of the literature studies; group training, peer mentoring and the importance of specific wheelchair skills training. The thesis can be used to give third parties an overview of the method and the evidence that supports it. Future studies are needed to explore the value and effectiveness of the method.
Preface
This is the report of the bachelor thesis written as part of the occupational therapy program at the Amsterdam School of Health Professions. In this report we will describe a wheelchair training method, developed and based at Rehab Station Stockholm, Sweden.

We would like to thank Åke Norsten for his valuable lessons and insights, Susanne Guidetti and Kerstin Wahman for their critical input and Miranda van Niel for her coaching and feedback.
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1. Introduction

The wheelchair is one of the most common and important rehabilitation devices (Kirby et al., 2004). It’s used by individuals who have impairments that have had limited their ability to walk (WHO, 2010). According to the most recent data, from January 2013, 1% of the Swedish population uses a wheelchair, this equates to about 150.000 wheelchair users. Of these people, 67% uses a manual wheelchair1. (Hjälpmedelsinstitutet, 2014) An active wheelchair1 is more hard-wearing and can withstand higher strains than other manual wheelchairs. To use an active wheelchair may be beneficial for the wheelchair user, since it can be used for up to 16 hours a day, 365 days per year (Cooper, 1998; Cooper, Boninger, & Rentschler, 1999).

People using a manual wheelchair encounter a substantial range of barriers which hinder them in reaching certain destinations. Examples of these barriers are: the lack of ramps, ramps that are too steep, and rudeness of other people (Meyers, Anderson, Miller, Shipp & Hoenig, 2002). When trying to overcome barriers without proper training, there is a potential for acute or long-term (by overuse) injuries to the wheelchair user (Boninger, Towers, Cooper, Dicianno, & Munin, 2001; Calder & Kirby, 1990; Gaal, Rebholtz, Hotchkiss & Pfaelzer, 1997; Liu, Mineo, Hanayama, Fujiwara & Chino, 2003; Ummat & Kirby, 1994; White & Kirby, 2003; Woolfrey & Kirby, 1998).

The reduced community access, due to difficulties in overcoming barriers, can be the result of a lack of intensive wheelchair skills training (Aronson, 1997; Best, Miller, Eng, Routhier & Goldsmith, 2014; Liu et al., 2003; McClain, Cram, Wood & Taylor, 1998; Norlin, Strinnholm, Carlsson & Dahl, 2003; Palisano et al., 2003; Pierce, 1998). This lack of wheelchair skills training is unfortunate because manual wheelchair users report that confidence with their wheelchair, grip, strength, and satisfaction has influenced their participation in a positive way (Smith, Sakakibara & Miller, 2016). Besides this: persons that are experienced in their use of active wheelchairs can be described as “healthy disabled”. When they have impairments that are stable and predictable (e.g. spinal cord injuries), they consider themselves to be healthy and do not expect to die any sooner than any other healthy persons their age. (Wendell, 2001)

If wheelchair users want to participate in daily activities they will need certain skills, for example they need to be able to balance on their rear wheels1. In this way they can overcome barriers like curbs, steep inclines and potholes (Kirby, Smith, Seaman, Macleod & Parker, 2006). One study shows that a better ability to mobilize in your manual wheelchair, leads to a higher level of independence and quality of life. It was also shown that trained wheelchair users use their wheelchair more than untrained wheelchair users. (Hoenig et al., 2005) This indicates that wheelchair skills training could make a change for the persons that need a wheelchair in everyday life.

To meet the needs of providing wheelchair skills training, ‘Drivkraft’ was developed. This is a method to successfully adjust the wheelchair in combination with wheelchair skills training. Drivkraft is developed, and still developing, by Åke Norsten, a Physical Education (PE) teacher and experienced wheelchair user. He teaches his method at Rehab Station in Stockholm, in co-operation with a physiotherapist and wheelchair mechanic.

After 37 years of teaching wheelchair skills, of which 20 years with the Drivkraft method, and getting positive feedback from participants, Åke is convinced that Drivkraft is effective. This is the main reason Åke wants to share his knowledge about training wheelchair skills with other health care facilities all over Sweden and, if possible, in other countries as well.

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1 See Appendix 1: Specification of wheelchair terminology for background information on wheelchairs and wheelchair parts.
Eventually he would like to have researched whether his method is effective and see that his method is taught in different places and countries.

One of the steps he took to transfer his knowledge, was to write a book about Drivkraft in 2001 (Norsten, 2001). Unfortunately, this book is only available in Swedish and some of the information has changed since publishing. He also gives lectures to spread his knowledge to other countries.

1.1 Aim

To support Åke in transferring his knowledge, the aim of this thesis is to describe the evidence base of Drivkraft, and explore the method including its components. Questions covered are: ‘How is Drivkraft developed?’, ‘What are the key components?’, and ‘What does the literature say about the components used in the method?’. The thesis can be used to give third parties an overview of the Drivkraft method and the evidence that supports it.

The following research question was formulated:

What is the Drivkraft method?

This thesis used three literature studies to determine what is written on three subjects. Three characteristic components of Drivkraft were chosen to be explored more thoroughly:

- **Group training**
  Within occupational therapy treatments, it’s more common in The Netherlands to give individual wheelchair training. In Drivkraft the focus lies on group training, even though individual training is sometimes used and needed. This study will research the value of a group training, and which factors make group training effective.

- **Peer mentoring**
  Åke gives the wheelchair training from his background and experience as PE teacher and wheelchair user. Healthcare professionals base their training mostly on educational knowledge. This study will investigate whether peer mentors should be used more in healthcare treatments and what the exact value of peer mentors is.

- **Specific wheelchair skills**
  In the Drivkraft training, specific wheelchair skills are trained. These skills are based on experience of the trainer and individual goals of the participants. This study will identify the skills that, according to manual wheelchair users, should be trained during and after discharge from rehabilitation in order to perform their daily activities.

The following research questions have been formulated for the literature studies:

- What factors make a wheelchair group training effective?
- What is the value of a wheelchair group program given by a peer mentor, compared to a healthcare professional?
- What wheelchair skills do wheelchair users need in order to perform their daily activities in an effective way?

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2 Participant: wheelchair user who is participating in Drivkraft.
1.2 Relevance for occupational therapy

Occupational therapists often get requests for wheelchair training from people using a wheelchair. Especially when people recently became dependent on the wheelchair. There are many methods describing wheelchair training methods (Best, Miller, Routhier, Eng & Goldsmith, 2014; Kirby, Smith, Parker, MacLeod, McAllister, Rushton & Routhier, 2012; Norsten, 2001). Occupational therapists can use this description, and the evidence, to reflect on their own way of teaching wheelchair skills and might find ways of adapting their training.

1.3 Setting

The Drivkraft method is taught in Rehab Station Stockholm. This is a private health care rehabilitation center. In Rehab Station Stockholm, rehabilitation is provided for multiple diagnoses, for example spinal cord injury, multiple sclerosis, brain damage, Parkinson disease, and orthopedic injuries.

There is a rehabilitation ward with 35 rooms where patients can stay for a couple of months. For family there are several guest rooms available. Rehab station Stockholm is still expanding and will move to a new building with 55 rooms in the near future.

During rehabilitation a multidisciplinary team is involved. The available disciplines are: doctors, occupational therapists, physiotherapists, social workers, psychologists, speech therapists, and nurses, of which some are specialized in wound care. A special discipline, employed by Rehab Station Stockholm, are the rehab instructors. They are in a wheelchair themselves, are members of the multidisciplinary team who train with the patients, and function as role models. Besides the health disciplines, Rehab Station Stockholm employs multiple researchers who are doing research in areas such as spinal cord injury and Multiple Sclerosis.

After rehabilitation it’s possible to get outpatient training in the fully equipped gym under supervision of a physiotherapist or a rehab instructor. It’s also possible to train on your own and join group lessons in wheelchair basketball or a workout to music.

For people with spinal cord injuries, Rehab Station Stockholm has an outpatient rehabilitation program called ‘Spinalis’. Connected to Spinalis are doctors, physiotherapists, occupational therapists and nurses to support people returning to work and society.

Another outpatient program is The Wheelchair School, given by Åke. This program is an addition to the basic wheelchair training given during rehabilitation. He meets about 100 patients per year with all kinds of injuries and disabilities. The Wheelchair School is based at the ground floor of Rehab Station Stockholm where it has different rooms. (Rehab Station Stockholm, n.d.)
2. Method

In this chapter the method of data collection through observations and interviews is described. Furthermore the data analysis and literature research are described.

2.1 Observations

To collect information about the method on which Drivkraft is built, two wheelchair classes were observed over a period of eight days. A few choices had to be made regarding the way of observing. The first choice was between participatory or non-participatory observation (Baarda et al., 2012). The decision was made to combine these two methods. Because a morning and afternoon class were attended, the decision was made that all researchers would actively participate in the morning class, and observe in the afternoon class. In this way the Drivkraft training could be experienced and, based on these experiences, decisions could be made of the subjects to be observed during the afternoon class.

The second choice was between structured and unstructured observation. Structured observations are characterized by using an observation form during the observation (Baarda et al., 2012). The decision was made to do an unstructured observation with only a few observation points, because a form couldn’t be drawn up beforehand. During the lunch break in between the two classes, possible observation points were discussed by the researchers, and a selection was made what would be observed. During the afternoon class, field notes were made on the observation points.

2.2 Interviews

After the afternoon classes, the field notes were compared and used to formulate questions about the Drivkraft method. All questions were written down, to be asked later in semi-structured interviews with the developer of Drivkraft. Interviewing is a good way to get information about someone’s feelings, knowledge or opinion (Baarda et al., 2012) and it can be done by using different strategies. The semi-structured strategy was chosen to make sure that all the important themes were discussed, but enough opportunity was given to expand on the themes (Saunders, Lewis, Thornhill, Booij & Verckens, 2011).

It was decided to conduct two interviews with the developer of Drivkraft, so the interviews wouldn’t take longer than approximately one hour. In this way it could be ensured that everyone would stay focused. The interviews were held by the same interviewer, so consistency of the interviews was warranted. (Legard, Keegan & Ward, 2003) The interviews were recorded on two devices, to make sure the information could be recalled later (Saunders et al., 2011). Afterwards the interviews were transcribed.

2.3 Data analysis

After conducting the interviews and having several informal conversations with the developer of Drivkraft, general themes were identified through coding and categorizing as described in The Coding Manual For Qualitative Researchers (Saldana, 2016). The result section will follow these themes.
2.4 Literature research

To search the literature two different strategies were used: searching the databases with search strings, and back & forward chaining. The selected databases cover a wide variety of professions. Although MEDLINE and CINAHL have a lot in common, both are included. MEDLINE goes back further in time compared to CINAHL, and focuses more on healthcare in general. CINAHL gives more literature about paramedic healthcare and is therefore also useful. Cochrane focuses on healthcare reviews, and therefore differs from CINAHL and MEDLINE. ERIC has its focus on education and might give results for the didactics. An overview of the databases is shown in Table 1.

<table>
<thead>
<tr>
<th>Database</th>
<th>Articles from...</th>
<th>Professions</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDLINE</td>
<td>1946 - present</td>
<td>Healthcare</td>
</tr>
<tr>
<td>CINAHL</td>
<td>1981 - present</td>
<td>(Paramedic) healthcare</td>
</tr>
<tr>
<td>Cochrane</td>
<td>2000 - present</td>
<td>Healthcare reviews</td>
</tr>
<tr>
<td>ERIC</td>
<td>1966 - present</td>
<td>Education</td>
</tr>
</tbody>
</table>

Table 1: Used databases

For every researched component a different search string was formulated. This was done by taking the keywords from the component and entering them in databases. An overview of the search strings and in which databases they were entered can be seen in Appendix 2.

The articles or books found were examined on relevance to the component by using in- and exclusion criteria.
Inclusion criteria:
- Articles published in peer reviewed journals
- Books based on articles that were published in peer reviewed journals
Exclusion criteria:
- Powered wheelchairs³
- Other languages than English, Dutch or Swedish

2.5 Quality assurance

The quality of the project was guaranteed by using the plan, do, study, act cycle - also known as the PDSA-cycle – in all steps of the project (W. Edwards Deming Institute, 2016). The project plan was executed and often evaluated and adjusted in Skype meetings with our supervisor. On a smaller scale, all written pieces were sent to our supervisor, Susanne Guidetti (PhD, occupational therapist), and Kerstin Wahman (PhD, physiotherapist), for feedback and evaluation of the contents. In this way, the information could be corrected when necessary.

³ See Appendix 1: Specification of wheelchair terminology for background information on wheelchairs and wheelchair parts.
3. Results

In this chapter an overview of the results of the interviews and observations will be presented. Besides the information retrieved through the interviews and observation, the literature studies are used in this chapter. The full literature studies, answering the research questions regarding specific components, and transcribes of the interviews can be found in Appendix 3-5.

The first topic that will be discussed is the initial assessment of the participants with Åke and the physiotherapist. Next the eight principles that form the base of Drivkraft are described. After this the more specific components, the peer mentoring and group work, are discussed. The results will also cover the exercises, with an explanation on how to perform them. Photos are added to support this explanation. At last, the theoretical lessons will be described.

It's advised to read Appendix 1 Specification of wheelchair terminology before reading the results to get familiar with the terminology.

3.1 Participating in Drivkraft

Wheelchair users apply for The Wheelchair School through a referral from the doctor, which is followed by an assessment with Åke and a physiotherapist. In this assessment, information is gathered about the participants' background, and factors influencing the training; such as the sitting position. Besides that, the suitability of the wheelchair, the level of wheelchair skills and the movement patterns are observed. A physical examination is performed to determine if any adjustments in the seating position should be made. The assessment is concluded by discussing a participants individual goals.

In general, all participants are accepted to participate in the training. Before inclusion they need to agree on the use of anti-tipping wheels for safety. An exclusion criterion is when a participant has pressure ulcers. In this case the participant will be referred to the wound specialist of Rehab Station Stockholm. When the pressure ulcers are under control, they can participate.

When participants start the wheelchair training, they either use their own wheelchair, or they borrow a suitable wheelchair from The Wheelchair School. This wheelchair can be taken home for practicing. Between the initial assessment and the first training, the first adjustments are made on the wheelchair and a training program is made. During the wheelchair training the wheelchair is being adjusted continuously.

When the wheelchair training is completed, all the participants have a final check up where the wheelchair, the movement patterns, the learned skills, and individual goals are reviewed. Besides this, final wheelchair adjustments can be made by Åke. If necessary a new wheelchair will be applied for, in which the adjusted elements will be taken into account.
3.2 Eight principles

The principles described below are the eight principles on which the Drivkraft method is based and affect the result of the training. These eight principles can be divided into three groups: the wheelchair adjustments, components of the training, and the patient education. These principles are all equally important and influence each other during the execution of the training in The Wheelchair School. Exceptions are made if participants can’t suffice to the eight principles, for example if participants don’t have core stability due to a high spinal cord injury or can’t push the wheelchair with two hands. If this is the case, the goal is to find the best alternative.

The eight principles are introduced by a definition followed by Åke’s words, based on his own experience and knowledge, under which the available evidence is described.

Definition: italic
Åke’s words: full indentation in grey italic
Evidence: roman

3.2.1 Group 1: Wheelchair adjustments

In this chapter, the three principles that can be connected to wheelchair adjustments, will be discussed.

3.2.1.1 Principle 1: Rolling and turning resistance

“Rolling resistance is the force that resists the movement whenever an object rolls on a surface. Turning resistance is going to restrict the length a manual wheelchair coasts once a force, like from a push stroke, is executed.” (Karman Healthcare, 2017) Turning resistance follows the same principle, but during a turn.

It doesn’t matter if you’re old or what kind of diagnosis you have, the wheelchair should be easy to maneuver. Therefore one of the first things that is checked when someone starts the wheelchair training is the rolling and turning resistance of the wheelchair. When a low resistance is achieved, less energy will be consumed while driving the wheelchair.

The fact that a lower resistance results in less energy consumption comes from the field of physics. A rolling wheel is subjected to energy loss and to compensate for this loss a higher input of energy is needed. (Princeton University, 2010)

A low rolling and turning resistance consists of two major elements:
(1) high pressure in the rear wheels
(2) high load on the rear wheels (90-95%) / a low load on the front wheels (5-10%).
See Figure 1.

Studies on the rolling and turning resistance confirm that a low load on the front wheels decreases the rolling resistance (Bascou et al., 2014; Sauret et al., 2012).

Other elements that influence the resistance are the camber of the wheels, the size of the wheels and the wheelbase.
A study revealed that -20° and -24° camber improved the mechanical efficiency of wheelchair propulsion in highly trained wheelchair athletes, yet this increased external power requirements and reduced the economy (Mason, van der Woude, de Groot & Goosey-Tolfrey, 2011). Research identified the fact that with smaller wheels, the rolling resistance is bigger (Kauzlarich & Thacker, 1985) and the wheels should rotate at a greater rate to maintain a constant speed (Mason, van der Woude, Tolfrey, Lenton & Goosey-Tolfrey, 2012).

To measure the load on the front wheels the wheelchair fork is lifted by hand while the person is sitting straight in the wheelchair with the arms hanging down. This isn’t an objective measurement but an estimation based on years of experience. When a person is easily tilted backwards it can be concluded that there is a low load on the front wheels. When a high load on the front wheels is estimated, a couple of things can be done to shift the load to the rear wheels. A first option is trying to seat the wheelchair user as far backwards as possible. By readjusting the angle of the backrest, you’ll create space to move backwards in the seat, and the center of gravity will be moved backwards. A second option is moving the wheel axle forward. Through this, the weight of the wheelchair user gets shifted backwards.

The concept of gravity is explained in literature. Gravity is an external force that constantly influences the body even though we don’t perceive it with conscious thought. Gravity is directed vertically downward, and affects the stability of the body from a point called ‘the center of gravity’. The center of gravity is a point on the body in which the entire weight of the body is concentrated and can be found at the balance point where horizontal and vertical planes meet. When in a sitting position, the center of gravity will thus be situated in the pelvic area. The center of gravity is the point from which the downward force, and thus the most weight, can be measured. In conclusion, if the pelvis is moved towards the rear wheels, the weight on the rear wheels will increase. (Rybski, 2004)

The center of gravity will not directly be moved backwards, so participants will have the opportunity to get used to a new point of balance.

![Figure 1: Load on the wheels](image)
3.2.1.2 Principle 2: Posture

“The position in which someone holds their body when standing or sitting” (Oxford University Press)

To adjust the posture you start by checking the position of the pelvic. A good pelvic position is shown in Figure 2. This is done in the frontal, transversal and sagittal plane. When the pelvis is adjusted it automatically affects the spine.

Literature also underlines the importance of a good pelvic position. By having a good pelvic position, the natural curves of the spine are maintained. From a biomechanical perspective, the optimal alignment of the spine requires minimal muscle activity in rest. (Hamill & Knutzen, 2009; Valent & van Breukelen, 2016) Most posture problems are related to sacral sitting and pelvic inclination (Collins & Shipperley, 1999). The most commonly encountered is sacral sitting due to posterior pelvic tilt (Hallenborg, 1987).

For stabilizing the pelvic, cushions can be used to get the person in a comfortable and secure seating position. Strong core muscles, and a well-adjusted backrest and upholstery are important for maintaining this seating position. A good pelvic position is important in preventing pressure ulcers.

Research found that a shaped cushion supports a neutral pelvic position and spinal curvature (Samuelsson, Björk, Erdugan, Hansson & Rustner, 2009). The sacral area, by nature, is not pressure resistant, and body weight load can lead to pressure ulcer development. (Hallenborg, 1987; Sluis, Smit, Middelweerd & van der Horst, 2016) Body weight load on the sacral area decreases when the support of the seat is optimized (Valent & van Breukelen, 2016).

Figure 2: A good pelvic position while sitting down
3.2.1.3 Principle 3: Ergonomics

“Physical ergonomics is concerned with human anatomical, anthropometric, physiological and biomechanical characteristics as they relate to physical activity.” (Ergonomics Plus, n.d.)

Ergonomics, or as I also like to call it: working position against the pushrims, has an important focus in Drivkraft.

Reston and Nock (2016) also underline the importance of good ergonomics in the wheelchair. They say that with backrest ergonomics optimized, wheelchair users can avoid many long-term health problems and enjoy a better quality of life.

The three parts of ergonomics are: the working angle, the driving phase, and the pushrim. The working angle is the angle that can be measured in the armpit when a person hangs his arms down the sides of the wheels. This angle is influenced by the distance between the center of the frame and the wheels.

When both the arms and the wheels move in the sagittal plane of the upper body, all energy of the arm muscles can be used for moving in the forward direction. When the arms are positioned in a bigger angle with respect to the wheels, the arms will not move in the sagittal plane. A compensatory force inwards must be delivered to move the arms in forward direction, which is less effective. (Lohman & Zuidgeest, 2015)

The driving phase is the length that is covered by the hands along the pushrim during one push. The bigger the driving phase, the longer distance you can drive within one push. You do need more power per stroke.

Slowik, Requejo, Mulroy, and Neptune (2015) describe that to increase power output to the pushrim, either the angle of pushrim contact, cadence and/or pushrim force must increase. This was also described in previous research (Wang, Deutsch, Morse, Hedrick, and Millikan, 1995).

Components that influence the driving phase are the height of the seat, the size of the rear wheels, and the pushrim. The lower the seat is, the greater the range of the arms along the wheels. This results in more contact with the pushrim. When the pushrims are smaller than the wheel, the driving phase automatically becomes smaller. Following the same principles, a last factor influencing the driving phase is the size of the wheels.

The effect of the height of the seat is explained by the research of McLaurin & Brubaker (1991). They concluded that if the seat is high, the driving phase is shorter because the hands aren’t able to reach as far down the pushrim. When the seat is positioned lower, the driving phase is longer and less force input is needed. The effect on the driving phase related to the height of the seat is explained in Figure 3.
The driving phase is measured when a person is sitting in a driving position and relaxing the arms. In general a good position is when the middle finger is between +2cm or -2cm to the axle. The height of the seat and the size of the wheels can be adjusted to achieve an optimal driving position.

Research also states several additional factors influencing the driving phase. It was found that when participants propelled with a low backrest (27.6±3.2cm), push times were longer, cadence was lower, and stroke angles were larger (Yang, Koontz, Yeh, Chang, 2012). Study results also show that more trunk forward lean motion resulted in a large initial contact angle of the pushrim (Wang et al., 1995).

3.2.2 Group 2: Components of the training

In this chapter, four principles will be discussed that can be connected to components of the training.

3.2.2.1 Principle 4: Basic skills

“a skill considered fundamental or elementary in a particular field” (Oxford University Press, 2017)

A couple of things are considered as basic skills in Drivkraft. These skills are: maneuvering the wheelchair forward and backward, braking, turning, rotating, and driving uphill and downhill. The basic skills are the first skills that are trained, and a focus lies on using optimal driving patterns. An overall goal is to consume as little energy as possible.

A literature study has been written on the topic of basic skills that are needed for wheelchair users in daily life. This literature study can be found in Appendix 5.
In the research of Kirby et al. (2016) they asked participants if they used certain skills daily, weekly, monthly, yearly or never. Most skills named by Drivkraft as basic are scored as used daily by the participants in the study of Kirby et al. (2016). Only the skill of descending or ascending an incline isn’t scored as a daily skill. This difference can be explained by the geographic location. Stockholm is a city with several steep inclines. Without practicing this skill, ascending or descending such an incline can be dangerous. For a description of all basic skills, see Chapter 3.4 Exercises.

3.2.2.2 Principle 5: Rear wheel balance
“A rear manual wheelchair wheelie occurs when the front wheels, ordinarily in contact with the support surface, are intentionally caused, by means of a transient or sustainable rear pitch, to lift from the surface while the rear wheels remain on the surface.” (Kirby, Smith, Seaman, MacLeod & Parker, 2006, p. 119)

The rear wheel balance has a great focus within the Drivkraft method.

Literature confirms that the skill of rear wheel balancing is necessary for almost every obstacle encountered in daily life. It is suggested that the most important skills besides moving forward and backwards are: overcoming small bumps and curbs, going up and down a slope, and move on uneven surface. (Morgan, Engsberg & Gray, 2017; Flies-Douver, Vanlandewijck & van der Woude, 2012) The research of Kirby et al. (2006) states that all of these important skills, wouldn’t be possible without being able to perform a wheelie.

Besides that, balancing on the rear wheels is a good way to let people get used to the wheelchair. Anti-tippers are used to give patients a secure feeling and a safe way to practice the rear-wheel balance. A good posture and well balanced wheelchair are important for making a rear-wheel balance. After adjusting the wheelchair, the position in which you make the rear-wheel balance changes. It’s therefore important to keep practicing the rear-wheel balance in different stages of the training.

3.2.2.3 Principle 6: Patterns
“A regular and intelligible form or sequence discernible in the way in which something happens or is done.” (Oxford University Press, 2017)

Three parts are checked in optimizing the patterns for propulsion of the wheelchair: the movement of the arms, the grip of the hands, and the movement of the trunk.

ARM PATTERN
It’s checked which pattern the arms follow while pushing the wheelchair. You always strive for an elliptic pattern, which is described in Figure 4.

Boninger (2002) explains that it’s logical that an elliptical pattern, also called a semicircular pattern, is the most advantageous. An elliptical path avoids abrupt changes in direction and minimizes the need for extra hand movement. The same results are found by Kwarciax, Turner, Guo & Richter (2012).
The pattern a patient follows, depends on the posture, ergonomics, and pushrims. When one of these components isn’t optimal, the elliptic pattern will be hard to achieve. There are situations in which the type of disease restricts you to make the elliptic pattern. In these cases you will try to find the most efficient alternative for pushing the wheelchair.

The study of Slowik et al. (2015) suggests that the speed and grade significantly influence preferred hand patterns. Raina, McNitt-Gray, Mulroy, and Requejo (2012), add that differences in individual anthropometrics, strength and functional capacity may prevent the identification of a single optimal hand pattern for all wheelchair users.

Figure 4: Elliptic arm pattern

HANDS
If your hand function is normal, there is one grip that you use for pushing the wheelchair. Your thumb and mouse are placed along the top of the pushrim and the remaining fingers are placed at the bottom of the pushrim. See Figure 5. When this is impossible due to adhesions of the hand, it’s better to use the thumbs only, tape the fingers together, or use special gloves. In this way the fingers can’t get stuck behind the attachment points of the pushrim, leading to injuries of the fingers and causing the wheelchair to stop.

For the standard pushrim grip the thumb is placed along the top surface while the rest of the hand wraps laterally around the rim such that the fingers contact the bottom surface (Koontz et al., 2006; Slowik et al. 2015)
If you have a wheelchair that’s well balanced without much load on the front wheels, you adjust the center of gravity all the time, which you do with your upper body and by sliding the pushrims. If you don’t bend your upper body forward, the wheelchair will tilt backwards while driving.

Julien, Morgan, Stephens, Standeven & Engsberg (2014) found that the amount of trunk and neck movement increases with the speed of the wheelchair to compensate for tilting backwards. The amount of movement in the trunk will differ on different surfaces and slopes (Worobey, Koontz & Boninger, 2010).

3.2.2 Principle 7: Obstacles

“Something that blocks you so that movement, going forward, or action is prevented or made more difficult.” (Cambridge University Press, 2017)

Some examples of obstacles are: curbs, thresholds, and stairs. The obstacles will only be trained after the basic skills and rear-wheel balancing are taught.

Research is mostly conducted on obstacles instead of the basic skills (Flies-Douer et al., 2012; Flies-Douer, Vanlandewijck, Post, van der Woude & de Groot, 2013; Kilkens, Post, Dallmeijer, van Asbeck & van der Woude, 2005).

By focusing on obstacles, the importance of the posture, pattern and pushing range is often undervalued. A day can go by without coming across many obstacles, but you can’t drive a wheelchair without using your basic skills.

For a description of obstacles, see Chapter 3.4 Exercises.
3.2.3 Group 3: Patient education

In this chapter, the principle of patient education will be discussed.

3.2.3.1 Principle 8: Patient education

"Is the process by which health professionals and others impart information to patients and their caregivers that will alter their health behaviors or improve their health status." (Wikipedia, n.d.)

Patient education is all about getting the patients to understand the wheelchair and everything around it. The ideal result is when the patients become so interested in the wheelchair that they will take proper care of their wheelchair, and develop even further in their skills and usage of the wheelchair. It’s important to know how to clean the wheelchair and keep the wheelchair in a good condition. This includes knowing how to put air in the tires, how high the pressure should be, and where they can go if something breaks or how they can fix it on their own.

As far as research is conducted, wheelchair users often get little or no education about the wheelchair, the cleaning of the wheelchair or how to care for or adjust it (Morgan et al., 2017). This is important because 8 out of 10 accidents encountered by wheelchair users are caused by technical malfunction, such as a broken rear axle, broken armrest or loose footrest (Hansen, Tresse & Gunnarsson, 2004).

Patient education also includes background information about the ergonomics, posture and rolling and turning resistance. The patient should know about these principles, because not every professional knows about them. Another aspect of the patient education is about electrical support for the wheelchair. This is so they know what is out on the market: some people might need it in the future.

An elaboration on the theory covered in Drivkraft can be read in Chapter 3.5.

3.3 Characteristic components

In this chapter components of Drivkraft that aren’t covered by one of the eight principles, will be discussed.

3.3.1 Component 1: Peer mentoring

“People who have faced, endured and overcome adversity, that can offer useful support, encouragement, hope and perhaps mentorship to others facing similar situations.” (Davidson, Chinman, Sells & Rowe, 2006)

There’s a difference between therapists that give wheelchair training during rehabilitation and me. I have much more time to focus on the wheelchair skills. Within rehabilitation there’s a lot of focus on being able to walk. The wheelchair functions as my legs and I know how important it is to be able to use the wheelchair and take part in society. I understand that learning new skills in the wheelchair, even when you’re older, is very important, although it may not be as easy as learning new skills when you’re young.
A literature study has been written on the topic of peer mentoring, see Appendix 4. The study found that a peer mentor indeed has a unique position within the multidisciplinary team. They function as a full team member, and are a voice for the client at the same time (Young et al., 1999). Besides this, peer mentors show a level of understanding that participants can’t get from friends, family or any other professionals (Beauchamp et al., 2016; Divanoglou & Georgiou, 2017; Standal & Jespersen, 2008; Young et al., 1999; Veith et al, 2006).

I based my training largely on experiences from daily life. The rest of the exercises resulted from daily life problems of participants. Also I try different wheelchairs often and I thus learn about different adjustments as well. I can use what I learned for my patients.

Peer mentors are a good source to gain practical support, such as information about the wheelchair and using the wheelchair efficiently. (Beauchamp et al., 2016; Hanks et al., 2012; Powers et al., 1995; Standal & Jespersen, 2008; Veith et al., 2006). In two studies mentees noted that the information they got from their peer mentor was new for them and wouldn’t have reached them without the program (Ljungberg et al., 2011; Veith et al., 2006).

I think it’s an advantage the participants believe in me, because I am using the wheelchair myself. Nevertheless I don’t think you have to be in a wheelchair to be a good teacher. It’s an advantage when you’re in a wheelchair yourself, but I believe an occupational therapist or physiotherapist could do the same job.

Participants reported that it’s pleasant to learn from one source who, having experienced multiple facets of the situation, could advise about multiple aspects of the disease. (Veith et al., 2006)

**3.3.2 Component 2: Training groups**

*Before starting the group training I always have one individual session to get to know the participant and to get an idea of his/her goals. After that I give group training sessions, and within that I give individual directions to each person. Sometimes I also train individually with a client. This is never during the first sessions. When the group doesn’t know what to train on, then I can’t be absent with one of the participants.*

*I train groups of five participants maximum. I don’t teach more than five so I can put enough focus on each individual. Drivkraft is an intensive training program where people have three classes a week. One lesson takes three hours and every week an hour is scheduled for theoretical lessons.*

*Before the training starts, participants can have coffee and talk to each other. They talk about their diagnosis and problems they face in life, which bonds them as a group and motivates them to train. The same thing happens during fika (coffee breaks). When one or more participants are absent during the training, you notice less factors of group dynamics. Although I notice the group dynamics are important they are not my main focus during the training.*
During the coffee breaks multiple therapeutic factors, as described by Yalom & Leszcz (2005), are present. Members recognize that they share experiences and feelings with other group members (universalia) and they learn about their treatment or other services (imparting information). The importance of being around people with mutual experiences is also described by Standal and Jespersen (2008). Mentees reported they took in information of other wheelchair users whenever possible, because they didn’t get this opportunity in daily life. They could discover whether their own solutions were useful, and they could notice specific details of wheelchair skills. De Haas (2013) describes that participants learn easier from other participants compared to a therapist.

The groups aren’t formed by diagnosis, although I think this would be nice sometimes. I don’t know if it will be more effective when I have for example 4 or 5 participants with MS in one group, but I would like to try it someday. Or maybe I can put the groups together on skill level, I don’t really know. If I had the opportunity I would learn a bit more about how I would put the groups together.

Homogenous groups have the benefit of creating a feeling of comfort by showing the participants that they are not the only ones with that type of diagnosis or problem (Spitz, 2013). In Drivkraft the homogeneity is the use of a wheelchair, any other type of homogeneity happens at random.

‘Heterogeneous elements offer the ability to create a baseline tension in groups that can be used in the service of motivating the group members to change. Differences among members form the building blocks for group interaction and interpersonal curiosity, factors that accelerate the pace of the group process.’ (Spitz, 2013, pp. 68)

This corresponds to the therapeutic factor ‘instillation of hope’. To create hope is crucial, by having a mixed group that has members at different stages of recovery, a member can be encouraged by a member who has already overcome a problem or obstacle that they are still struggling with. (Yalom & Leszcz, 2005)

In short term groups, such as Drivkraft, heterogeneity has a positive influence. The influence of heterogeneity is often underemphasized and the focus lies too much on the homogeneity of groups (Spitz, 2013).
3.4 Exercises

In this chapter, different wheelchair exercises will be explained. These exercises are included in the training program, and form the basis of group 2: components of the training.

3.4.1 Basic skills

Slalom

For this exercise, cylinders in red and white are placed down in a line. Participants are asked to pass the white cylinders while driving forward and pass the red cylinders backwards. Figure 6 shows an example of a parkour.

Figure 6 Slalom parkour

Turning

To practice turning, a cylinder is placed down approximately 10 meters away from the participant. The participant drives towards the cylinder and turns around the cylinder by firming the grip on the pushrim on the side of the cylinder. Leaning backwards will prevent losing speed. If done correctly, it’s possible to make it back to the starting point without pushing.

Figure 7: Turning, notice the backward leaning
Street with an incline
While driving on a street with an incline it’s important to have the weight of the body on the rear wheels. When the weight is placed on the front wheels, the wheelchair will turn towards the lower side and goes downhill. For this reason: prevent moving the trunk forward during the push. Push a little bit harder on the side of the wheelchair that’s on the lowest side of the street.

Up-down hill
When going up the hill, make sure to increase speed before the hill. Downhill, always lean backwards. Make the wheelchair go less fast by firming the grip on the pushrims. It’s important to keep the hands near the pushrims (Slowik et al., 2015)
When going up the hill, it’s important to lean forward while pushing and straighten in between pushes. This increases the speed and prevents the wheelchair from tilting backwards. A common mistake is pushing the front part of the pushrims only; keep the focus on the correct hand patterns.

Optional:
- Take the obstacle from a stationary position directly in front of the hill.
- Slalom down the hill, this will make the wheelchair go less fast.
3.4.2 Rear-wheel balance

Rear-wheel balancing can be trained in several levels of difficulty and is done by pushing or sliding the pushrims in combination with adjusting the center of gravity. When in horizontal position the wheelchair is pushed to get into rear-wheel balance while leaning backwards. When going downhill it’s done by sliding the pushrims through the hands, increasing the friction on the pushrims and bringing the center of gravity backwards.

To get a feeling for rear-wheel balancing the participant can be put on its anti-tipping wheels. When they feel secure the participant can try to bring the wheelchair in rear-wheel balancing position. As soon as they can do the rear-wheel balance a high and low balance position can be trained. It’s also good to train sliding the hands over the pushrims without moving the wheelchair, as a prerequisite for the rear-wheel balance with sliding force.

**Rear-wheel balance with driving force**

- Drive forward and backward while being in rear-wheel balance. Do this over a small distance and a longer distance. Try to make the driving phase as smooth as possible.
- Move the wheelchair from the left to the right while in rear-wheel balance.
- Try to make the wheelchair turn while in rear-wheel balance. Turn both hands in opposite direction to make the turn as efficient and small as possible. Try to use as less pushes as possible throughout the rotation. Also try it the other way around.

**Rear-wheel balance with sliding force**

- Try to go downhill while in rear-wheel balance.
- Try to come in balance position with speed on a flat surface, keeping the balance until the wheelchair stops.
3.4.3 Obstacles

Curbs

Going up and down curbs of different heights (2cm, 3.5cm, and \(\geq 5\)cm) is something a person encounters daily. Achieving a good technique on the lower curbs is important before trying the higher curbs.

To get onto the curb it’s important to have the hands in the right position so the rear-wheel balance with driving force can be made. Timing is important for this, people tend to finish a stroke before they get into a rear-wheel balance. Sometimes it’s better to skip a stroke so the rear-wheel balance can be timed better. Keep in mind to move the body forward when going onto the curb and move the body backwards when getting of the curb.

Safety risk: when going too fast while approaching a curb and the rear-wheel balance isn’t timed correctly the front casters will hit the curb and there is a risk of falling out of the wheelchair.

Getting of the curb can be done in different ways.
- Give the wheelchair a small push when getting of the curb. This results in landing on four wheels at once.
- Keep the wheelchair in rear-wheel balance so only the rear wheels hit the ground.
- Block the rear wheels against the curb while getting of. This is an advanced option and mainly used for going down the stairs.

Safety risk: when the front casters touch the ground first while getting of, there is a risk of falling out of the wheelchair. Therefore, be aware of the aspect of timing.

![Figure 11: Going up the curb](image)
Threshold

This obstacle trains getting over thresholds on different heights, and can be adjusted to the level of the participant. Place the wheelchair in rear-wheel balance to get the casters over the threshold and push the wheelchair over the threshold in a fluent motion.

For advanced wheelchair users who are using the high threshold, be sure to stay in rear-wheel balance while on top of the threshold before getting off. Be careful not to let the front wheels drop, because there is a risk of falling forward.

Figure 12: Threshold, notice the different planks so it can be changed in height

A problem that often occurs is when people have energy to lift their front wheels over the threshold, but don’t have strength to push their rear wheels over as well. Because of this, they get stuck on both sides of the threshold. A rear-wheel exercise for this is using a frame and putting the casters over and back the obstacle multiple times.

Figure 13: Framework for practicing the lifting of the caster wheels for a threshold
Ladder (advanced)

A ladder is placed down on the floor. This full exercise will be done while rear-wheel balancing. Create a momentum by moving the front wheels down and up again, without them touching the floor. With this momentum it will be easier to get over the rung of the ladder.

Figure 14: Ladder, an advanced rear-wheel balancing skill (not possible with anti-tippers)
3.5 Theoretical lessons

Every week the participants learn relevant theoretical knowledge about the wheelchair. During the first lesson a part of the time is used to get to know each other and to introduce the training program. These theory lessons will also cover ergonomics, posture, and mechanics/rolling- and turning resistance.

In the second lesson, information will be given about how to take care of the wheelchair. Things discussed are: how to put air in the tires, how to get hair and other filth out of the front wheels, and how to perform maintenance on the wheelchair.

In the third lesson information will be given about gadgets that can be used for the wheelchair. For instance: gloves for better grip, and special wheelchair bags.

In the fourth lesson, electrical types of wheelchairs and electrical devices for support in propulsion are discussed. This information is specifically important for participants with degenerative diseases.
4. Discussion

The purpose of this thesis was to describe the Drivkraft method and the specific components that make Drivkraft unique. This purpose was achieved by combining the interviews with Åke, the observations and the literature research.

4.1 Strengths and limitations

It was planned to go to Sweden early in the project to get more information about Drivkraft and to meet Åke in person. The trip was planned five weeks after starting the project.

A strength of this early trip is that the data was gathered soon after starting the project. This means that time and care could be given on analyzing the information and writing the thesis.

The early trip can also be seen as a limitation. A few days before leaving, the project plan was turned down and a new plan had to be made. Because of time pressure, it’s possible that the new project plan was not complete. With more time, more background information on conducting interviews could have been obtained which might have resulted in a better quality of interviewing.

Only one week was spent in Stockholm due to limited budget and time restraints. The consequence was that only the first three lessons of the training could be observed. With more time the whole training period would have been observed to see the progress of the participants.

This thesis is written by Dutch students for our Swedish supervisor. Communication was done in English, which isn’t the native language for any of them. Because of this, information was possibly misinterpreted. With intensive contact and questions this possible error was made as small as possible.

While in Sweden, interviews were conducted with Åke. This resulted in information about Drivkraft, that couldn’t be obtained by observing. Because of the time limit the participants weren’t interviewed. With more time, it would be interesting to interview participants about how they experience Drivkraft.

For this thesis three extensive literature studies were written on specific components. The other components were also substantiated with literature, but not as extensive. With more time, these other components could also be substantiated with literature studies.

Some of the articles used, were written before 2000. Although old, these were still included, because little evidence was written on some of the topics.

A final strength is the way this thesis adds to the quality of the care given in Rehab Station Stockholm. Swedish law on quality care (Lag 1998:531) states that:

“1 § Anyone who belongs to a health profession carries out their duties in accordance with scientific evidence and proven experience.” (Sveriges Riksdag, 2010)

This thesis gives the overview of the evidence base that Drivkraft uses and therefore helped Åke to improve his work according to this law. To assure the quality of the evidence base the PDCA circle was used. There was a constant communication with Åke and pieces were send to Susanne Guidetti (PhD, occupational therapist), and Kerstin Wahman (PhD, physiotherapist). Feedback was given on content and quality which improved the strength of this thesis.
4.2 Implications for clinical practice

Eventually, our supervisor would like to see that Drivkraft is implemented in different health care facilities all over Sweden, and if possible in other countries as well. This thesis project resulted in an English document that describes the evidence base of the method and can be spread to create a better understanding of Drivkraft.

Drivkraft is a method created within the Swedish healthcare system. The responsibility for health and medical care within the Swedish healthcare system is shared by the government, the county councils, and municipalities and is mostly funded by taxes. (Swedish Institute, 2017) Because Drivkraft receives funding, it’s possible to continue the intensive training program. Within other healthcare systems, the funding might be less, and this program might not be possible. Implementation in other countries might not be cost effective.

Ideally the training would be given by peer mentors, because Drivkraft is given by a peer mentor and the positive effects of the use of peer mentors have been identified (Beauchamp et al., 2016; Divanoglou & Georgiou, 2017; Hanks et al., 2012; Ljungberg et al., 2011; Powers et al., 1995; Standal & Jespersen, 2008; Struchen et al., 2011; Veith et al., 2006; Young et al., 1999). However, experienced wheelchair drivers that are capable and willing to give training, are not always available. Besides this, training should be provided to these new trainers to fully master the Drivkraft method. Finally, it needs to be noted that wheelchair training is sometimes already given by other professions. This can create a conflict of interest.

4.3 Recommendations for future research

A next step in the research of Drivkraft is to research the value and effectiveness of the method. By performing qualitative research, the experiences and the value of participation in Drivkraft could be described. In order to study the effectiveness a randomized controlled trial should be performed. This could be ethically difficult because it would deny people access to training. Therefore, a cohort study would be a good alternative in order to evaluate the outcomes and the effect of Drivkraft. Multiple groups could be followed during the training and a follow up could be done to see the lasting effects on wheelchair skills reached by Drivkraft.

As described above Drivkraft can’t be implemented directly in other countries because of the differences in healthcare systems. Extensive research must be performed on the exact differences in these healthcare systems to see if the intensive wheelchair training method Drivkraft will be cost effective. In these countries market research needs to be done to identify if there is a need for Drivkraft.
5. Conclusion

The Drivkraft method is an intensive training program in which not only wheelchair skills are trained, but the wheelchair is also adapted to a participant’s physical measurements and capabilities, and participants also learn relevant theory about the wheelchair. Over a period of four weeks, participants will follow the Drivkraft training, consisting of three lessons a week for a duration of three hours. The training will be given to groups with a maximum of five participants and when necessary individual instructions/lessons are given.

The Drivkraft training is based on eight principles that either can be connected to wheelchair adjustments, wheelchair training, or patient education. The eight principles are: rolling and turning resistance, posture, ergonomics, basic skills, rear-wheel balance, patterns, obstacles, and patient education. Characteristic of this training is that Drivkraft is taught by a peer mentor.

The literature studies seem to support the three characteristic components in Drivkraft; group training, peer mentoring and the importance of specific wheelchair skills training. Literature also supports the value of the eight principles.

The thesis can be used to give third parties an overview of the method and the evidence that supports it. Future studies are needed to explore the value and effectiveness of the method.
References


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Appendices

Appendix 1: Specification of wheelchair terminology.
To be able to fully understand the description and evidence base of the Drivkraft method, one needs to have knowledge of specific wheelchair-terminology. In this chapter, relevant terminology will be explained.

1 Types of wheelchairs
Because different terms are used to define wheelchairs, and there will be referrals to different wheelchair types, it’s necessary to specify what is meant by the terminology used. The term ‘wheelchair’ is defined in the following definition:

“A wheelchair is a wheeled mobility device with a seating support system for a person with impaired mobility, intended to provide mobility in a seated position as its primary function.” (Assistive Technology Partners, 2013, p. 20)

There are two subtypes of wheelchairs, that both are very different, and ask different skills from its user: the powered wheelchair and the manual wheelchair.

**Powered wheelchair**: A wheelchair that relies on power control for its operation. (Assistive Technology Partners, 2013)

**Manual wheelchair**: A wheelchair that is propelled by the user. This wheelchair also has handles on the back so it can be pushed by another person. (Disabled World, 2017)

https://www.disabled-world.com/assistivedevices/mobility/wheelchairs/

Drivkraft focuses on manual wheelchairs. Therefore, when a referral is made to ‘wheelchair’ without further specification, a manual wheelchair will be meant.

A specific type of manual wheelchairs is an active wheelchair. By this is meant that it’s a manual wheelchair that is easy to maneuver and weighs less. Often active wheelchairs have a low backrest. The active wheelchair is meant for users that don’t rely on others for propulsion. A lot of the participants in The Wheelchair School use an active wheelchair.

2 Wheelchair parts
A wheelchair consists of many parts that can be named and specified. The main parts are: chassis; footrest; backrest; seating and cushion; side protectors; anti-tipping wheels; hand bars; brakes; calf support; front wheel or caster wheel; and the rear wheels.

The rear wheels can be specified in different parts, they are: axle; hub; spokes; pushrim; and the tire.

All these parts can be seen in Figure 1. Wheelchair parts. These parts are explained with the use of the Glossary of Wheelchair Terms and Definitions (Assistive Technology Partners, 2013), unless otherwise specified.
Figure 1. Wheelchair parts

**Chassis:** The frame of the wheelchair with the wheels, but without additional cushions or functions.

**Frame:** The wheelchair frame of an active wheelchair is usually rigid, whereas other manual wheelchairs can be folded.

**Fore fork:** A part of the frame is the fork, this is the footrest combined with the connection to the rest of the frame. In active wheelchairs it’s usually u-shaped.

**Footrest:** The footrest differs on every type of wheelchair, it can be a solid piece for both feet or separately adjustable for each foot.

**Calf support:** An extra, textile, sling between the fore fork to support the calves and prevent the feet from sliding off the footrest.

**Backrest:** A support for a person’s back when they are seated.

**Seat cushion:** Separate, removable seat intended to perform one or more functions including modifying or accommodating the occupant’s sitting posture, managing tissue integrity and/or providing comfort.

**Side protector:** A component that provides a barrier between the wheelchair user and the wheel (also known as a clothing guard).

**Anti-tipping wheels:** A set of extra wheels on the back of the wheelchair that prevent the user from falling backwards.

**Hand bars:** A component designed to be grasped by the hand of an assistant to propel or tip the wheelchair (also known as push handles).
**Brakes:** Means of keeping the wheelchair stationary without continuous force from the user. Different types of brakes are on the market, including push to lock, pull to lock or retractable scissor locks.

**Front wheel:** Small wheels that are in contact with the ground during normal operation of the wheelchair and cannot be used for arm propulsion (also known as caster wheel or swiveling wheel).

**Rear wheels:** A set of big wheels available in different diameters, positioned next to the seat. Usually they are filled with air.

**Axle:** A thin straight bar passing through the centre of a wheel. Quick-release axles are a type of axle in which depression of the center button of the rear wheel axle allows the wheel to be removed from the frame.

**Hub:** The central part of a wheel, rotating on or with the axle, and from which the spokes radiate.

**Pushrim:** Outer, circular component of the maneuvering wheel intended for propelling a manual wheelchair with an upper limb. These can be made with different diameters.

**Pushrim types:** Refers to the style or type of material of the pushrim such as: anodized aluminum, chrome, foam coated, vinyl or plastic-coated, titanium, contoured/ergonomic or with projection knobs.

**Tire:** A rubber covering, typically inflated or surrounding an inflated inner tube, placed round a wheel to form a soft contact with the road.

**Camber:** Alignment of a wheel in the frontal plane (front view), expressed as the angle between vertical and a plane perpendicular to the axis of the wheel.
Appendix 2: Search strings
The table shows an overview of the search strings that are used for finding the evidence base.

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<th>Component</th>
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<td>rolling resistance AND wheelchair</td>
<td>CINAHL</td>
<td>18 (1)</td>
</tr>
<tr>
<td>Posture</td>
<td>optimal posture</td>
<td>MEDLINE &amp; CINAHL</td>
<td>114 (1)</td>
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<td></td>
<td>pelvic posture AND wheelchair*</td>
<td>MEDLINE &amp; CINAHL</td>
<td>11 (2)</td>
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<tr>
<td>Ergonomics</td>
<td>ergonomics AND wheelchair</td>
<td>MEDLINE &amp; CINAHL</td>
<td>126 (3)</td>
</tr>
<tr>
<td></td>
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<td>MEDLINE &amp; CINAHL</td>
<td>30 (1)</td>
</tr>
<tr>
<td></td>
<td>compensating forces AND wheelchair</td>
<td>MEDLINE &amp; CINAHL</td>
<td>12 (1)</td>
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<td></td>
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Appendix 3: Literature study – Factors of an effective wheelchair group training

Factors of an effective wheelchair group training

Written by: Michael Zonneveld
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On behalf of: Åke Norsten
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Date: 18-04-2017

Abstract
Objective: To answer the question: What factors make a wheelchair group training effective?
Method: Literature search in the databases CINAHL, MEDLINE & Cochrane and in books. Peer review was conducted on the results of the search which resulted in the inclusion of 2 articles and 8 chapters from 3 different books.
Results: Multiple therapeutic factors and characteristics of effective group training were found, supported by a qualitative study focussing on wheelchair group trainings.
Discussion: Multiple factors seem to influence the effectivity of a group. A limitation was that the factors described were not tested on wheelchair group trainings. Although, having used books a broader range of research was covered. More extensive literature research and research on the factors that influence the effectivity of group training is needed.
Conclusion: By knowing the therapeutic factors and the characteristics of effective group training a more substantiated wheelchair group training can be executed.
Introduction

The wheelchair is one of the most common and important of rehabilitation devices (Kirby, Mifflen, Thibault, Smith, Best, Thompson & MacLeod, 2004). It is used by individuals who have impairments that limit their ability to walk (WHO, 2010). According to the most recent data, from January 2013, 1% of the Swedish population uses a wheelchair, this equates to an amount of 150,000 wheelchair users. Of these people 67% uses a manual wheelchair4 (Hjälpmedelsinstitutet, 2014). Using an active wheelchair1 may be beneficial. They are more hard-wearing, can withstand higher strains than other manual wheelchairs and can be used for up to 16 hours a day, 365 days per year, a degree of usage few other devices withstand (Cooper, 1998; Cooper, Boninger, & Rentschler, 1999).

People using a manual wheelchair encounter a substantial range of destinations that can’t be reached due to barriers. This includes the lack of ramps, ramps that are too steep and rudeness of other people (Meyers, Anderson, Miller, Shipp & Hoenig, 2002). When trying to overcome barriers without proper training, there is a potential for acute or overuse injuries to the wheelchair user (Boninger, Towers, Cooper, dicianno, & Munin, 2001; Calder & Kirby, 1990; Gaal, Rebholtz, Hotchkiss & Pfaelzer, 1997; Liu, Mineo, Hanayama, Fujiwara & Chino, 2003; Ummat & Kirby, 1994; White & Kirby, 2003; Woolfrey & Kirby, 1998).

The reduced community access, due to difficulties in overcoming barriers, can be the result of a lack of intensive wheelchair skills training (Aronson, 1997; Best, Miller, Eng, Routhier & Goldsmith, 2014; Liu et al., 2003; McClain, Cram, Wood & Taylor, 1998; Norrlin, strinnholm, Carlsson & Dahl, 2003; Palisano, Tieman, Walter, Bartlett, Rosenbaum, & Hanna, 2003; Pierce, 1998). This is a shame because manual wheelchair users report that confidence with their wheelchair, the grip strength, and satisfaction has influenced their participation in a positive way (Smith, Sakakibara & Miller, 2016). Besides this: persons that are experience their use of active wheelchairs can be described as “healthy disabled”. When they have impairments that are stable and predictable (e.g. spinal cord injuries), they consider themselves to be healthy (i.e. opposed to ill or sick) and do not expect to die any sooner than any other healthy persons their age. (Wendell, 2001).

If wheelchair users want to participate in daily activities they will need certain skills, for example they need to be able to balance on their rear wheels. In this way, they can overcome barriers like curbs, steep inclines and potholes (Kirby, Smith, Seaman, Macleod & Parker, 2006). A better ability to mobilize in your manual wheelchair, leads to a higher level of independence and quality of life. Trained wheelchair users also use their wheelchair more than wheelchair users who haven’t had wheelchair training (Hoenig, Landerman, Shipp, Pieper, Richardson, Pahel & George, 2005). This indicates that there is need for wheelchair skills training.

To meet the needs of providing wheelchair skills training, ‘Drivkraft5’ was developed. This is a method to successively adjust the wheelchair in combination with wheelchair skills training. Drivkraft is developed by Åke Norsten, a Physical Education (PE) teacher and wheelchair user. He teaches his method at Rehab Station in Stockholm, in co-operation with a physiotherapist and wheelchair mechanic. Special about Drivkraft is the fact that it’s not only developed, but also taught by an experienced wheelchair user. This seems to be a unique concept and therefore the aim of the main study is to explore the Drivkraft method with all its unique components and to describe the evidence base.

4 More information can be read in the glossary at the end of the document.
5 More information can be read in the glossary at the end of the document.
Since the Drivkraft method has multiple elements that have to be described, three topics were selected for a more extensive literature review. These topics focus on:
- Group training;
- Peer mentoring
- Specific wheelchair skills

In this literature study the first topic, the group training, will be studied. The question that will be answered is:

What factors make a wheelchair group training effective?

Relevance for occupational therapy
An answer to this question is relevant for occupational therapy practice, since wheelchair training is mostly given individually in the Netherlands so far. This was noticed during internships and conversations with other students in rehabilitation settings. When the occupational therapist knows which factors are important to have in a wheelchair group training to make it more effective it will have multiple benefits for the patient as well. The patient will have to invest less time to get to the same skill level when the training is more effective and/or will come out at a higher skill level than possible with the training without the effective factors.

To have the knowledge about the factors for a wheelchair group training might also help with setting up other groups. Therefore, knowing these factors might not only be useful for occupational therapists, but paramedics in general as well.

Method

Search
For searching the literature two different strategies were used: searching the databases with search strings and back & forward chaining. To search the databases different search terms were set with which different search strings were formulated. The terms were selected by taking the key components of the research question and when possible use synonyms for them. The terms used in the search strings are shown in Table 1.

<table>
<thead>
<tr>
<th>Search terms</th>
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</thead>
<tbody>
<tr>
<td>Patient: Group</td>
</tr>
<tr>
<td>Intervention: Training, therapy, treatment</td>
</tr>
<tr>
<td>Outcome: Wheelchair*</td>
</tr>
</tbody>
</table>

The formulated search strings combined the group with the intervention and outcome. These were put in different databases. The selected databases were chosen because the topic ‘wheelchair group training’ is usually performed by healthcare professionals. Therefore both CINAHL and MEDLINE were included. MEDLINE goes back further in time compared to CINAHL, and also focuses more on healthcare in general. CINAHL gives more literature about paramedic healthcare and is therefore also useful. The final database that was used was Cochrane, a database that focuses on healthcare reviews.

Although the databases were chosen to get articles from different professions, databases such as PsychINFO and ProQuest Social Sciences are not included. These were excluded on purpose, because the professions in the database had to be linked with the possibility to give a wheelchair training.

An overview of the databases is shown in Table 2.
Table 2 Used databases

<table>
<thead>
<tr>
<th>Database</th>
<th>Articles from…</th>
<th>Profession(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDLINE</td>
<td>1946 – present</td>
<td>Healthcare</td>
</tr>
<tr>
<td>CINAHL</td>
<td>1981 – present</td>
<td>(Paramedic) healthcare</td>
</tr>
<tr>
<td>Cochrane</td>
<td>2000 – present</td>
<td>Healthcare reviews</td>
</tr>
</tbody>
</table>

The titles that were found were put in the program RefWorks, where duplicates were filtered. This was first done by the program and then checked by hand, to make sure the program did not skip any duplicates.

**In- and exclusion criteria**

The titles found were examined on relevance to the aim by using the in- and exclusion criteria. The inclusion criteria were:

- Written in English or Dutch
  This is an inclusion criterion, because there are no other languages that are understood well enough by the author.
- Published in peer reviewed journals
  If the article is not published in peer reviewed journals but general magazines the credibility and quality can’t be assured. To make sure the articles are of good quality they have to be published in peer reviewed journals.
- Description of the wheelchair group training
  If the article doesn’t give a description of a wheelchair group training it won’t be useful for answering the research question since it misses the main topic.

The exclusion criteria were:

- Sports training
  A quick scan of the titles made this exclusion criteria to be on the list. It turned out the search string also found the description of training for wheelchair sports or physical exercises. Since they don’t focus on the wheelchair training in a way it’s useful for the research question they are excluded.
- Respiratory training
  A quick scan of the titles made this exclusion criteria to be on the list. It turned out the search string also found the outcome of respiratory functioning. Since they don’t focus on the wheelchair training in a way it’s useful for the research question they are excluded.
- Powered wheelchairs
  Within the Drivkraft method only active wheelchairs are used. Therefore a training for powered wheelchairs if of no use to the main project.

As you may notice there is no restriction on the date the articles were published in. This is done on purpose to not preliminary exclude articles, older articles will be analysed more critically on relevance to the current situation.

An overview of the in- and exclusion criteria is shown in Table 3.

Table 3 In- and exclusion criteria during the selection process

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written in English or Dutch</td>
<td>Sports training</td>
</tr>
<tr>
<td>Published in peer reviewed journals</td>
<td>Respiratory training</td>
</tr>
<tr>
<td>Description of the wheelchair group training</td>
<td>Powered wheelchairs</td>
</tr>
</tbody>
</table>

**Peer review**

A peer review was conducted by 2 reviewers independent from each other. Both of the reviewers are also working on the main project. There was contact between the author and the reviewers after the title selection and after the abstract selection and on both occasions there was a discussion about which titles and abstracts had to continue.
Search results
The search and peer review resulted in a total amount of 231 titles, of which 11 abstracts were selected for reading, of which 2 articles were selected for answering the research question. The articles were checked on their quality by using the McMaster guidelines on quantitative (Law, Stewart, Pollock, Letts, Bosch & Westmorland, 1998) and qualitative studies (Letts, Wilkins, Law, Stewart, Bosch & Westmorland, 2007)
The selection process is shown in Flowchart 1.

Since there weren’t enough articles included out of the databases to answer the research question, and no other articles were found, the focus shifted to books. The online libraries of the Amsterdam School of Health Professions, University of Amsterdam and Leiden University were consulted to find books about group treatment in general. This was done by searching for “factors of group treatment”. The expectation was that there aren’t any wheelchair specific books either. A total of 3 books were found and included, based on their relevance to the research question. They had to describe some sort of factors that are at work during a training or therapy group. The books were checked on their references to see which evidence the authors have found for their comments. The books were also checked by the peer reviewers on relevance to the research question, before full inclusion.
<table>
<thead>
<tr>
<th>Author, year</th>
<th>Aim</th>
<th>Design</th>
<th>Population</th>
<th>Results/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standal &amp; Jespersen, 2008</td>
<td>To investigate the learning that takes place when people with disabilities interact in a rehabilitation context.</td>
<td>Phenomenological &amp; hermeneutical</td>
<td>N= 9 in the pilot, N=11 in the main study. Spinal cord injury N=11 Other conditions N=9 N=16 male Mean age 43</td>
<td>Four themes emerged from the data analysis: (a) learning together, (b) understanding my struggles, (c) getting a measuring stick, and (d) the wheels are my shoes. In this study, it’s the resources for learning in such settings that are highlighted. One of the most important resources in this respect is peer learning.</td>
</tr>
<tr>
<td>Worobey, Kirby, Heinemann, Krobat, Dyson-Hudson Pedersen, Shea &amp; Boninger, 2016</td>
<td>To evaluate the effectiveness of group wheelchair skills training among people with spinal cord injury to improve wheelchair skills and achieve individual goals.</td>
<td>Randomized Controlled Trial</td>
<td>Intervention group N=36 Mean age 40.1 N=32 males Control group N=43 Mean age 41 N=37 males</td>
<td>Group training can provide effective goal attainment with potentially greater efficiency. A structured group-training program may be a useful resource for therapists. Regardless of setting, group training provides an opportunity for participants to learn from their peers, and participants with the same skill levels may have similar goals.</td>
</tr>
<tr>
<td>Author, Year</td>
<td>Title</td>
<td>Field of Study</td>
<td>Included Chapters</td>
<td></td>
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<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>----------------------</td>
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<td></td>
</tr>
<tr>
<td>Yalom &amp; Leszcz, 2005</td>
<td>The Theory and Practice of Group Psychotherapy 5th ed.</td>
<td>Psychotherapy</td>
<td>Ch. 1 The Therapeutic Factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ch. 2 Interpersonal Learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ch. 3 Group Cohesiveness</td>
<td></td>
</tr>
<tr>
<td>Marilyn Cole, 2012</td>
<td>Group Dynamics in Occupational Therapy: The Theoretical Basis and Practice Application of Group Intervention 4th ed.</td>
<td>Occupational therapy</td>
<td>Ch. 1 Group Leadership: Cole’s Seven Steps</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ch. 2 Understanding Group Dynamics</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ch. 3 Client-Centered Groups</td>
<td></td>
</tr>
<tr>
<td>De Haas, 2013</td>
<td>Groepsbegeleiding en groepsbehandeling in de gezondheidszorg 4th ed. [Group coaching and group treatment in healthcare]</td>
<td>Group Dynamics</td>
<td>Ch. 1 de groepsdynamiek als krachtbron [The group dynamics as a source of power]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ch. 4 een groep leiden [Leading a group]</td>
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</tr>
</tbody>
</table>
Results

During the selection procedure a total of 2 articles and 8 chapters from 3 books were included. All of the literature that’s included describes group therapy in general or a specific group therapy.

Yalom & Leszcz (2005a) focusses on therapeutic factors in psychotherapy. They describe this factors in the first three chapters (Yalom & Leszcz, 2005b; Yalom & Leszcz, 2005c; Yalom & Leszcz, 2005d). These factors are relevant to the research question, because they might be transferrable to occupational therapy practice or group training in general. The book written by Cole (2012a) is an occupational therapy book and also mentions the therapeutic factors from Yalom & Leszcz (2005a). This gives all the more reason to use the therapeutic factors in occupational therapy practice. Cole (2012b) describes a seven step format for group training as an occupational therapist and also gives the evidence for characteristics of groups in her second chapter (Cole, 2012c). In the last chapter included, she focusses on a more client centred way of giving groups (Cole, 2012d).

De Haas (2013a) is a book that focusses on group dynamics in general. He also refers to the therapeutic factors in his first chapter (De Haas, 2013b). In his fourth chapter (2013c) he describes the skills a group leader needs. This is useful for the research question, since not only the participants of the group are of an influencing factor, but the skill level of the therapist leading the group as well.

The article written by Standal & Jespersen (2008) is a qualitative study about the experience of participants in a wheelchair group training. The themes that emerged can be compared with the therapeutic factors of Yalom & Leszcz (2005a). Worobey et al. (2016) turned out to be less useful to the research question then expected. They give some valuable information about the greater efficiency a group training can achieve, but don’t elaborate on factors that create this influence. An overview can be seen in Table 4 and Table 5.

Extensive results

To create an overview with more detail on the results from the included chapters and articles this section was written. In here you can find all the information that was used for answering the research question.

Yalom & Leszcz (2005a) is a book that the other books are all referring to. The book starts with the explanation that group psychotherapy is equally effective as individual psychotherapy. Yalom says that

“Once identified, the crucial aspects of the process of change will constitute a rational basis for the therapist’s selection of tactics and strategies to shape the group experience to maximize its potency with different clients and in different settings. I suggest that therapeutic change is an enormously complex process that occurs through an intricate interplay of human experiences, which I will refer to as “therapeutic factors”’’

(Yalom & Leszcz, 2005b, p.1).

In total he divided the therapeutic experience in 11 primary factors:

1. **Instillation of hope**
   To create hope is crucial in any psychotherapy. By having a mixed group that has members at different stages of recovery, a member can be encouraged by a member who has already overcome a problem or obstacle that they are still struggling with.

2. **Universality**
   Members recognize that they share experiences and feelings with other group members and they start to understand that they are not the only one coping with certain problems. This removes a sense of isolation and can raise the self-esteem.

3. **Imparting information**
Members learn from other group members and the therapist, about their treatment or other services.

4. **Altruism**
   Members of the group help each other, this experience of helping someone can raise the self-esteem and help develop more adaptive coping styles.

5. **The corrective recapitulation of the primary family group**
   The identification a member has with their own parents and siblings. The therapist helps the group members to understand the impact of childhood experiences on their personality. This can help them to avoid repeating unhelpful patterns.

6. **Development of socializing techniques**
   The group setting provides a safe and supportive environment. This will help members improve their social and communication skills.

7. **Imitative behaviour**
   Members can develop social skills by observing and imitating the therapist or other group members.

8. **Interpersonal learning**
   Members gain a higher level of self-awareness by interacting with other group members who give feedback on the members’ behaviour.

9. **Group cohesiveness**
   Personal development can only take place in an interpersonal context. A cohesive group gives the members a feeling of trust, belonging and togetherness.

10. **Catharsis**
    A release of strong feelings and emotions about experiences by a member towards the group. The groups support can give relief to the member.

11. **Existential factors**
    The acceptance that a person has to take responsibility for their decisions in life and the consequences that followed.

   (Yalom & Leszcz, 2005b; Yalom & Leszcz, 2005c; Yalom & Leszcz, 2005d)

The distinctions among these factors are arbitrary. They are discussed separately from each other, but they are interdependent of each other. None of them occur or function separately. Yalom and Leszcz (2005b) say that groups are not just practical to treat clients, but offers unique advantages that only groups can offer in treatment. Because the therapeutic factors combined in a group is of a far greater value than what they can get from any individual.

Cole (2012a) describes her 7 step format for group leadership. They can meet the needs of the highest level of different kind of groups and are chosen for maximum integration of learning by the members. The format is based on Pfeiffer and Jones’ *Reference guide to handbooks and annuals* (1977) and can be adapted to meet the goals of any group. The 7 steps she is talking about are:

1. **Introduction**
   Does more than just introduce each other by name, it also acknowledges their membership in the group and invites them to be a part of it. The introduction also consists of a warm up and sets the mood for the group. The therapist also talks about the expectations of the group and explains the purpose. The introduction ends with an outline of the session that will follow and the duration of that session.
   The introduction is one of the steps that is consistent in every frame of reference and every type of group.

2. **Activity**
   The following issues have to be considered before selecting a therapeutic activity: timing; therapeutic goals; physical and mental capacities of the members; knowledge and skill of the leader, and adaptation of an activity.

3. **Sharing**
The members share their own experience with the group and each member’s contribution is acknowledged. Members cannot be forced into sharing their experiences, and this should not be pressured.

4. **Processing**
   Processing involves members expressing how they feel about the experience, the leader, and each other. The outcome of the group can never be fully understood if the feelings of the group members are unknown, while influencing the results. This step also includes a discussion of nonverbal aspects of the group.

5. **Generalizing**
   During this step the cognitive learning aspects of the group are addressed. Some of the general principles derived from the group should be close to the goals that were originally set. The general principles discussed shouldn’t be planned before the start, but come directly from the members.

6. **Application**
   The therapist learns the group to understand how the discussed principles can be applied to everyday life. The goal for this step is for each member to understand how to apply the principles.

7. **Summary**
   The purpose of the summary is to emphasize the most important aspects of the group so they will be remembered correctly.

(Cole, 2012b)

Cole (2012d) also describes the concepts, and summarizes the evidence for working client centred in a group. The concepts are divided in existential concepts and humanistic concepts. Existentialism centralizes the idea that meaning in life is not predetermined and that each person must find meaning for him-or herself. The humanistic approach is based on the assumption that the client really knows what is best for him or her, that allows the client to choose the direction of the therapy by setting their own goals and providing their own solutions to problems. Humanists say that we cannot change our clients, they must have the desire to change themselves.

Cole (2012c) refers to Yalom & Lesczc (2005a) as experts on the process of psychotherapy groups. In this chapter she includes the evidence for therapeutic group interventions and the evidence of some occupational therapy groups. Cole (2012c) mentions the most characteristic of groups with positive outcomes, studied by Kottler & Englar-Carlson (2010). These characteristics are:

- “High levels of trust and safety
- Individual and cultural differences are respected
- Clear boundaries and rules of conduct are in place
- Conflict is acknowledged and worked through (or resolved without hostility)
- Information and resources are openly shared
- Every member participates
- Unproductive behaviours are effectively managed so as not to block the group’s progress
- The group accomplishes its objectives (efficiency)
- Nonverbal communications are acknowledged and verbalized
- There is continuity and follow-up from one session to the next
- A healthy group culture guides group behaviours, in which both caring behaviours and productive contributions are encouraged
- The group process results in some form of action (for members both inside and outside the group)”

(Cole, 2012c, p52)

De Haas (2012b), describes 10 therapeutic factors, based on the factors of Yalom (1981) and Bloch & Crouch (1987). They are almost the same as they are in the most recent version of
Yalom & Leszcz (2005a), the existential factor has been added. He also describes that group members accept something faster from each other compared to accepting it from the therapist. De Haas (2013c) also explains the way a group can be given. He describes different styles of leadership, and the basic tools a group leader needs. These are:

1. Communicative skills (verbal)
   Words are the instrument of transferring, receiving and process information. Different communication skills can help doing this. Examples of skills are: advising, mirroring, connecting, questioning and ignoring.

2. Relationship techniques (non-verbal)
   Just words aren’t going to help the group leader. It will only work once he has established a proper, collaborative, relationship with the group. It consists of sensing the attitude of group members and varying your own attitude.

3. Organisation skills
   A group only functions well when it’s set up good and well organized. The group leader can profit from the knowledge he has about the science of preparing and organizing a group.

When looking at the articles it shows that one of them has gotten similar results to the therapeutic factors described by Yalom & Leszcz (2005a). Standal & Jespersen (2008) found 4 themes: (a) learning together, which connects to the therapeutic factors ‘imparting information’ and ‘altruism’. (b) Understanding my struggles, which connects to the therapeutic factor ‘universality’. It also connects the description of De Haas (2013b) that group members accept something faster from each other compared to accepting it from the therapist. (c) Getting a measuring stick, connects to ‘universality’, and (d) the wheels are my shoes, this can’t be really linked to any of the factors explained before. It explains that the group used their own language and not the technical phrases used by healthcare professionals. One of the most important resources for learning found in this study is peer learning.

Worobey et al. (2016) studied a wheelchair skills group training by performing an RCT. They found that group training can provide effective goal attainment with potentially greater efficiency. A structured group-training program may be a useful resource for therapists. Regardless of setting, group training provides an opportunity for participants to learn from their peers, and participants with the same skill levels may have similar goals.
Discussion

Implications for clinical practice
The results show multiple characteristics a therapeutic group can or should have to be effective. Although the included chapters did not specify on a wheelchair group training, but were more focussing on general characteristics, the results can still be used for clinical practice. By knowing the therapeutic factors (Yalom & Leszcz, 2005b) and the characteristics Cole (2012c) described a more substantiated group training can be executed. Since the qualitative study by Standal & Jespersen (2008) found 4 themes that can be connected to the therapeutic factors of Yalom & Leszcz (2005b) it might be that these are the more important for wheelchair group trainings compared to the other factors. Therefore the factors that could use extra attention in a wheelchair group training are: imparting information, altruism and universality.
Furthermore Standal & Jespersen (2008) emphasize the use of peer learning as a factor that could increase the outcome of a wheelchair group training.

Strengths and limitations
One of the limitations of this study was the lack of literature describing wheelchair group trainings and how their method works in detail. Let alone that they described what the evidence base is for their specific training. By not having enough research articles which described their method the focus had to shift to books from different fields of study. This shift however, can be seen as a strength of this literature study. By using the books that show different perspectives on what factors or characteristics make a group effective and comparing them with each other a more general evidence base is created. Additionally, the use of books give a more complete coverage of literature then what would have been covered by using articles only. The included books are all referring to years of literature and experience, which can’t be done in an article. This however can also be seen as a limitation, because the evidence the author of the book used has not been checked.
Another strength is that the book of Cole (2012a) shows the occupational therapy perspective on groups and she also refers to Yalom & Leszcz (2005a) as experts on group psychotherapy, and includes their therapeutic factors. This results in an easier translation of the therapeutic factors for group psychotherapy to therapeutic factors for occupational therapy groups.
A final limitation might be that there were only three databases searched. Although the psychological and social databases were not selected for inclusion they might have given some useful input. This can be considered, because the books that got included are of a more social and psychological perspective.

Suggestions for improvement
As earlier mentioned there is a lack of literature on the topic. Therefore a general suggestion for improving the results on what factors make a wheelchair group training effective is by describing and substantiating the training in more detail in future research. Future wheelchair group trainings would benefit from this by knowing what factors are effective and existing wheelchair group trainings could adapt their training by implementing these factors.
Furthermore a more extensive literature search can be conducted, including the psychological and social databases, to see if they give any input on the factors in wheelchair group training. More research could also be conducted on the effectivity of the factors in wheelchair group training by performing qualitative and quantitative research.
Implications for the main project
In regard to the main project this literature research helped by getting the information about factors that influence group training in general. Albeit that these factors are tested on different kind of groups instead of wheelchair training specific. The following step in the project will be to link these factors to the Drivkraft method and to see how Drivkraft is using them. By describing the evidence base for this particular component a start is made in describing the evidence base. This will be one of many steps to describe the evidence base of the Drivkraft method.

Conclusion
The question of this literature study was:

What factors make a wheelchair group training effective?

To answer this question multiple databases have been consulted. Which resulted in 2 articles and 8 chapters that have been included to answer the question. The following factors might be of influence on the effectivity of a wheelchair group training:
High levels of trust and safety; Individual and cultural differences are respected; Clear boundaries and rules of conduct are in place; Conflict is acknowledged and worked through; Information and resources are openly shared; Every member participates; Unproductive behaviours are effectively managed so as not to block the group’s progress; The group accomplishes its objectives (efficiency); Non-verbal communications are acknowledged and verbalized; There is continuity and follow-up from one session to the next; A healthy group culture guides group behaviours, in which both caring behaviours and productive contributions are encouraged; The group process results in some form of action. As well as the relationship techniques and the communication and organisation skills of the group leader.
General therapeutic factors that might be of influence are:
Instillation of hope; Universality; Imparting information; Altruism; The corrective recapitulation of the primary family group; Development of socializing techniques; Imitative behaviour; Interpersonal learning; Group cohesiveness; Catharsis; Existential factors.
By knowing the therapeutic factors and the characteristics of effective group training a more substantiated wheelchair group training might be executed.
To give a real answer to the question research has to be performed on a wheelchair group training with the focus on the influencing factors.

In regard to the main project this literature research helped by getting the information about factors that influence group training in general. The following step in the project will be to link these factors to the Drivkraft method and to see how Drivkraft is using them. This will be one of many steps to describe the evidence base of the Drivkraft method.
References


methodologic lessons from a pilot study of environmental effects. Social Science & Medicine, 55(8), 1435-1446.


Glossary

Active wheelchair:
A type of manual wheelchair, which is easier to manoeuvre, because of the small wheel base, and often has a low back rest. The active wheelchair has usually less options for adaptations once it’s installed. It’s meant for users who are in the wheelchair longer periods per day and who don’t rely on other means of propulsion then their own strength.

Drivkraft:
Name of a wheelchair training method, developed over the years by Åke Norsten and taught in Rehab Station Stockholm.

Manual wheelchair:
A manual wheelchair is one that is propelled (pushed forward) by the user. This is done by using the rims on the wheels. A manual wheelchair usually has grip bars on the back of the backrest so others can push the wheelchair around easily. A manual wheelchair is easy to maintain, is lightweight, and is the least expensive to buy.
Appendix 4: Literature study – Value of a peer mentor compared to a healthcare professional

What is the value of a wheelchair group program given by a peer mentor, compared to a healthcare professional?

Written by: Lauren Ebbes
Student number: 500684387
On behalf of: Åke Norsten
Tutor: Miranda van Niel
Fieldwork setting: Rehab Station, Stockholm, Sweden
Words: 5463

Amsterdam School of Health Professions (HvA), Tafelbergweg 51, Amsterdam, The Netherlands
Date: 18-04-2017

Objective: To answer the question: What is the value of a wheelchair group training given by a peer mentor, compared to a healthcare professional?
Method: Two search strings have been entered in four databases and articles are selected based on title/abstract by researcher and peer reviewers. Nine selected articles are read completely and coded to find results.
Results: Described are: the characteristics of peer mentors, the process of matching mentors and mentees, the mutuality of the disability: relatedness, the role of a peer mentor in a multidisciplinary team, and the types of support given by a peer mentor.
Discussion: The articles found describe the value of peer mentoring profoundly, but there was a small number of evidence available on this topic and the articles aren’t established according to the same structure as the Drivkraft method. Further, as I am not a professional researcher, I probably missed out on useful evidence. Finally, the results can’t be used to draw a comparison between peer mentors/ health care professionals.
Conclusion: Peer mentors not only give practical support in the form of wheelchair training, but are also capable of providing emotional support and can help mentees create a new identity.
Introduction
This literature study is part of the bachelor thesis that is written in 2017 by three occupational therapy students of the Amsterdam School of Health Professions (HvA) in Amsterdam, the Netherlands. The thesis is written for Åke Norsten, who is a physical education teacher and experienced wheelchair user. Åke Norsten developed a manual wheelchair training called “Drivkraft”, which he teaches in Rehab Station Stockholm in co-operation with a physiotherapist and wheelchair mechanic. Drivkraft focuses on adjusting the wheelchair correctly, in combination with intensive wheelchair skills training. The thesis focuses on the method that is used for training clients and tries to describe the evidence base of the Drivkraft method. We know that clients are positive about Drivkraft, but we wonder: does the training line up with evidence? Because we'll all write a literature study, we can explore the evidence on three characteristic components of the training extensively. The components we chose are:

- Group training
- Peer mentoring
- Specific wheelchair skills

This literature study will elaborate on the element of peer mentoring.

The literature study will start describing the background and relevance of this research, which will lead to the formulation of the research question. After that, the literature search and selection of articles will be described. Following you will find a result section, describing the articles and information found about peer mentoring. Finally, a discussion and conclusion section is written, to formulate an answer to the research question. In Appendix 1 you will find a glossary with explanations of the more unknown terminology.

Background, relevance and research question
The wheelchair is one of the most common and important of rehabilitation devices. (Kirby et al., 2004). It's used by individuals who have impairments that limit their ability to walk (WHO, 2010). According to the most recent data, from January 2013, 1% of the Swedish population uses a wheelchair, this equates to an amount of 150.000 wheelchair users. Of these people 67% uses a manual wheelchair. (Hjälpmedelsinstitutet, 2014) There are advantages in using an active manual wheelchair: they are more hard-wearing, can withstand higher strains than other manual wheelchairs and can be used for up to 16 hours a day, 365 days per year. A degree of usage few other devices withstand. (Cooper, 1998; Cooper, Boninger, & Rentschler, 1999). People using a manual wheelchair encounter a substantial range of barriers which hinder them in reaching certain destinations. Examples of these barriers are: the lack of ramps, ramps that are too steep, and rudeness of other people (Meyers, Anderson, Miller, Shipp & Hoenig, 2002). When trying to overcome barriers without proper training, there is a potential for acute or overuse injuries to the wheelchair user. (Boninger, Towers, Cooper, Dicianno, & Munin, 2001; Calder & Kirby, 1990; Gaal, Rebholtz, Hotchkiss & Pfaelzer, 1997; Liu, Mineo, Hanayama, Fujiwara & Chino, 2003; Ummat & Kirby, 1994; White, & Kirby, 2003; Woolfrey & Kirby, 1998)

The reduced community access, due to difficulties in overcoming barriers, can be the result of a lack of intensive wheelchair skills training (Aronson, 1997; Best, Miller, Eng, Routhier & Goldsmith, 2014; Liu, Mineo, Hanayama, Fujiwara & Chino, 2003; McClain, Cram, Wood & Taylor, 1998; Norrlin, Strinnholm, Carlsson & Dahl, 2003; Palisano et al., 2003; Pierce, 1998). This is a pity because manual wheelchair users report that confidence with their wheelchair and the grip, strength, and satisfaction has influenced their participation in a positive way (Smith, Sakakibara & Miller, 2014). Besides this, persons that are experienced in their use of active wheelchairs can be described as “healthy disabled”. When they have
impairments that are stable and predictable (e.g. spinal cord injuries), they consider themselves to be healthy and do not expect to die any sooner than any other healthy persons their age. (Wendell, 2001)

If wheelchair users want to participate in daily activities they need certain skills, for example they need to be able to balance on their rear wheels. In this way they can overcome barriers like curbs, steep inclines and potholes (Kirby, Smith, Seaman, Macleod & Parker, 2006). A better ability to mobilize in a manual wheelchair, leads to a higher level of independence and quality of life. Trained wheelchair users also use their wheelchair more than wheelchair users who haven’t had wheelchair training. (Hoenig et al., 2005) This indicates that there is need for wheelchair skills training.

To meet the needs of providing wheelchair skills training, and by doing so making wheelchair users more independent, the previously described training ‘Drivkraft’ was developed. Special about Drivkraft is the fact that it’s not only developed, but also taught by an experienced wheelchair user: a peer mentor.

During my occupational therapy internship, I discovered that in the Netherlands peer mentors are part of the therapeutic team in rehabilitation centres (Reade, 2017). However, these peer mentors are not teaching wheelchair skills. This is interesting, because there is evidence stating that peer-led training leads to a better wheelchair use (Best et al., 2014; Best, Miller, Huston, Routhier & Eng, 2016). It thus might be a missed opportunity to have peer mentors in the rehabilitation team, but not use them for wheelchair training. I wonder what the exact added value is of a peer mentor when giving wheelchair training, and whether occupational therapists need to collaborate more with peer mentors when giving wheelchair training. Therefore, the following research question has been formulated:

What is the value of a wheelchair group training given by a peer mentor, compared to a healthcare professional?

Method

To answer this research question, a literature search was conducted in four databases: CINAHL complete, PubMed, Cochrane and OT-seeker. These specific databases were selected because they are medical databases and the topic of peer mentorship is researched within a healthcare situation.

Search terms were selected by identifying key words from the research question and combining these in search strings. The selected key words are: “wheelchair group training”, “peer mentor” and “healthcare professional”. To get more results, synonyms or parts of the key terms were used (e.g. “wheelchair”).

Boolean phrases were used to make sure that the search strings covered the topic of interest and to minimalize the number of irrelevant articles. For the same reason, MESH terms were used. Because I couldn’t find articles that specifically compared peer mentors to healthcare professionals, I decided to exclude the key term “healthcare professional”. In this way, I could still focus on articles that described the value of peer mentors, but I wouldn’t find irrelevant articles about health care professionals.

The search strings that were entered in the databases, can be found in Table 1. The complete search history can be found in Appendix 2.

Table 1. Search strings

<table>
<thead>
<tr>
<th>Search string</th>
<th>Description</th>
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<tbody>
<tr>
<td>Peer mentor AND Rehabilitation</td>
<td></td>
</tr>
<tr>
<td>&quot;Wheelchairs&quot;[Mesh] AND Peer*</td>
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</tbody>
</table>

All articles were imported in Refworks. In the Refworks database duplicates were deleted, and a list of titles and abstracts was exported. Articles were selected by reading the titles. When the title was promising, the abstract of the article was read as well.

Inclusion- and exclusion criteria were formulated to help decide whether an
article was useful or not. All inclusion- and exclusion criteria can be found in Table 2. I chose to include articles that had a focus on the effect of peer mentorship. Articles that don’t elaborate on the effect of peer mentorship, won’t answer my research question. Articles were also included when they focused on peer mentorship in rehabilitation. Rehabilitation programs make people more independent despite of their disease. This is the same thing the Drivkraft training tries to reach.

Articles were excluded when they described programs for disabilities or diseases which do not hold the necessity of using a wheelchair. I did this to make sure that the group described in the articles would be comparable to the participants of Drivkraft. Finally, articles that described peers instead of peer mentors were also excluded. When peer workers are healthy and don’t teach from experience of the disease, the described information will not be useful.

Table 2. Inclusion and exclusion criteria

<table>
<thead>
<tr>
<th>Inclusion</th>
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<tbody>
<tr>
<td>Focus on the effect/value of peer mentorship</td>
</tr>
<tr>
<td>Rehabilitation programs</td>
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</table>

<table>
<thead>
<tr>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabilities/diseases which do not hold the necessity of using a wheelchair. (e.g. psychosis/diabetes)</td>
</tr>
<tr>
<td>Healthy mentors/peers. (i.e. without a history of the disease)</td>
</tr>
</tbody>
</table>

To make sure I didn’t overlook useful articles, the list of titles and abstracts was peer reviewed. The two peer reviewers made an independent selection of articles. Afterwards we discussed our selection of articles, until we found consensus on which articles to include. Articles were included when all of us thought useful information would be described. A selection of 14 articles was made.

One of the 14 full-texts couldn’t be found, and students from other universities couldn’t get access either. Therefore, 13 articles were left. I read all 13 full-texts and used McMaster review forms (Letts et al., 2007) to critically identify the quality of the articles. 6 articles were excluded for the following reasons:
- The article didn’t focus on the value of peer mentoring, but rather on the effect/feasibility of a peer mentoring program. (n=3)
- The article full-text consisted of the abstract only and gave no additional information or references. (n=1)
- The article focused on multiple diseases, in which the majority were not diseases that hold the necessity of using a wheelchair. (n=1)
- The article described peer mentoring to improve transfers, and did not focus on other mentoring aspects. (n=1)

Because a minimum of 8 articles had to be found, forward and backward chaining was used on the included articles. This led to another 6 articles that were possibly interesting. 4 articles were excluded from this selection, for the following reasons:
- The article didn’t focus on the value of peer mentoring, but rather on the effect/feasibility of a peer mentoring program. (n=1)
- The article focused on multiple diseases, in which the majority were not diseases that hold the necessity of using a wheelchair. (n=1)
- The article was not based on evidence (n=1)
- The participants were healthy. (n=1)

Eventually, 9 articles were left describing the value of peer mentoring. For an overview of the selection process, see Table 3.
Table 3. Flow chart

![Flow chart image]

- **PubMed** (n=91)
- **CINAHL** (n=33)
- **OT seeker** (n=2)
- **Cochrane** (n=8)

**Peer reviewing title + abstract**
- Deleted duplicates
- **No full-text** (n=1)

- **Total** (n=134)
  - **Total** (n=113)
  - **Total** (n=14)
  - **Total** (n=13)
  - **Total** (n=7)
  - **Total** (n=15)
  - **Total** (n=9)

**Forward- and backward chaining** (n=8)

- **Full-text records excluded** (n=6) for the following reasons:
  - Didn't focus on value of peer mentoring (n=3)
  - Abstract only (n=3)
  - Non-comparable participants (n=1)
  - Peer mentoring on 1 aspect (n=1)

- **Full-text records excluded** (n=4) for the following reasons:
  - Didn't focus on value of peer mentoring (n=1)
  - Non-comparable participants (n=1)
  - Not based on evidence (n=1)
  - Participants without disability (n=1)
Gathering data
After reading the 9 selected articles, a table with study characteristics was made (Table 4). Sentences stating information about the value of peer mentors were highlighted. These sentences were then analysed and coded as described in the manual “An introduction to coding” (Saldana, 2008). The codes led back to an overall of 5 themes:

- Characteristics of peer mentors
- Matching mentors and mentees
- Mutuality of the disability: relatedness
- The role of a peer mentor in a multidisciplinary team
- Support given by a peer mentor
  - Practical support
  - Emotional support
  - Support in finding your identity

Per theme a table has been made, giving an overview of the sentences in the articles that connect to the theme of interest (Appendix 3). The result section was written using these tables and will follow the themes stated above.

Results
Characteristics of peer mentors
All articles describe characteristics of a good peer mentor. They agree on the fact that a peer mentor should have a disability which relates to the type of disability of the mentees. In this way, the peer mentor can function as a role model for the rehabilitation processes of the mentees (Beauchamp et al., 2016; Standal & Jespersen, 2008). Besides this, the articles describe other important characteristics: a peer mentor should foster trust and respect (Beauchamp et al., 2016), be empathetic (Beauchamp et al., 2016; Standal & Jespersen, 2008), have good communication and listening skills (Hanks, Rapport, Wertheimer & Koviak, 2012; Young, Lawrence & Quick, 1999), live an active life within the community (Powers, Sowers & Stevens, 1995; Struchen et al., 2011; Veith, Yasui, Sherman & Pellino, 2006), have knowledge about the disease (Hanks et al., 2012), have a positive view on disability (Powers et al., 1995), recognize individual needs (Beauchamp et al., 2016), and have the ability, time and commitment to convey their experiences to others (Standal & Jespersen, 2008; Ljungberg, Kroll, Libin & Gordon, 2011; Veith et al., 2006).

Further, it turned out to be very important that the language used by a peer mentor is a non-technical language. Mentees felt that the technical phrases in healthcare situations were sometimes derogatory or insensitive. (Standal & Jespersen, 2008) Standal and Jespersen (2008) also described the importance of showing fears and worries as a peer mentor. Mentees felt more connected to peer mentors when they saw that they also struggled with aspects of life.
<table>
<thead>
<tr>
<th>First author, year</th>
<th>Design/ level of evidence</th>
<th>Participants</th>
<th>Aim</th>
<th>Method</th>
<th>Most important findings</th>
</tr>
</thead>
</table>
| Beauchamp, 2016    | Phenomenological study (3)| Adults with spinal cord injury (SCI) (n=15) | Examine the nature of effective peer mentoring of adults with SCI. | 15 adults with SCI that received individual peer mentorship were interviewed about their experiences with peer mentorship. The findings were compared with aspects of transformational leadership theory. | - Effective peer mentoring closely aligns with the core components of transformational leadership.  
- Participants who perceived their mentors to use transformational leadership behaviours reported increased motivation, confidence, hope, well-being, greater acceptance of their situation, a redefined sense of their limitations and a greater engagement in life. |
| Divanoglou, 2017   | Meta analysis (1)         | Not applicable. | To establish the perceived effectiveness and mechanisms of community peer based programs based on narratives of consumers with SCI. | Article selection in 9 databases. The result section of included studies was extracted and entered into NVivo. Data were coded and analysed. | Three analytical themes emerged:  
- A unique learning environment created by the right mixture of learning resources, learning processes and can-do attitude  
- Peer mentors – a unique learning resource with high level of relatedness that eases and empowers participants  
- An intervention that responds to important unmet needs and unrealised potential. |
<p>| Hanks, 2012 | Randomized controlled trial (2) | Persons with traumatic brain injury (TBI) (n=96) and their caregivers/significant others (n=62) | Examine the efficacy of a peer-mentoring program for persons with TBI and their caregivers/significant others, by looking at three areas: emotional well-being, post-TBI quality of life, and community integration. | Persons with TBI and friends/caregivers were randomly assigned to a treatment (mentored) or no-treatment (no mentoring) control group prior to discharge from the rehabilitation unit and were mentored for up to 2 years. Outcome was tested using 6 measurements. | - Individuals who received mentoring showed better behaviour control, less chaos in the living environment, lower alcohol use, less focus on emotion, less avoidance coping, and a good physical quality of life. - Mentored individuals demonstrated greater community integration. - Mentoring can be an effective way to benefit mood and healthy coping after TBI, and it can help to prevent maladaptive behaviors, such as substance abuse and behavioral dyscontrol, in the living situation. |
| Standal, 2008 | Phenomenological study (3) | People with disabilities in a rehabilitation context, participating in the 'Wheels in Motion' (WiM) program (n=20), and peer mentors of the WiM program (n=2) | Investigate the learning that takes place when people with disabilities interact in a rehabilitation setting. More specifically: how are peers resources for each others’ learning, and what are the meanings and experiences of learning for the participants in this setting? | 8 of the 20 participants were interviewed in depth about their experience with the WiM program. 2 peer consultants were also interviewed. Themes were identified by conducting data analysis. | Four themes emerged from the data analysis in which the importance of peer mentorship was described: - learning together - understanding my struggles - getting a measuring stick - the wheels are my shoes. The study found that not only peer-mentors, but group members as well, could provide help. |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participants</th>
<th>Intervention</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Struchen, 2011</td>
<td>Pilot randomized controlled study. (3)</td>
<td>Community-dwelling individuals with TBI (n=30) (Matched with peer mentors (n=12) completing the waitlist condition (n=18)).</td>
<td>To describe the development and implementation of a social peer-mentoring program for persons with TBI and to explore whether this program yielded increased social functioning outcomes compared with wait-list (WL) controls.</td>
<td>Trained social peer mentors (SPMs) were matched to partners with TBI (peer partners [PP]) to foster skill-building in planning of social activities and improving social communication abilities. Seven measurements were used to collect data on the effects of the program. Both SPM and PP participants reported high satisfaction with the mentoring program. Statistically significant improvements in perceived social support after mentoring were observed for the mentored group; however, an increase in depressive symptoms was also observed. While significant improvements in social activity level and social network size were not found, a trend toward increased satisfaction with social life was present for mentored participants.</td>
</tr>
<tr>
<td>Ljungberg, 2011</td>
<td>Mixed method study (3)</td>
<td>Patients with newly acquired SCI / disease (n=37)</td>
<td>Describe the implementation of a peer-mentoring program, designed to support psychosocial adjustment for people with SCI. It also describes the programs believed impact on self-efficacy and prevention of medical complications.</td>
<td>Patients participated in a one-year SCI peer-mentoring program. On entering the program and again six months after enrolment, study participants completed a Generalized Perceived Self-Efficacy Scale (GSEF). Further, participants completed a qualitative in-depth exit interview. - 67% of the participants showed improved self-efficacy score between the two time points. - Medical complications and doctor visits decreased significantly between 0-6 and 7-12 months. - Mentees felt they could connect well with their peer-mentor.</td>
</tr>
<tr>
<td>Young, 1999</td>
<td>Survey study (3)</td>
<td>Patients with SCI (n=13)</td>
<td>Describing the peer mentor's facilitation of communication between clients and staff and two initiatives that promote clients' perspectives.</td>
<td>Not applicable. - The role of the peer mentor bridges professional and client perspectives - The peer mentor is living proof of the possibility of a successful life.</td>
</tr>
</tbody>
</table>
| Veith, 2006 | Grounded theory study (3) | Mentees from a hospital based SCI peer mentoring project (n=7) | To identify salient dimensions and outcomes of the peer mentoring relationship among individuals with SCI on three areas: Areas of adjustment affected by the mentor; dimensions of the peer-mentor relationship that lead to improved adjustment outcomes; how these dimensions differ from those found in relationships with other supportive people. | Telephone interviews were held with 7 mentees that participated in a hospital based peer mentoring project. The interviews took place 1-4 months postdischarge and results were coanalyzed with grounded theory methodology. | Mentoring programs are useful interventions for facilitating adjustment after SCI. Mentees emphasized the influence of mentors on practical, emotional, and identity changing matters. Five components of the mentor-mentee relationship differentiated from other supportive relationships:  
- Credibility  
- Equitability  
- Mutuality  
- Acceptance  
- Normalization. |
| Powers, 1995 | Pilot randomized controlled trial (3) | Adolescents with severe physical challenges (n=10) and their parents (n=?) | Find out about the impact of mentoring by role models on the self-efficacy, disability-related self-efficacy, community-based self-confidence, and community-based knowledge of adolescents with severe physical challenges. The study also aimed to determine the impact of mentoring on the perceptions held by parents regarding the capabilities and community-based knowledge of their children. | Adolescents were placed in the experimental group (n=5) or the wait-list group (n=5). The experimental group was matched to a peer mentor and received peer mentoring twice a month over a period of 6 months. Results were obtained by using two self-efficacy scoring measurements, two questionnaires, and qualitative interviews with students, parents and mentors. | - This study provides evidence for the usefulness of this approach for promoting student disability-related self-efficacy and knowledge, and for enhancing parent perceptions of student disability-related knowledge and competence.  
- Qualitative interviews with students, parents, and mentors also support these findings. Following interaction with their mentors, students expressed increased confidence in their abilities to perform specific community-based activities and to overcome disability-related barriers to independence.  
- As a result of meeting and observing mentors and hearing about the experiences of their sons and daughters, parents also expressed increased confidence in the knowledge and capabilities of their children. |
Matching mentors and mentees
Most articles describe a method in which they match peer mentors and mentees. The articles mostly matched mentors and mentees based on gender (Powers et al., 1995; Struchen et al., 2011), age (Ljungberg et al., 2011; Veith et al., 2006), interests (Beauchamp et al., 2016; Powers et al., 1995; Struchen et al., 2011), and level of injury (Powers et al., 1995; Ljungberg et al., 2011; Veith et al., 2006). In the study of Veith et al. (2006), mentees stated that it was very important for them to have a mentor with the same level of injury. They viewed this similarity as important for obtaining credible information. Most mentees also described that they appreciated talking to someone of the same gender. In the study of Powers et al. (1995) there was one participant that couldn’t be matched to someone the same age. This participant indicated afterwards that she would like to additionally meet a successful young adult with a disability that was more like herself.

Mutuality of the disability: relatedness
The relatedness people feel with their peer mentor, following their mutual experience of having a disease, is something that is described in almost all articles. Mentees feel that peer mentors have a level of understanding that they can’t get from friends, family or any other professionals. Peer mentors get credibility cause ‘they have lived it’. (Beauchamp et al., 2016; Divanoglou & Georgiou, 2017; Standal & Jespersen, 2008; Young et al., 1999; Veith et al, 2006). Because of the level of understanding that’s experienced in contact with peer mentors, mentees feel more comfortable showing their own emotions. They believe that the mentor is more likely to view their response as normal in the context of the situation. (Veith et al., 2006). Further, as stated by Divanoglou and Georgiou (2017): “the feeling of relatedness helps mentees find relevance in what peer mentors represent, it makes learning worthwhile, and it positively influences learning efficacy.”

Besides this, a part of the mentees had never met a person with the same kind of disability. By having contact with one or more people in the same situation they realized that they were not alone in their experiences. (Powers et al., 1995; Veith et al., 2006). The importance of being around people with mutual experiences is also described by Standal and Jespersen (2008). The mentees reported that they took in all information possible, while being around other wheelchair users. By getting to know how other people do things, they could discover whether their own solutions were useful or could be improved. By observing how others perform in their wheelchair, they could note the specific details of the skill. In their daily lives, they didn’t get this opportunity.

The role of a peer mentor in a multidisciplinary team
The peer mentor has a unique position in the multidisciplinary team. As a full team member, the peer mentor has credibility with the staff, but is also in the unique position to be a voice for the clients. Their role in the team thus bridges professional and client perspectives. Because the peer mentor isn’t required to work with guidelines of education and experience, he can work genuinely client focused and cover multiple aspects of the disease. (Young et al., 1999) The latter is something that’s noticed by mentees as well. They reported that it’s very pleasant to learn from one source who, having experienced multiple facets of the situation, could advise about multiple aspects of the disease. (Veith et al., 2006)

Support given by a peer mentor
Discussions with mentors consist mainly of topics directly related to the disease (Veith et al., 2006). However, support of peer mentors is identified in other fields as well. The three main fields in which support is given, are: practical support, emotional
support, and support in finding you identity.

**Practical support**
Peer mentors provide practical support in many ways. They for instance provide information about living with the disease: returning to work, managing family roles and responsibilities, self-care, emotional and social effects of the disease, services available for help, adaptations, strategies for independence, adapted activities, sexuality and using the wheelchair efficiently (Beauchamp et al., 2016; Hanks et al., 2012; Powers et al., 1995; Standal & Jespersen, 2008; Veith et al., 2006). Mentees noted that the information they got from their peer mentor was new for them and wouldn’t have reached them without the program (Ljungberg et al., 2011; Veith et al., 2006). By reframing problems and introducing their mentees to new activities, mentees gained better social participation and redefined their limitations (Beauchamp et al., 2016; Struchen et al., 2011). Because of mentoring, mentees started talking more about their abilities to live and work independently, getting involved in community groups, and self-advocating at school and in the community (Powers et al., 1995). Important is the fact that mentees describe their peer mentors as ‘realistic optimistic’, by which they mean that however mentors set high expectations, they don’t give their mentees false hope. Mentors provide their mentees with a realistic future outlook (Beauchamp et al., 2016; Veith et al., 2006). Peer mentoring further leads to increased time management (Veith et al., 2006). Even though some of the articles describe that social participation increases because of peer mentoring, one article describes that objective measures of social activity levels and social network size didn’t show statistically significant improvements (Struchen et al., 2011). In fact, mentored participants reported less social support and community integration, compared to individuals that didn’t receive mentoring.

Within the mentored group, a higher level of family dysfunction and anxiety was also measured. The latter could be a consequence of being in an environment where it’s deemed safe to talk about effects of the disease on the family and more attention is drawn to the potential problems in this area. (Hanks et al., 2012)

**Emotional support**
Peer mentors also provide emotional support. They discuss the ways mentees cope with the disease, talk about feelings and concerns, and encourage and motivate their mentees (Veith et al., 2006; Young et al., 1999). One participant reported that peer mentoring was effective cause you not only shared concerns, but also shared successes (Ljungberg et al., 2011). Nevertheless: emotional support was less needed when friends or family could provide adequate emotional support. In these cases, mentees tended to rely on their mentor more for practical support. (Veith et al., 2006)

One of the most important factors named in several articles, is the fact that by showing mentees the range of things that are possible with the disease, the peer mentor is ‘living proof’ of the possibility of a successful, healthy life. He gives hope of a future, which is critical in rehabilitation (Beauchamp et al., 2016; Young et al., 1999; Powers et al., 1995; Veith et al., 2006) Peer mentoring also turned out to have a positive impact on the way parents viewed the capabilities and future’s potential for independence of their children with disabilities (Powers et al., 1995).

Besides the improvements in hope for the future, peer mentoring also leads to a decrease in feelings of loneliness (Hanks et al., 2012; Struchen et al., 2011) and an increase in overall well-being (Beauchamp et al., 2016). Mentees showed a more positive mind-set (Divanoglou & Georgiou, 2017) and felt that the peer mentoring had improved their life (Hanks et al., 2012). The better emotional situation of mentees leads to fewer distressing somatic
symptoms, healthier coping styles, less emotion-oriented and avoidance oriented coping, and less use of alcohol. (Hanks et al., 2012)

One of the articles describes something completely different. It states the fact that the scores of mentees at the post-mentoring evaluation suggest mild depression instead of improved well-being. It’s argued that this could be explained by increased awareness of problems resulting from the peer intervention. Another explanation could be the emotional response to the ending of the peer mentoring experience. (Struchen et al., 2011)

Support in finding your identity
The last element on which peer mentors turned out to have large impact, was the element of finding your identity. A first identity change that was reported by mentees was an elevated self-confidence (Beauchamp et al., 2016; Standal & Jespersen, 2008; Struchen et al., 2011). Mentees realized they could do more than they thought they could do and showed an increased motivation to do activities and find a renewed purpose in life (Beauchamp et al., 2016; Divanoglou & Georgiou, 2017; Veith et al., 2006). They expressed increased interest in working, going to college and living on their own (Powers et al., 1995). Besides this, mentees report an elevated level of practicing self-advocacy and feel that they are more self-reliant (Powers et al., 1995).

A second identity change was seen in the appreciation of life. Because of the peer mentoring, mentees realized that it’s okay to be upset about their situation, but they also saw that life really did go on. (Beauchamp et al., 2016) By also sharing limitations, mentees felt more comfortable with the idea of not being able to manage everything (Divanoglou & Georgiou, 2017). Overall mentees had the feeling that they were better able to deal with life after receiving peer mentoring (Hanks et al., 2012).

Discussion
The articles describe several elements that are influenced due to peer mentoring, which made me able to write a profound literature study. The result section gives insight into the literature that is written about the topic and describes the value of peer mentoring. Because nine articles were used, the value of peer mentoring could be described as seen from different perspectives. By using peer reviewers for selecting the articles, I made sure I didn’t miss out on good evidence. Of course there were some limitations to this study as well. Because there aren’t much articles written on the subject within a rehabilitation or wheelchair setting, I didn’t have the opportunity to choose the best evidence available. For instance, two of the articles I used are written before 2000. This is not ideal, because the information can be outdated. However, on this occasion I chose to include the articles. I did so because there aren’t many insights on the subject yet and because the vision of mentees on peer mentoring back then was also interesting for me. If I had the opportunity though, I wouldn’t have chosen to include these two articles.

Another limitation is the fact that the situations described in the articles aren’t established according to the same structure as the Drivkraft training. In Drivkraft, all participants receive training from the same peer mentor. The mentors and mentees aren’t matched. Besides this, the peer mentoring is given in a group, and not individually.

Because I’m not a professional researcher, I probably missed out on useful evidence. I searched in four databases, whereas more healthcare databases are available. Besides this, I didn’t use search strings that gave more than 400 results. Because of time restrictions I wouldn’t be able to read and select all evidence available.
Finally, in selecting my articles I chose to exclude the term ‘healthcare professional’ from my search string, because this resulted in too much irrelevant articles. Nonetheless, this also means that I solely analyzed articles about the value of peer mentoring, and none that compare peer mentoring and healthcare professionals. Because of this, my conclusion will focus only on the extra value peer mentors give to a healthcare team. The comparison between healthcare professionals and peer mentors is something I can’t justify.

Next time I would use the same strategies for searching and reviewing articles. I would want a longer period to work on the literature study, because this would give me the opportunity to review more articles and search more profoundly for the evidence available. This would give me the chance to select the best research available and will make the literature study better.

**Conclusion**

The main question to be answered was: *What is the value of a wheelchair group training given by a peer mentor, compared to a healthcare professional?*

I found that peer mentors are effective trainers, because they not only function as a role model, but also show a level of understanding for their mentees, that can’t be given by friends, family or any other professionals. Because of their positive view on the disease, and their role modelling, peer mentors provide hope for a better future and mentees will be motivated to learn more and become more independent. Peer mentors will not only give the practical support in the form of wheelchair training, but are also capable of providing emotional support and can even help mentees create a new identity.

These results provide us with useful information for our thesis about the specific value of peer mentoring. We can compare the Drivkraft method to the value of peer mentoring described in literature and substantiate in which ways effective peer mentoring manifests itself in the Drivkraft method. When differences between literature and practice are identified, recommendations will be written about possible ways to improve the Drivkraft training.

**References**


of children with cerebral palsy. 
*Developmental Medicine & Child Neurology, 45*(2), 113-120.


**App. 1 - Glossary**

**Active wheelchair:** Type of manual wheelchair, which is easier to manoeuvre and often has a low back rest. The active wheelchair is meant for users that don’t rely on others for propulsion.

**Drivkraft:** Name of the wheelchair training, developed by Åke Norsten and taught in Rehab Station Stockholm.

**Manual wheelchair:** A manual wheelchair is one that is propelled by the user. It’s usually done by pushing on round bars that surround the wheels. This wheelchair also has handles on the back so it can be pushed by another person. A manual wheelchair is easy to maintain, is lightweight, and is the least expensive to buy.

**Mentee:** A person with a disease/disability that receives peer mentoring.

**Peer mentor:** People who have faced, endured and overcome problems occurring after having a disease/disability, that can offer useful support, encouragement, hope and perhaps mentorship to others facing similar situations.
App. 2 - Search history

What is the value of a wheelchair group training given by a peer support worker, compared to a healthcare professional?

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Peer support worker AND physical disorder AND wheelchair

“Peer support work”

OT seeker

peer led wheelchair training

peer support AND physical disability

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A) Peer mentoring of adults with spinal cord injury: a transformational leadership perspective.
B) Using peer mentoring for people with spinal cord injury to enhance self-efficacy beliefs and prevent medical complications.
C) Peer-supported self-management to facilitate community re-entry after discharge from spinal cord injury rehabilitation: Engaging peers as change agents and research partners.
D) What Peer Mentoring Adds to Already Good Patient Care: Implementing the Carpeta Roja Peer Mentoring Program in a Well-Resourced Health Care System.
E) Perceived effectiveness and mechanisms of community peer-based programmes for Spinal Cord Injuries-a systematic review of qualitative findings.
F) A systematic review of mentorship programs to facilitate transition to post-secondary education and employment for youth and young adults with disabilities.

H) Peers as resources for learning: a situated learning approach to adapted physical activity in rehabilitation.

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H) Peers as resources for learning: a situated learning approach to adapted physical activity in rehabilitation.

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I) Responding to the needs of the underserved: a peer-mentor approach.

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J) The effects of modeling on the movement confidence of individuals with spinal cord injuries.

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Inclusie:
- rehabilitatieprogramma’s
- ziektebeelden waarbij men in een rolstoel terecht kan komen
- focus op het effect van peer-mentorship voor mensen met een ziekte

exclusie:
- ziektebeelden waarbij men niet in een rolstoel terecht komt (bijv. Ggz/ diabetes)
- peer-mentors die niet zelf de ervaring van de ziekte hebben
## Characteristics of peer mentors

<table>
<thead>
<tr>
<th>Author</th>
<th>Description</th>
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<tbody>
<tr>
<td>Beauchamp, 2016</td>
<td>Peer Mentor Training consists of teaching potential mentors about the mentor’s volunteer role and scope, confidentiality/privacy, and referrals to other programmes and services (...). Mentors were reported to display inspirational motivation, and they did so through (1) encouragement and promoting achievement, (2) demonstrating optimism and enthusiasm towards mentees’ accomplishments and (3) setting high expectations. (1) acting as a role model and (2) fostering trust and respect (1) displaying empathy and understanding; (2) displaying responsive and caring behaviour; and (3) recognising individual needs.</td>
</tr>
<tr>
<td>Divanoglou, 2017</td>
<td>The three key features of peer mentoring, that is, credible learning resource, high degree of relatedness and motivators, make peer mentors a unique learning resource.</td>
</tr>
<tr>
<td>Hanks, 2012</td>
<td>What characterized a good mentor in this regard included having good communication and listening skills, being cordial, and being knowledgeable about brain injury.</td>
</tr>
<tr>
<td>Powers, 1995</td>
<td>Adults selected to be mentors lived independently, had an active vocation, and presented a positive view of disability as evidenced during their interview and through reference checks. Mentors participated in a 4-hour training during which their roles and the procedures were detailed.</td>
</tr>
<tr>
<td>Standal, 2008</td>
<td>The peer consultant is an experienced wheelchair user, whose function is to be a model that can show the different techniques of wheelchair handling and be a role model for the rehabilitation processes of the participants. The peer consultant is recruited from a previous program. The choice of peer consultant is based on a professional judgment about how well potential candidates relate to other people and their ability to convey their experiences to others. The peer consultant at WiM does not receive formal training by the rehabilitation professionals before program. However, the professionals and the peer consultant have daily meetings throughout the WiM-program. The bar was raised too high&quot; by the presence of highly skilled peers. When Kari showed her fears and worries, this made her more “down to my level,” The language they used was their own, and not the technical phrases of the healthcare system or the sometimes derogatory and insensitive language of able-bodied persons.</td>
</tr>
<tr>
<td>Struchen, 2011</td>
<td>Social mentors were required to demonstrate good social integration functioning. As a minimal criterion, mentor participants were required to obtain a Social Integration subscale score of 100 on CHART-SF. Potential mentors completed an extensive interview to facilitate an understanding about relationship issues (eg, current friendships, family relationships) and perceptions of the role of a peer mentor, explore problem-solving abilities with respect to potential peer interactions, and identify potential risk factors for impediments in fulfilling the mentor role (eg, drug/alcohol use, legal history).</td>
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Group training sessions included didactic presentation, discussion, and role-play of specific skill-building activities. Specific components of the formal training included (1) review of the SPM role and “ground rules” to follow in the mentor relationship; (2) understanding TBI; (3) outlining common cognitive, physical, and behavioral challenges following brain injury and ways to manage these challenges; (4) reviewing skills that may enhance social functioning and ideas for facilitating skill growth for PP (eg, accessing transportation, improving social communication skills, and budget planning); (5) handling difficult communication issues (eg, expression of anger) and crisis situations (eg, suicidal ideation); and (6) review of documentation responsibilities for the study.

SPMs were significantly more active and had significantly more individuals in their social networks than did the PPs.

<table>
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<th>Source</th>
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<tr>
<td>Ljungberg, 2011</td>
<td>Mentors were selected carefully using the following inclusion criteria: • SCI/D diagnosis • Successful completion of the inpatient rehabilitation process • Minimum 18 years of age • Eighth grade literacy levels to complete necessary tasks adequately • Time since injury a minimum of one year • Motivation to regularly interact with other people with SCI/D • An ability to provide information and training to others • A commitment to participate in weekly group meetings with other mentors and programme supervisors. Peer mentors were trained to monitor (1) medical complications (e.g. pressure sores, urinary tract infections); (2) secondary conditions (i.e. respiratory conditions, cardiovascular disease symptoms, osteoporosis); (3) health risk behaviors (e.g. alcohol use, sedentary lifestyle); (4) emotional well-being (e.g. depression); and (5) general health status. The training also covered issues such as causes of medical complications, early warning signs, prevention strategies, coping strategies for dealing with conditions as they occur and when to refer for further medical attention. Moreover, the training introduced communication techniques and instruction on the use of the medical complications tracking form (MCTF).</td>
</tr>
<tr>
<td>Young, 1999</td>
<td>The peer mentor requires considerable skill in communication, conflict management, and problem solving. If perceived solely as a client advocate, credibility with staff would be tested and loyalties questioned. “It’s important for the peer mentor to be more than a benign presence. It’s important to strive to do what is right, be constructive, and be perceived as constructive. It’s important to support clients regarding their concerns in a way that does not target staff</td>
</tr>
<tr>
<td>Veith, 2006</td>
<td>employed or active community participant, no alcohol or drug abuse problems, no obvious psychiatric issues, and friendly and personable interpersonal style. topics such as relationship building, communication skills, maintaining appropriate boundaries, addressing crises, making referrals, and general community resources. The most frequent complaint regarding the quality of the relationship was that mentees had too few opportunities to meet with their mentor</td>
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</table>

Matching mentors/mentees
Beauchamp, 2016 | People with SCI who request a peer mentor are matched with an individual who has a similar background.

Divanoglou, 2017

Hanks, 2012

Powers, 1995 | Mentors were matched to youth based on gender, interests, and similarity of challenge. The remaining participant who was assigned to the oldest mentor, indicated that she would like to maintain contact but also wanted to meet a successful young adult with a disability similar to her own.

Standal, 2008

Struchen, 2011 | Social mentors were matched to their PPs on the basis of group consensus of the research team using the following criteria: geographical proximity, age, gender, and interests.

Ljungberg, 2011 | Demographic information such as age, race and aetiology of injury was considered when assigning a potential mentee to a mentor.

Young, 1999

Veith, 2006 | The mentoring relationship was influenced by intervening conditions, such as mentee personality and quality and type of alternative social support.

mentees viewed the quality of the mentoring relationship in terms of key mentor characteristics as well as their own reactions to the mentor (e.g. feeling accepted)

mentors were matched to mentees with respect to level of injury, gender, and age

Most mentees were matched with mentors of a similar age, approximately 5–10 years age difference, with the mentee being older. The mentees generally expressed satisfaction with that aspect of the relationship

Most mentees, particularly the 2 women, commented that they appreciated talking to a mentor of the same gender

All mentees stated that it was important for their mentor to have a level of injury that yielded similar major impairment. They viewed this similarity as important for obtaining credible information about physical and emotional coping and healing.

**Mutuality of the disability: relatedness**

Beauchamp, 2016 | He can probably tell that you’re having a problem or... just need advice

level of understanding from somebody else using a wheelchair that I, I didn’t get from friends or family, or any professionals

Divanoglou, 2017 | Peer mentors were described as having credibility because ‘they have lived it all’ and because they developed high level of relatedness with the participants. These attributes were described as unique to peer mentors, as these could not be offered by non-disabled health professionals.
Peer mentors have a high degree of relatedness with participants. Relatedness is considered a result of acceptance, understanding, and taking responsibility for the well-being of others. Peer mentors understand the needs of participants and respect their feelings. The feeling of relatedness helps participants find relevance in what peer mentors represent, making learning worthwhile and positively influencing learning efficacy.

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<tr>
<td>Hanks, 2012</td>
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<tr>
<td>Powers, 1995</td>
<td>Parents communicated that mentoring was important for their sons and daughters, who had little opportunity for contact with independent adults with similar disabilities.</td>
</tr>
<tr>
<td>Standal, 2008</td>
<td>You know that this is in fact a person who actually knows what we are dealing with. It’s not just somebody who has learned to become very good at it. Kari said that she had felt that going to stores was difficult, and she still feels that way, so she has kind of seen it from our side. At home you are often alone; you don’t meet other wheelchair users... so when you come here for three weeks with others in the same situation as yourself, you take in all the information you can.” You get to know how others are doing different things, and I find that important, because it’s not everything that goes by the book. (...) it was a way of seeing whether one’s own solutions were useful or could be improved. The trials and errors of their fellow newcomers made it easier for them to find out how the skill should be performed (...) By seeing the others, the participants could note the specific details of the skill, like when and how much force should be applied and when and how they should shift their weight. Able-bodied instructors who have good balance and full function in arms and legs cannot show the techniques in a truly realistic way.</td>
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<tr>
<td>Struchen, 2011</td>
<td>-</td>
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<tr>
<td>Ljungberg, 2011</td>
<td>All mentees completing the programme felt that they could connect well with their peer mentor and were able to talk about a wide range of issues, including circumstances of accident, general SCI education, transportation and intimacy.</td>
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<tr>
<td>Young, 1999</td>
<td>“The things he said were better than another person because he had something similar happen to him. I believed what he had to say because he understood the situation I was in, both the psycho- logical and physical.”</td>
</tr>
<tr>
<td>Veith, 2006</td>
<td>Four participants had little or no knowledge of what SCI was or had never met an individual with an SCI. As such, they were receptive to meeting the mentor to decrease “the fear of the unknown.” Participants with strong support from family and friends seemed less reliant on support from their mentor. This informal, casual relationship was difficult, if not impossible, to duplicate with professionals, who were often forced into the mentee’s life and were viewed as...</td>
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detached experts: “It’s more comfortable for me to talk to somebody who’s been through it. Who’s actually been through it and just not read about it. What it’s actually like, not just what they read in the book.”

Although mentees were provided with a wealth of knowledge about life with SCI from sources such as hospital staff, textbooks, and the Internet, they identified their mentor as the most credible source of information. Having experiential knowledge, mentors could provide the truth regarding life with an SCI, which professionals could only relay secondhand knowledge.

Mentees viewed themselves as equals with their mentors. One was neither better nor worse than the other; the experience alone united them on the same level. The SCI experience provided a foundation on which mentees could exchange feelings and experiences with a mutuality that was unmatched by other relationships.

Mentees who were married, however, typically discussed everything with their spouse, including SCI issues, except for concerns related to sexuality, which were frequently only discussed with the mentor. The majority of mentees found it difficult to discuss SCI topics with friends because of the friends’ lack of understanding about the impairment.

Mentees also felt a level of acceptance with mentors that was not present in other relationships. Mentees felt comfortable showing outward displays of emotion in the presence of mentors, as opposed to family or hospital staff, because the mentor was more likely to view the mentee’s response as normal in the context of the situation. Mentees realized they were not alone in their experiences.

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The role of a peer mentor in a multidisciplinary team

<table>
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<th>Author</th>
<th>Year</th>
<th>Role</th>
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<tr>
<td>Beauchamp, 2016</td>
<td></td>
<td>The role of peer mentor on the clinical team bridges professional, lay and client perspectives</td>
</tr>
<tr>
<td>Divanoglou, 2017</td>
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<tr>
<td>Hanks, 2012</td>
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As an employee of the hospital and a full team member, the peer mentor also has credibility with staff. It’s recognized that he is hired by, works within, and is accountable to the same organization as all other staff. Seeing both clients and staff as peers, the peer mentor is in a unique position to be a ‘voice’ for both, in a manner unlike any other team member or external peer counsellor.
The peer mentor has no assigned agenda such as ensuring that equipment is ordered or housing located; he is free to be genuinely client focussed and directed.

Unlike professionals who are required to work within guidelines of education and experience, the peer mentor is free to teach and advise about multiple aspects of spinal cord injury; from wheelchairs, to emotions and relationships, to bladder infections.

Veith, 2006

mentees could learn about all topics from one source of information who, having experienced multiple facets of the situation, could provide a more comprehensive and objective picture.

**Overall effect peer support**

mentees organized their notions about the impact of their mentor in terms of how the mentor helped them to cope with the practical, emotional, and identity challenges of their acute SCI (Veith, 2006)

Discussions with mentors consisted mainly of topics directly related to the SCI, including emotional coping, resources, work, transportation, physical conditions, and sexuality; other personal, family-related issues were typically not discussed. (Veith, 2006)

Support by the peer mentor to clients and families includes encouraging, teaching, advising, promoting self advocacy, validating feelings and concerns, and modeling successful living skills (Young, 1999)

**Practical support**

Beauchamp, 2016

Mentors provide information and support on a wide range of topics regarding living with SCI (e.g. returning to work, managing family roles and responsibilities, self-care).

the ability of their mentors to help them redefine their limitations

"her mentor opens up your mind to all the things you can do and the way that you can get around it"

"they [the mentor] would be like a big safety net for us, and create just a comfortable place to, uh explore from and test our limits from"

mentors were able to support greater social participation in various life pursuits

his mentor introduced him to new activities

"I made the step to go back to school and . . . that was because of the peer support I received."

(2) and reframing problems

Realistic optimism was described as not giving participants a sense of “false hope”

Divanoglou, 2017

- 

Hanks, 2012

A theme of increased knowledge about brain injury, the emotional and social effects of brain injury, and services available to help with adjustment were chief among the aspects experienced as most helpful

Mentored participants with TBI showed better physical functioning
Among significant others, mentored participants reported less social support and community integration than individuals who did not receive such services. This was paired with the notable trend toward greater family dysfunction and anxiety in the mentored group than in the nonmentored controls. Such findings could reflect increased awareness of the issues related to family functioning after TBI; in particular, being in an environment where it’s deemed safe to talk about the effects of TBI on the family may direct attention to potential problems in this area.

Powers, 1995

One parent shared that her son consistently expressed high levels of excitement following visits with his mentor, coming home with numerous ideas for strategies he could use to be more independent.

Parents reported that, in conjunction with mentoring, their children began talking more about (a) their abilities to live and work independently when they were older, (b) getting involved in community groups, and (c) self-advocating at school and in the community.

Youth reported that they enjoyed having opportunities to do activities they’d never done before, such as adaptive sailing, wheelchair basketball, and canoeing.

Of great interest to youth were adaptations and strategies they observed their mentors using.

Mentors reported that their mentees (a) learned how to conquer disability-related barriers.

Standal, 2008

The peer models (i.e., both the peer consultant and experienced participants) were models not only in the sense that they showed how skills and techniques should be done, but also by showing the range of skills and techniques that actually can be mastered in a wheelchair.

The relationship to experienced peers was something they recognized as a positive input when they first entered rehabilitation (…) they took me out to town. I followed those who were quite a bit better than me, so I saw the techniques they were using, and I tried to learn them as good as I could.

I started to think more critically about what we are learning.

Struchen, 2011

67% felt that their mentor was able to help them with increasing social activities and decreasing loneliness.

While satisfaction with the social peer-mentoring program was high, objective measures of social activity levels and social network size did not show statistically significant improvements for those who received social peer mentoring over time or as compared with those in a WL/deferred mentoring condition.

“getting to go out,” “meeting new friends” “having mentor as good inspiration,”

Ljungberg, 2011

Program was good psychologically because you share concerns and successes and get good advice.

Perceived the mentors as very knowledgeable about how to successfully live with SCI and secondary complications after SCI. As one participant said: I gained good SCI knowledge I would not have gained without the program. (Man, age 32, C4 complete injury)
Young, 1999 -
Veith, 2006
mentors tended to provide much relevant and eye-opening information about the practical aspects of SCI
mentees stated that they received detailed and practical information from their mentors that was not mentioned by professionals.

**Practical:** Increased knowledge of resources; Increased time management; Realistic future outlook

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<table>
<thead>
<tr>
<th>Emotional support</th>
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<tbody>
<tr>
<td><strong>Beauchamp, 2016</strong></td>
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<tr>
<td><strong>Divanoglou, 2017</strong></td>
</tr>
<tr>
<td><strong>Hanks, 2012</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Powers, 1995</strong></td>
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<tr>
<td><strong>Standal, 2008 - Struchen, 2011</strong></td>
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</tbody>
</table>
Ljungberg, 2011  Program was good psychologically because you share concerns and successes and get good advice.

Young, 1999  the peer mentor is ‘living proof’ of the possibility of a successful, healthy life. He gives hope of a future, which is critical in rehabilitation

Veith, 2006  if friends or family could not provide adequate emotional support, mentors were more likely to become that source of support. In contrast, if mentees had a significant other to provide emotional support, they tended to rely on the mentor more for practical support.

Those who were less self-assured relied more on their mentor to help them understand the injury and move forward with life

**Emotional** Decreased fear of unknown; Increased hope; Reduced distress

mentees revealed that the most frequent and useful outcome from the mentoring experience was the provision of hope. realization that life could still be a positive experience after acquiring an SCI.

mentees reported reduced distress and fear of the future after learning about mentors’ experiences

---

**Support in finding your identity**

Beauchamp, 2016  It’s just setting an example, and it’s helpful to others, because you’re faced with a similar predicament, and it helps you to realise well, a lot of it’s going to be about your choices from here on in, and how you go about things

improvements in their motivation as a result of their mentor’s actions

“seeing somebody in the same shoes doing it, was what made it for me. That was... it was proof, it was right there. I couldn’t deny it, and I couldn’t, I couldn’t very well just sit around on my butt and collect welfare for the rest of my life. I had to be them. I had to do it, you know? I had to prove myself”

five participants corresponded to elevated self-confidence. As an example of the effects of role modelling Ashley related that “I’m a quad, so... holy crap if somebody else can do it, I could probably do it to"

feeling a greater sense of comfort and acceptance of their situation through the contributions of their mentor

through demonstrating optimism and enthusiasm about what the mentee could accomplish Jacob stated that he “empowered me... [and helped me realize that] that it’s ok to be upset and all that type of stuff, but it’s still... you know, life really did go on”

(1) changing perspectives

Divanoglou, 2017  sharing openly their own limitations made participants feel comfortable with the idea of not being able to manage everything. Therefore, peer mentors were credible both for what they could and could not achieve.

peer mentors are an important source of social influence that can impact theoretically relevant motivational determinants of behaviour such as self-efficacy, perceptions of competence and self-determination.

Hanks, 2012  most mentees felt that the peer-mentoring experience improved their quality of life and enhanced the feeling that they were better able to deal with life
Another key theme that mentees found helpful about the peer-mentoring relationship involved providing support: most mentees felt that the program improved their lives via support from their mentors and family members, as well as decreased feelings of being alone.

<table>
<thead>
<tr>
<th>Author</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powers, 1995</td>
<td>Another participant reported that, after learning about and practicing self-advocacy with his mentor, he had requested and obtained a meeting with the principal of his school to advocate for the construction of a ramp. This student was particularly pleased because the principal agreed to his request. Mentors reported that their mentees (c) became more self-reliant, and (d) expressed increased interest in working, going to college, and living in their own homes.</td>
</tr>
<tr>
<td>Standal, 2008</td>
<td>was afraid that I was going to be sitting here and be the one that didn’t dare and didn’t manage things. But it hasn’t been like that at all, so this has been a boost for my confidence.</td>
</tr>
<tr>
<td>Struchen, 2011</td>
<td>Peer partners viewed their SPMs as helping them by “thinking I could do more than what I thought I could do,” “finding out it was not all about me.”</td>
</tr>
<tr>
<td>Ljungberg, 2011</td>
<td>-</td>
</tr>
<tr>
<td>Young, 1999</td>
<td>-</td>
</tr>
<tr>
<td>Veith, 2006</td>
<td><strong>Identity</strong> Increased motivation to work; New self-identity; Inspiration; Appreciation for life. This provision of life information that was relevant for mentee self-evaluation, also referenced as <em>appraisal support</em> (House, 1981), appeared to empower mentees, because many mentees expressed an increased motivation to return to school or work, a greater acceptance of the injury and associated physical limitations, and a renewed sense of purpose in their life.</td>
</tr>
</tbody>
</table>
Appendix 5: Literature study – Important wheelchair skills for daily activities

Most important wheelchair skills needed for performing daily activities

Literature study

Written by: Dynthe Faes
Student number: 500683545
On behalf of: Åke Norsten
Tutor: Miranda van Niel
Fieldwork setting: Rehab Station, Stockholm, Sweden
Words: 4777

Amsterdam School of Health Professions (HvA), Tafelbergweg 51, Amsterdam, The Netherlands
Date: 18-04-2017

Abstract
Objective: To identify the wheelchair skills most important for daily life, according to wheelchair users.
Method: A review of the literature.
Results: Many skills are named as essential, which include a wheelie, transfers, up/down stairs, curbs, steep hills, maneuvering the wheelchair, opening a door, picking up objects from the floor or reaching high objects. Other subjects mentioned are the maintenance and cleaning of the wheelchair and education about the mechanics.
Conclusion: The wheelie can be seen as the most important wheelchair skill for manual wheelchair users because this skill is needed to perform most of the other skills mentioned in the articles. The skills mentioned should be considered as a base for every wheelchair skills training given in a rehabilitation center or afterwards to (new) manual wheelchair users, because these are the skills most used in daily life.
Preface
Before you lies the literature study about the most essential skills used by wheelchair users in daily life. This literature study is part of a research report about Drivkraft. Drivkraft is a training method, developed and based at Rehab Station, Stockholm by Åke Norsten. The aim of the research report is to explore the Drivkraft method including its components, and describe the evidence base for this training.
This literature study will be combined with two other literature studies about other components of Drivkraft. These components will be explained later on.

For this review a glossary was made to prevent any confusion about the interpretation of words. This glossary can be reviewed in appendix 1.

Many thanks to Lauren Ebbes and Michael Zonneveld for their peer-review and feedback on the study and Miranda van Niel for her guidance on the content and helping me with the structure of this study.
1. Introduction
The wheelchair is one of the most common and important of rehabilitation devices (Kirby, Mifflen, Thibault, Smith, Best, Thompson & MacLeod, 2004). It’s used by individuals who have impairments that limit their ability to walk (WHO, 2010). According to the most recent data, from January 2013, 1% of the Swedish population uses a wheelchair, this equates to an amount of 150,000 wheelchair users. Of these people, 67% uses a manual wheelchair. (Hjälpmedelsinstitutet, 2014)

Using an active wheelchair may be beneficial. They are more hard-wearing, can withstand higher strains than other manual wheelchairs and can be used for up to 16 hours a day, 365 days per year, a degree of usage few other devices withstand (Cooper, 1998; Cooper, Boninger, & Rentschler, 1999).

People using a manual wheelchair encounter a substantial range of destinations that can’t be reached due to barriers. This includes the lack of ramps, ramps that are too steep and rudeness of other people (Meyers, Anderson, Miller, Shipp & Hoenig, 2002). When trying to overcome barriers without proper training, there is a potential for acute or overuse injuries to the wheelchair user (Boninger, Towers, Cooper, Dicianno, & Munin, 2001; Calder & Kirby, 1990; Gaal, Rebholz, Hotchkiss & Pfaelzer, 1997; Liu, Mineo, Hanayama, Fujiwara & Chino, 2003; Ummat & Kirby, 1994; White & Kirby, 2003; Woolfrey & Kirby, 1998).

The reduced community access, due to difficulties in overcoming barriers, can be the result of a lack of intensive wheelchair skills training (Aronson, 1997; Best, Miller, Eng, Routhier & Goldsmith, 2014; Liu et al., 2003; McClain, Cram, Wood & Taylor, 1998; Norrlin, Strinnholm, Carlsson & Dahl, 2003; Palisano, Tieman, Walter, Bartlett, Rosenbaum, & Hanna, 2003; Pierce, 1998). This is a shame because manual wheelchair users report that confidence with their wheelchair and the grip, strength and satisfaction has influenced their participation in a positive way (Smith, Sakakibara & Miller, 2016). Besides this, persons that are experienced in their use of active wheelchairs can be described as “healthy disabled”. When they have impairments that are stable and predictable (e.g. spinal cord injuries), they consider themselves to be healthy (i.e. opposed to ill or sick) and do not expect to die any sooner than any other healthy persons their age. (Wendell, 2001)

If wheelchair users want to participate in daily activities they will need certain skills. For example they need to be able to balance on their rear wheels. In this way they can overcome barriers like curbs, steep inclines and potholes (Kirby, Smith, Seaman, Macleod & Parker, 2006). A better ability to mobilize in your manual wheelchair, leads to a higher level of independence and quality of life. Trained wheelchair users also use their wheelchair more than wheelchair users who haven’t had wheelchair training. (Hoenig, Landerman, Shipp, Pieper, Richardson, Pahel & George, 2005) This indicates that there is need for wheelchair skills training.

To meet the needs of providing wheelchair skills training, ‘Drivkraft’ was developed. This is a method to successfully adjust the wheelchair in combination with wheelchair skills training. Drivkraft is developed by Åke Norsten, a Physical Education (PE) teacher and wheelchair user. He teaches his method at Rehab Station in Stockholm, in co-operation with a physiotherapist and wheelchair mechanic. Special about Drivkraft is the fact that it’s not only developed, but also taught by an experienced wheelchair user. This seems to be a unique concept.

The main goal of the report is to gain an evidence base for Drivkraft. Therefore three literature questions were formulated based on the specific components of the method.
The three literature questions all contribute to the main question of the research report, which is: “What is the Drivkraft method?”

To answer this main question, the three literature questions focus on a specific component, as stated above. Two of these specific components of the method are the value of group training and the value of training given by a peer-mentor. The following questions were formulated:

- What factors make a wheelchair group training effective?
- What is the value of a wheelchair group program given by a peer mentor, compared to a healthcare professional?

The component that will be substantiated in this review are the skills. The developer based his skills training on years of experience and the individual goals of the participants. This means the skills are not based on any (recent) literature. This is the case with more training methods and protocols that are developed over time (Taylor et al., 2015). In order to support the Drivkraft method with literature, it’s important to identify the skills that should be trained, according to manual wheelchair skills, during and after discharge of rehabilitation (Morgan, Engsberg & Gray, 2015). This can be compared to the skills that are currently trained.

Therefore the following review question is formulated: What wheelchair skills do wheelchair users need in order to perform their daily activities in an effective way?

1.1 Relevance for occupational therapy

A varying amount of wheelchair training is given to new manual wheelchair users during rehabilitation (National Spinal Cord Injury Statistical Center, 2013; Kendall, Ungerer, & Dorsett, 2003). If the wheelchair training is given, it tends to be brief and is usually based on the clinical experience of the health care professional (McNevin, Wulf & Carlson, 2000). Therefore new wheelchair users don’t always learn the skills that they need the most in daily life (Flies-Douer, Vanlandewijck, Manor & Van der Woude, 2010).

Besides this, Kilkens et al. (2005) stated that participation in daily life increases if the level of wheelchair skills is high. This means it’s important that wheelchair users get the opportunity to identify the skills that should be practiced during the training.

Staying independent and being able to participate in daily activities are important aspects in occupational therapy.
2. Search strategy
In order to get an answer to the review question, keywords were formulated. With these keywords a single search string was formed which was ran in several databases. The keywords were:

<table>
<thead>
<tr>
<th>Manual wheelchair skill*</th>
<th>Daily activit*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair skill*</td>
<td>Perform*</td>
</tr>
<tr>
<td></td>
<td>Need*</td>
</tr>
</tbody>
</table>

The search string that was ran through the databases is:
(manual wheelchair skill* OR wheelchair skill*) AND (daily activit* OR perform* OR need*)

2.1 Inclusion and exclusion criteria
To make the search more specific inclusion and exclusion criteria were formulated. The inclusion criteria are:
- Skills training program
  These training programs train on specific skills. These articles were included because they may describe where the training is based on.
- > 15 years
  The articles shouldn’t be older than 15 years because since then a lot has been changed in wheelchair accessibility. If an article is older than 15 years old, it couldn’t be assured that the identified training skills would still be relevant.
- Specific diagnosis → A lot of skill trainings are aimed at specific diagnoses, for example, spinal cord injury. The target audience is manual wheelchair users in general, articles with any kind of diagnosis were included, as long as they are in a manual wheelchair.

The exclusion criteria are:
- Power wheelchair → Drivkraft focuses only on manual wheelchairs.
- Wheelchair tests → In articles that focus on wheelchair tests, they only measure progression, but they do not focus on why these skills are important for wheelchair users.
- Comparison between different wheelchairs → These articles focus on the differences between multiple types of wheelchairs, these aren’t relevant for my review question.
- Only focuses on children → Drivkraft focuses mainly on adults from 18 years and older. The wheelchair skills that children need, may differ from the skills adult need in daily life.
- Teaching strategies → Different kind of teaching methods is not relevant for answering my review question.

2.2 Databases
The databases Medline, Cochrane Library and OT Seeker were used for finding relevant literature. Within the search in Medline, database CINAHL was included as well. All these databases were used because of the diversity in healthcare related journals, matching the review question. OT Seeker was used because of the relevance for occupational therapy. The next table shows the results of the search string and the number of hits and useful articles.
<table>
<thead>
<tr>
<th>Database</th>
<th>Date</th>
<th>Search string</th>
<th>Number of hits</th>
<th>Useful articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medline</td>
<td>16-02</td>
<td>(manual wheelchair skill* OR wheelchair skill*) AND (daily activit* OR perform* OR need*)</td>
<td>228</td>
<td>8</td>
</tr>
<tr>
<td>Cochrane library</td>
<td>16-02</td>
<td>(manual wheelchair skill* OR wheelchair skill*) AND (daily activit* OR perform* OR need*)</td>
<td>45</td>
<td>2</td>
</tr>
<tr>
<td>OT Seeker</td>
<td>16-02</td>
<td>(manual wheelchair skill* OR wheelchair skill*) AND (daily activit* OR perform* OR need*)</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

*Table 1: results search string*

2.3 Selection of the articles
The search was conducted within the databases and 281 articles were found. All the articles were imported in Refworks and the duplicates were removed. This resulted in a list of 169 articles. The inclusion and exclusion criteria were used to critically assess the articles, based on their title. This was done through peer review with peer students. All the decisions were discussed and 26 titles were selected for further assessment. From all these articles, the abstracts were read and critically assessed by all the group members. Two articles were deselected because of a missing abstract or full-text.

After discussing all the findings fourteen articles were selected for further assessment using the MacMaster Critical Review Form (Letts, Wilkins, Law, Stewart, Bosch, & Westmorland, 2007; Law, Stewart, Pollock, Letts, Bosch, & Westmorland, n.d.).

The final selection of articles used for this literature study are eight articles that together answer the review question. The process of selection is briefly displayed in the flowchart below.
Figure 1: Flowchart
### 2.4 Overview articles

As stated before, the final selection includes eight articles. In Table 2 an overview of those eight articles is given.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design &amp; Level of evidence</th>
<th>Aim of the study</th>
<th>Participants</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best, K.L., Miller, W.C., Huston, G., Routhier, F., &amp; Eng, J. J. (2014)</td>
<td>Randomized controlled trial; 2</td>
<td>Evaluate the effect of WheelSee on wheelchair use self-efficacy in community-living adult MWC users compared to a control group who received no training.</td>
<td>N = 28; N = 16; peer-led group training</td>
<td>WheelSee had a large statistically significant effect on MWC use self-efficacy (p = 0.002). WheelSee also had a large statistically significant effect on MWC skills capacity (p = 0.003) and performance (p = 0.02). Conclusion: A peer-led MWC training program improves wheelchair use self-efficacy in adult MWC users, and had a positive influence on other wheelchair-related outcomes.</td>
</tr>
<tr>
<td>Flies-Douer, O., Vanlandewijck, Y.C., &amp; Van der Woude, L.H.V. (2012)</td>
<td>Cross-sectional; 5</td>
<td>Create a hierarchical list of the most essential wheeled mobility (WM) skills for everyday life of wheelchair users with a spinal cord injury (SCI), and to compare perceptions of WM gained during and after clinical rehabilitation.</td>
<td>Paralympic athletes N = 49 men N = 30 women</td>
<td>Rated as the most essential skill was transfer into and out of a car. Rated as the least essential skill was the 1-handed wheelie. Conclusion: The main survey outcome is a sorted list of WM skills according to their essentiality for daily life of hand-rim wheelchair users with SCI.</td>
</tr>
<tr>
<td>Flies-Douer, O., Vanlandewijck, Y.C., Post, M.W.M., Van der Woude, L.H.V., de Groot, S. (2013)</td>
<td>Cohort study; 3</td>
<td>Study possible changes in wheelchair skills in participants with spinal cord injury between discharge and 1 year after rehabilitation, and to determine whether changes</td>
<td>N = 111 Participants performed the Wheelchair Circuit twice: at discharge (t1) and 1 year after discharge (t2).</td>
<td>No statistically significant changes were found in the ability and performance time scores of the Wheelchair Circuit over the first year after discharge. Younger persons, those with paraplegia, and those with a better self-efficacy score showed</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Hypotheses</td>
<td>Participants</td>
<td>Findings</td>
</tr>
<tr>
<td>-------</td>
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</tr>
<tr>
<td>Inkpen, P., Parker, K., &amp; Kirby, R.L. (2012)</td>
<td>Cross-sectional; 5</td>
<td>Test the hypotheses that self-reported manual wheelchair skills capacity and performance are highly correlated and that capacity significantly exceeds performance.</td>
<td>N = 26</td>
<td>There were 9 (28%) of the 32 skills for which the participants’ mean capacity success rates were 20% higher than the mean performance success rates. Of the reasons for not performing individual skills, 66% of the instances were because the participant lacked the capacity.</td>
</tr>
<tr>
<td>Study</td>
<td>Study Type</td>
<td>Title</td>
<td>Participants</td>
<td>Findings</td>
</tr>
<tr>
<td>-------</td>
<td>------------</td>
<td>-------</td>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td>Kirby, R.L., et al. (2006)</td>
<td>Systematic review; 1</td>
<td>To review the current understanding of the manual wheelchair wheelie.</td>
<td>-</td>
<td>Pitch control (partial or full) is the foundation of many wheelchair skills (e.g., negotiating thresholds, potholes, curbs, steep inclines and gravel). Yet, most wheelchair users never learn to perform this valuable skill. Conclusion: Improvements in our understanding of the nature of wheelies, formalization of training protocols and innovations in wheelchair design hold promise for improved activities and participation by wheelchair users.</td>
</tr>
</tbody>
</table>
| Kirby, R.L., et al. (2016) | Cross-sectional descriptive study; 5 | Describe the wheelchair skills capacity and performance of experienced manual wheelchair users with spinal cord injury (SCI) and to assess measurement properties of the Wheelchair Skills Test (WST) and Wheelchair Skills Test Questionnaire (WST-Q). | N = 117 Manual wheelchair users with SCI. | The total WST capacity scores correlated significantly with the total WST-Q capacity scores (p < .01) and WST-Q performance scores (p < .01). The WST and WST-Q measures correlated significantly with the Confidence, Basic Mobility, Independence, or Pain Interference measures. Conclusion: Many people with SCI are unable to or do not perform some of

| Participation action research; 3 | Identify wheelchair skills currently being taught to new manual wheelchair users, identify areas of importance for manual wheelchair skills' training during initial rehabilitation, identify similarities and differences between the perspectives of health care professionals and manual wheelchair users and use the ICF to organize themes related to rehabilitation and learning how to use a manual wheelchair. | N = 27 |
| Focus group health care professional; N = 13 |
| Focus group manual wheelchair users; N = 14 |

Wheelchair skills identified as important for new manual wheelchair users included propulsion techniques, transfers in and out of the wheelchair, providing maintenance to the wheelchair and navigating barriers such as curbs, ramps and rough terrain. Health care professionals and manual wheelchair users identified the need to incorporate the environment (home and community) into the wheelchair training program.

Conclusion: Identifying essential components for training the proper propulsion mechanics and wheelchair skills in new manual wheelchair users is an important step in preventing future health and participation restrictions.
2.5 Gathering results
In this section the gathering of the results will be described. Because most of the articles
don’t give a clear answer of the review question, the conclusion had to be drawn from tables
and other results. In this section, the process of this gathering is described.

Only the articles of Flies-Douer et al. (2012), and Morgan et al. (2017) give a clear answer on
the question: ‘What are the most important wheelchair skills, according to wheelchair users?’
The articles of Kirby et al. (2016), and Inkpen et al. (2012) focus on the capacity of
wheelchair skills versus the performance of it. From their results it’s possible to select the
skills that wheelchair users are most capable of doing and compare this to the actual
performance of the skills. The conclusion that can be drawn from this comparison is that the
skills that have the highest performance rate and the highest capability, are the skills most
used in daily life. Kirby et al. (2016) also asked participants how often they used the skills
included in the intervention.
Best et al. (2014) does a pilot study on a peer-led wheelchair training program. Part of the
program is setting individual goals for each participant. The goals which were set, are a clear
indicator of what skills wheelchair users need in daily life and thus what skills should be
trained during wheelchair training.

The study of Kilkens et al. (2005) suggests that the better the wheelchair skills are, the more
wheelchair users participate in daily life and social events. They tested the level of skills with
the Wheelchair Circuit, which consists of eight tasks. The better this Wheelchair Circuit could
be executed, the better the wheelchair skills. The conclusion that can be drawn, is that these
eight skills are important for wheelchair users to control.
3. Results

Seven of the articles gave an indication of which wheelchair skills are important for manual wheelchair users to control, so they can participate in daily activities without any difficulties. All the articles use different words for the skills. For making Table 3, the words are categorized in a diagram and one overall term was chosen. The full diagram is retrievable in appendix 2.

A few skills that were named in the most articles are:

<table>
<thead>
<tr>
<th>Skill</th>
<th>Article</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelie</td>
<td>Best et al., 2014; Kirby et al., 2006; Morgan et al., 2017</td>
</tr>
<tr>
<td>Transfer; this includes transfers from the</td>
<td>Best et al., 2014; Flies-Douer et al., 2012; Inkpen et al., 2012; Kirby</td>
</tr>
<tr>
<td>wheelchair to another chair, bench or</td>
<td>et al., 2016; Morgan et al., 2017</td>
</tr>
<tr>
<td>car seat but also from the ground into the</td>
<td></td>
</tr>
<tr>
<td>wheelchair and back.</td>
<td></td>
</tr>
<tr>
<td>Up/down stairs</td>
<td>Best et al., 2014; Morgan et al., 2017</td>
</tr>
<tr>
<td>Un/down curbs</td>
<td>Best et al., 2014; Morgan et al., 2017</td>
</tr>
<tr>
<td>Uneven terrain</td>
<td>Best et al., 2014; Flies-Douer et al., 2012; Inkpen et al., 2012; Kirby</td>
</tr>
<tr>
<td></td>
<td>et al., 2016; Morgan et al., 2017</td>
</tr>
<tr>
<td>Steep ramps/hills</td>
<td>Best et al., 2014; Flies-Douer et al., 2012; Inkpen et al., 2012; Kirby</td>
</tr>
<tr>
<td></td>
<td>et al., 2016; Morgan et al., 2017</td>
</tr>
<tr>
<td>Maneuvering</td>
<td>Best et al., 2014; Inkpen et al., 2012; Kirby et al., 2016; Morgan et</td>
</tr>
<tr>
<td></td>
<td>al., 2017</td>
</tr>
<tr>
<td>Opening a door</td>
<td>Flies-Douer et al., 2012; Inkpen et al., 2012; Kirby et al., 2016</td>
</tr>
<tr>
<td>Relief pressure from buttocks</td>
<td>Inkpen et al., 2012; Kirby et al., 2016; Morgan et al., 2017</td>
</tr>
<tr>
<td>Turns in place or while moving forward</td>
<td>Inkpen et al., 2012; Kirby et al., 2016</td>
</tr>
<tr>
<td>Rolls forward short distance</td>
<td>Flies-Douer et al., 2012; Inkpen et al., 2012; Kirby et al., 2016</td>
</tr>
<tr>
<td>Picks objects from the ground</td>
<td>Inkpen et al., 2012; Kirby et al., 2016</td>
</tr>
</tbody>
</table>

Table 3: most mentioned skills

It’s notable that many of the mentioned skills are only possible if the wheelchair user is able to do a wheelie (Kirby et al., 2006). The wheelie is needed for skills like turning in tight places, obstacles, potholes, gravel, inclines, curbs and even stairs or escalators. This indicated that the wheelie should be the most important skill for wheelchair training, because the other skills are only possible if the wheelchair user has control over the wheelie and the balance that is essential for this skill.

Table 3 displays the skills, which were mentioned by more than one article. Other skills were named only by one of the articles. These will be discussed below.

The participants from the study of Best et al. (2014) name the ability to go up and down an escalator and crossing the street as important skills.

According to Flies-Douer et al. (2012) being able to ascend or descend a 2,5 cm sidewalk is also an important skill. Besides the essential skills, the questionnaire used in the study also asked about the way the participants learned the skills. 57% claimed to have learned the skills in clinical rehabilitation, 40% claimed to have learned the skills afterwards in a community setting. The other 3% have never learned the essential skills.
On the contrary, Flies-Douer et al. (2013) concludes that the level of wheelchair skills doesn’t improve or decline in the first year after being discharged from a rehabilitation center.

Kilkens et al. (2005) also mentions crossing a doorstep, mounting a platform, 3-minute wheelchair propulsion and performing a figure-of-8.

Inkpen et al. (2012) concludes that it’s also important to be able to reach 1,5 meter high objects, to get over a 2 cm threshold, to roll 2 meter on a soft surface and to roll backwards 5 meter. For the skills that had a low performance, several reasons were given, such as a lack of capacity, people to assist or because of a safety concern.

Kirby et al. (2016) also names rolling backwards for a short distance, turning while moving backwards and reaching high objects as important.

In the study of Morgan et al. (2017) the wheelchair users and health care professionals mention the maintenance, cleaning and adjustments of the wheelchair as important. Besides that the propulsion techniques, sitting position/posture, chair education, community mobility and strength and condition are needed skills.

Wheelchair users also think it’s important to be able to assemble and disassemble the wheelchair and do activities of daily life (ADL) in the wheelchair.

The wheelchair users as well as the health care professionals made two final suggestions. Firstly, more attention should be paid to the psychological adjustment of new wheelchair users. Adjusting to a wheelchair and disability is a process that most health care professionals feel is out of their field of expertise.

Secondly, wheelchair training could be more effective if given in the home environment of the new wheelchair user.

As mentioned before, a few articles have also paid attention to where the participants learned the skills (Flies-Douer et al., 2012) and the reasons why participants weren’t capable of performing a certain skill (Inkpen et al., 2012). Those two articles have contradicting conclusions.

The participants in the study of Flies-Douer et al. (2012) state that they’ve learned the skills after being discharged from rehabilitation. This statement is backed up by other wheelchair users who claim that wheelchair skill training should be given at home, because that is where the actual learning started (Morgan et al., 2017).

This strokes against the argument that a lot of wheelchair skills aren’t performed because of the lack of capacity (Inkpen et al., 2012). The study Flies-Douer et al. (2013) confirms these findings by stating that the level of wheelchair skills doesn’t improve or decline in the first year after being discharged from a rehabilitation center.
4. Discussion

The purpose of this review was to identify which wheelchair skills are most important for manual wheelchair users, according to them. This purpose was achieved by comparing the seven articles. All the used articles came to a similar conclusion about the most essential wheelchair skills.

Six of the articles (Best et al., 2014; Flies-Douer et al., 2012; Inkpen et al., 2012; Kilkens et al., 2005; Kirby et al., 2006; Kirby et al., 2016) have only focused on the wheelchair skills. The study of Morgan et al. (2017) is more extensive and also focuses on the design of the training such as the psychological adjustment of new wheelchair users. This is a subject that only this study mentioned, but what should be taken seriously during wheelchair training and maybe even after the training.

This study also mentioned the wheelchair training in the environment of the wheelchair user, because in a rehabilitation center the obstacles and challenges aren’t the same as at home. This also needs to be considered if the goal is to set up wheelchair training.

The concept of wheelchair training in a community environment will need more research to investigate the most important factors.

The last factor that was mentioned only in this article, but should be taken seriously, is education about the wheelchair, including maintenance and adjustments. Because none of the other articles mentioned this aspect, the conclusion which can be drawn is, that it’s not essential. Considering that all the other articles have focused only on the skills, this could still be an important part of the wheelchair training.

There is more research needed to identify the importance of this aspect and if so, what education manual wheelchair users would need.

4.1 Study limitations

In the results, it was mentioned that two of the articles (Flies-Douer et al., 2012; Morgan et al., 2017) gave a direct answer to the review question. Other articles were used because both of those articles don’t have a representative participant group.

In the study of Flies-Douer et al. (2012) the participants are paralympic wheelchair athletes with a spinal cord injury. These athletes can be seen as the elite in wheelchair skills. This means that the skills that they rate as most important could be different from the skills that a less skilled wheelchair user could see as essential. Nevertheless, the study describes an extensive list of most essential wheelchair skills that can be used to compare with other studies. The same goes for the study of Morgan et al. (2017). In this study only 14 wheelchair users were asked what they thought were the most essential wheelchair skills. This group is too small to be representative for every manual wheelchair user.

The articles of Kirby et al. (2016), and Inkpen et al. (2012) focus on the performance and capability of the wheelchair skills from the Wheelchair Skill Test. The results were interpreted, for which the capability and performance were compared in order to get a clear view on the most important skills. Because the writer of this literature study did this herself, there could be a bias that she didn’t interpret the table correctly.

Another possible bias is the interpretation of the mentioned skills in the articles. These skills were categorized in order to combine them in table 3. The skills, which were mentioned, weren’t always explained in the article. This could result in wrongly interpreting of the words. This way it’s possible some skills were combined, that weren’t supposed to be combined.
Looking back on the process of searching for articles, the selection wasn’t optimal. For a next literature study, more time would be needed in order to be more critical with the selection of the articles. During this literature study, the first selection was based on the titles only. During the process, the writer of the literature study experienced that a less accurate title, could still mean that the article was useful. Because of the time limit for this study, there is a chance that potential useful articles were deselected, based on the title.

Also, there was a database, which had over a 1,000 hits and couldn’t be narrowed down by using exclusion criteria. Because of the small time frame, this database wasn’t used for searching. This means that potential useful articles weren’t found.

With more time, more databases would be used and the selection of the articles would be more precise.

5. Conclusion
The review question of this literature study is: What wheelchair skills do wheelchair users need in order to perform their daily activities in an effective way?

Within the articles there is a lot of similarity in the skills named as important for daily life. The wheelie can be seen as the most important wheelchair skill for manual wheelchair users because this skill is needed to perform most of the other skills mentioned in the articles. The other essential skills are: transfers, up/down stairs, curbs, steep hills, and maneuvering the wheelchair.
This small list answers the review question as cited above. The skills mentioned in the list should be considered as a base for every wheelchair skills training given in a rehabilitation center or afterwards to (new) manual wheelchair users because these are the skills most used in daily life.

The list can also be compared to the list of skills that are trained with Drivkraft. This comparison can indicate if Drivkraft trains the right skills or whether there should be some adjustments to the training method and which this should be.
6. References


App. 1 - Glossary

**Manual wheelchair**
A wheelchair that is propelled by the user or pushed by another person.
(World Health Organisation. 2008, p. 11)

**Wheelchair skills mobility**
The ability to move around and overcome obstacles encountered when carrying out daily activities or social roles in a self-propelled wheelchair.
(Routhier, F., Vincent, C., Desrosiers, J., & Nadeau, S. 2003, p. 20)

**Wheelie**
A rear manual wheelchair wheelie occurs when the front wheels, ordinarily in contact with the support surface, are intentionally caused, by means of a transient or sustainable rear pitch, to lift from the surface while the rear wheels remain on the surface.
(Kirby et al, 2006, p. 119)
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<tr>
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<td>Crossing a doorstep</td>
<td>Rolls forward 10 m</td>
<td>Wheelie</td>
<td>Rolls forwards short distance</td>
<td>Transfers</td>
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<td>50 m forward</td>
<td>Mounting a platform</td>
<td>Turns 90° while moving forward</td>
<td>Rolls backwards short distance</td>
<td>Maintenance, cleaning, adjustments</td>
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<td>Up/down stairs</td>
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<td>Up/down curbs</td>
<td>Up/down hill gentle slope</td>
<td>3% slope</td>
<td>Maneuvers sideways</td>
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<td>Uneven terrain</td>
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<td>Picks objects from the floor</td>
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<td>Up steep hills</td>
<td>Moving on irregular surface propulsion</td>
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<td>Transfer from 1 wheelchair to another</td>
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<td>Rolls forward 10 m in 30 sec</td>
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<td>Transfer from the ground to a wheelchair</td>
<td>Performing a figure-of- 8</td>
<td>Relieves weight from buttocks</td>
<td>Turn in place</td>
<td>Community mobility</td>
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<td>Reaches 1.5m high objects</td>
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Appendix 6: Interview transcribes
The text in bold is said by the interviewer, normal is the response of the developer of the Drivkraft method Åke Norsten.

Interview Åke Norsten – Part 1 – 09-03-2017

Well, yesterday you told us about the (eah) eight principles of your method. The drivkraft method.
Uhm, And we were actually wondering maybe it’s interesting if you just uhm take one of the principles and then go through all eight of them (uhm) so we can have a more clear view of what you mean with the principle and what kind of thing are connected to this principle and yeah so ... that’s pretty much it.
Though it will not go really deep.
Well yeah. Just as much as you like to tell us. We have the time so....
Oke, uhhh We start directly?
Yeah
Oke, first, not the first thing but we start with the rolling and turning resistance.
mhm
Because you need to to, doesn't matter if you’re old of what kind of diagnosis you have, the wheelchair should be easy to maneuver. So the first thing is just about how the wheelchair, the mechanicals or the rolling resistance and turning resistance of the wheelchair. And the two major things when you talk about it’s (ehh), you need high pressure in the wheels at the back and then you’ll need a low. Low, low load on the small wheels. (uhm) so that’s good, main thing, but then you have many other small things like the camber, angle of the camber, wheelbase and many many things, but the two major things that’s easy to work with is the pressure in the rear wheels and ehhh the small load on the front wheels.
yeah, and can you maybe explain us a little bit more about how you make sure eeh that the pressure is on the back wheels instead of the front wheels?
Uhhh, I try to lift uhm just over the fork, so I need to, I can’t measure it more and I, I just lift it and uhm, uh, I have been lifting many hundred and maybe thousand a wheelchairs so it’s ehh but it’s hard to say, I usually say if it’s heavy or medium heavy or light and uh so I, I all of them when I meet them the first time I lift the fork when they are sitting in a driving position.
hmmm. And then uhm, yesterday you told a little bit about the mechanics of the wheelchair and how you can adjust them to make it uhm better that the weight is on the backwheels, can you explain a little bit more about that?
eeh, it’s only two, two things you can adjust the balance of the wheelchair.
And that is to, to hand the wheel axel forward.
hmmm
or the person backwards, you open up the, the backrest.
Oke
the, textile of the polsture on the backrest.
oke, so those are the two things that you check when
yeah, and it also about the angle of, the angle of the backrest and how much you’ll open it up and so the main thing, the, the wheels forward and the person backwards.
That’s the way you make it lighter in front.
Oke, alright, that's good.
(to other interviewers) Do you have any additional questions?
hmmmm
You can have all those small things but I don't think it will be to complicated if you don't camber on the wheelbase and uhmm all the other things, but I think it's most important is the two major things.
Yeah, those are the things you do with everyone
yeah
The other ones are just really specific
yeah
Yeah
Ake hmmm
oke, alright, uhmm, so that's, that's the first uhm principle actually, the ... no, not the first, it's one of them, I but I can't say everybody is important, but I, you should start with explain and so I think
So all of the principles are equally important during the method?
yeah, I think, you combine all of them, sometimes one of them are more important for one person and uhmm but you have to combine all of them.
yeah
the holistic way of thinking
yes
(All laughing)
alright, uhm so the second element was the posture, right?
yeah, posture yeah
And how do you get to that?
well, it's uhm, I should have documents in front of me but uhm, but first it's the pelvic, the position, ehhh, the frontal plain, parsantel plain and the sagittal plain, so you have to, to, you know
Lauren & mhmm
so, that flex the spine, so then you look at the spine and eh lower back, the lumbal part, the thorical part, so you get a good shape on the front. Because if you adjust the pelvic, you adjust the spine. So, that's the major thing and then you need to, to, see, it depends on, if you work with a person without sensation then it's really important that you make sure that you that they won't get any pressure sores.
yeah
so you have a full contact under the tights all the way so the dept of the sitting and it's okay and, so that's eeh
And you were talking about adjusting the pelvic bone
yeah
How can you arrange that? Do you do it with couches or do you use something else?
uhm, yeah you can do it with couches a little bit, it's eeh you need to get some kind of stability in the wheelchair so you try to adjust the angle of the backrest and the textile, what do you say, textile? Or how do you say?
I'm not sure what it's called
yeah, but to arrange but than it’s, if, if you’re paralyzed for example you’re a T5 uhm then you
should in the beginning feel rather comfortable to flip it backwards because you create
stability, but it’s not good, it’s not a good position for your spine and if you go like this (sits
with his pelvic flipped). So you should lift your high, high so it’s not just to adjust, you
need to get the, the patient need to train and get eh comfortable in a more, how do you say it,
secure sitting position.
Because if you’re sitting with a neutral pelvic and you don’t have any muscles, you will fall
and then you….. so you try, try to correct anything

And do you need a specific posture to be able to drive the wheelchair?
yeah, the more up right you are with the neutral position, uhm it will be easier, if you have the
balance but you need to find exactly where I am.

So the core muscles are important, in that?
huh?
Your core muscles are… belly muscles….
yeah, yeah it could be, it, it’s easier of course it’s much easier to adjust if you have muscles
all over the upper body and in your legs, then it’s easier to get the up straight sitting position,
but if you’re paralyzed it’s much harder or even harder if you have some kind of….. the pelvic
is fixed, you can’t move it or you have scoliosis and things like that, it’s much harder.

yeah, okay
(Asks other interviewers: anything - No)
But that is just basic, there are more things, but basic things

yeah
But maybe you can name one of those ‘more’ things.
Because the basic things, we get them, but uhm what is something special to adjust or
….
yeah it, I think it’s important that you have the support all the way, because if like I told you, if
you have a backrest that’s, everything is straight and you go back with your back you get the,
it doesn’t follow your body, so if you have, you can slide it back or open up and slide back so
you can lean, so you have pressure all the way.
So, so, it’s hard to explain, but I hope you understand what I mean, when I open up and you
slide it back

So you feel supported?
yeah you feel, not only if it’s stiff it you have some small parts that’s connected to your
backrest.

yeah, and then the ergonomic.
Ergonomics is uhm important thing is eeh that the working angle, that is connected to the, not
the posture, but the working angle is how, what’s….. size of your hip eeh, so it has to be
rather narrow and then you can talk about the distance between the wheelchair and the
wheel and the …. 

So actually the space that is in between your arms….
yeah, the angle here, some of it’s just because of your hip and another thing is this distance
(shows the distance between his hip and the wheel on his own wheelchair) for example if you
look at your wheelchair you have a, a longer, if you put the end like this you see, here you
have a longer distance than I have here.
So you try, so you have to measure this and this, and, so one thing is the working angle and the other thing is eeh

And with working angle you mean....
this, the shoulders working angle, because if I work like this, it’s really hard and you can adjust it in, you can’t, okay your hips are really wide you can’t, but you can maybe get half an inch smaller and that will effect your ....

so your shoulder will be more relax?
yeah, easier, you’re stronger if you work in this position and you are weaker if you’re, you’re stronger the closer your arms and you don’t get the static work if you’re ....

yeah, so that’s the first one of ergonomics.
yeah, not the first, but it’s one of them. So eeh yeah. And uhm another thing, the ergonomics is eeh the driving fase. The fase how long distance you can push on the pushrim uhm then it depends on, if your sitting high in the wheelchair or if your sitting low.
If your sitting low you get a longer pushrange eeh so you can adjust it up and down the wheelchair eeh so if your sitting high up in the wheelchair it’s gear one and if you go down a little bit you come to gear 2, understand?

mhm

or, so that’s one thing you can change and another thing is that you change the size of the wheels.
So a big wheel give a higher gear 2 and a smaller wheel a gear 1. Just to not just one or two but you understand?
yeah

and you can also go into the pushrim, it could be changed, but normally you have a pushrim that’s in this position. Of course if you have a smaller, but it, it’s I never use it. You can have a pushrim like this…

that is really close
and a smaller one get gear 5 but it’s so hard to, to maneuver the wheelchair, so usually I work with, with a pushrim that’s just an inch smaller than. Or maybe just a size.

the base of the wheel..
okay. So, the pushrim it’s really important and it depends on how you’re going to use the wheelchair. Some of my patients they use them just indoors and you are maybe more comfortable with a short uhm driving fase. And if you just go out for long walk or you do a lot outside, you need longer so I use to measure it with this finger, the middle finger. So if I’m sitting in the driving position, upright, I, I, measure against the center of the hand. So for example, if I make note on myself now, so I’m sitting I think it’s plus 2, 2 cm, plus, see? This is the centre, you think it’s 2? 3?

No, maximum of 2.
3, maybe 2. And that’s not eeh, that’s good for me. This wheelchair you can say, plus 2 is good. But...

And when you’re close does it mean you have more range?
yeah, more plus the more drivefase, the more I go up, it’s minus, so eeh I you minus 10 and you are going to use the wheelchair outside, then you need to have maybe larger wheels or go down a little bit. But it’s not so nice to sit on the floor, so sometimes it’s more convenient with larger wheels.
So that’s really important to….., and also good to check if you check both sides. Sometimes you see it’s plus 2 here and minus 1 here. Then you have some asymmetric things in the posture. So you, you can’t say almost everybody comes into another but, I need to understand. So that’s the drive fase and then you have also the pushrim is really important because of your energy you go out in a wheelchair if it’s like this (doet iets voor) it’s no need if you have, you understand?
If I don’t get the grip, then it doesn’t matter if you’re …. So you need to, so that’s the thing that I, I put on this.

**So you try to give them a good grip?**
yeah, a good grip and a good slide. That’s a problem because you need tot slide and you need to grip and it depends where your use the wheelchair eeeh so, it’s hard to find a perfect thing or grip.

**Okay, so and the grip is most important for gaining speed during driving?**
pff, it’s a good question. I think it’s even it’s also maybe it’s important it can slide because if you go downhill you don’t push, you slide. So you need to have control of both of those. But of course you need to push it, you can’t go in a wheelchair just by sliding, so if I should choose between sliding and pushing I choose pushing. You need to be a good eeh have good wheelchair skills, you need to have a good sliding part also.

**And are there any more parts that you check for the ergonomics?**
Not the I think not. No I don’t think so. And now we have adjusted the wheelchair I think.

**(to other interviewers): any questions? – No.**
the wheelchairs, the ergonomics and the posture. So that’s one part.
yeah. And then we have the second part, which is training.
yeah

**And then you were talking about the basic skills.**
yeah, maybe we’ll start with the patterns.
**mhhmm, okay. So what do you see?**
You check three parts, I check three parts and it’s how you work with the hands and how you work with the arms and how you work with the trunk.
That’s three.

**yeah, can you specify more on the three concepts?**
yeah, you start with the arms. You thrive against an elliptic (…..)
That’s what you thrive against. So you, if you are, you have good patterns and good skills, you have that elliptic eeh arm….

**Yeah**
That’s, that’s what you strive against. So if if you’re, if you have good patterns and good skills you have that elliptic, eer.. or..

**Pattern, yeah.**
And of course if you are err atactic.. so on. It’s impossible to find it.. then you have to go away from the optimal one.

**Yeah**
And I think you can find things written about driving face. A Swedish guy from Karolinska, I think he made something about it 15 or 20 years ago.

**Uhu**
So I think it’s rather common about this.
Yeah. We actually learned that too at school, so. yeah
Yeah. Yeah.
And you only use that manoeuvre or are there a., other ways of.
Err, I think there are, okay I, I’ve seen literature about different kind of patterns but err, I think it’s err, you have one you strive against.. and everything, if you can’t reach it err you have different kind of— and I don’t know what to call them.

Uhu
And in many times if it, the push range is it’s not good. And in many cases it depends on the posture. And the ergonomics. So it’s no use to train it if you have a wrong posture, or wrong ergonomics, because you will never find it. Because it’s, the sitting position.. position is wrong, and the errr the ergonomics; the pos position of the wheels.

Uhu
The push rims are wrong so you can’t find it.
Yeah, and and if someone is not able to make the full elliptic..

Uhu
What kind of patterns do you use?
I don’t know I I use err I don’t know.. I think there are names on them but err that’s that’s when you err you try to use err, you don’t have the book here?

Err, I think we left it upstairs, no.
Yeah. Maybe it’s easier, do you have, err if you go back here from what, the same position whe when you go like this. [moves his hands towards the front of the push rims]

Uhu
But you you just slide back.
Okay
Everything is the same, but you don’t err, you can feel the push rim all the time.

So you don’t swing you arm.
No I don’t swing my arm, I I err, in the end of the push face I I stop here and then I slide back to the position and the longer distance you can use the better, so it won’t be a lot small
Yeah.
Okay
And why err do you thing that’s a less effective method? Because you err instructed everyone to do the first method you just told us about..
Yeah I I always try from that, but it’s err really hard for some people. Especially if you have used another kind of technique for for many years, but it it’s not a big big big deal if err but you loose some percent of efficiency if you, if you slide back on the push rim. But it’s so, it’s rather okay if you can do it rather well and you have many kind of different err err I can show you later on, remember me I have to.

Yeah!
Okay but err, that’s a little bit about the..

So the most optimal way is the elliptic, in which you swing the..
Yeah okay yeah, that’s a way
If we can call it like that
Yeah, I think the other name I I think they call.. I I, we can see.. I think it’s elliptic err
Yeah.
So that’s what you strive against but it’s many patients that not no they can’t err.. it’s hard for them to find it. Because of the shoulders or something. So, but it’s really important you know what you strive against, otherwise you can’t work with err cause this is what you strive against.

**Do you always start with, with the optimal and then see how you can adjust it?**

Yeah.. Not always. If I see they are atactic and err they have large problems than I never really try to find it. And it also depends on how motivated the ther persons are. If.. some patient are really really really motivated err, I’m really glad if I can get them motivated and then they just go back and forth and [inaudible] so back and forth and really they say: I want to learn it. But it’s err, usually they are so eager to learn new things and it’s so so err it’s motivating.

**Alright.. and then there were two other basic skills?**

Yeah it’s the handgrip that you find and and if you have err if you hand is err okay… there is only one grip that you use when you push and when you slide. It’s rather easy. So it’s very very important.. the grip of the hand. And and err it’s err it’s easier to work with persons without hands, than to work with people with hands where you don’t have full control over the fingers.

**Uhu**

So err I have had many people in..it’d not many, but some people in wheelchairschool without hands and they have really really good skills because they can use what’s left of the arm and push it. But the big big problem is, if you have fingers that don’t do hat you want to do. So err..

**And do you use different grips for the, for the people that have fingers that maybe are not optimal.**

No it’s some err.. no it err than you just need to err do not grip, because if they grip when they come here they can’t, the the hand is still on the push ring so so that’s the worst thing if if you push and when you come here.. the hand is.. you try to catch speed and then the hand is and then you will break.. it it will stop.

**Yeah**

So err, so sometimes you just tape.. you try to.. or special gloves. So it’s better to be like this

**Only the thumbs**

And and then to be like this

**Uhu**

So the grip is is really important

**Yeah. And the optimal grip you were talking about. You push you fingertips on the..**

Just under and then you slide so err this tabs… what people is afraid of is to to catch these into you see if you can go like this.

**Yeah**

So it’s easy to push the wheelchair like this, but you can’t slide.

**Yeah, cause you will get stuck on them.**

So you need to find this and I think that’s even much much more important than how the arm goes.

**Yeah**

Because if you’re afraid all the time it’s it’s err not so good.

**Yeah. Okay. And the third part?**
Trunk or the upper part. Is is very very important. Because err especially if you have a wheelchair that’s well balanced with a.. err.. not so much load on the front wheels.. err then you have to adjust the center of gravity all the time and that you do with you upper body from your head down to your hip.

Yeah
And err then it’s important that that maybe two things you can talk about it it’s err the balance .. how err l.. if you are going to use your body and you can use it the way you want.. but if you are paralyzed it it’s a balance balance thing. But it’s really really important if you have a.. you can err go that you can lean forward while you are.. and so.. so it’s maybe it’s three things that make err when you talk about ho how the trunk works that makes it err hard to adjust the wheelchair correctly. And that is when you can’t use your trunk.

Uhu
And it’s if you have a big airbag, when you, you’re fat

Uhu
Then you can not [bends forward] and then you can’t have the wheelchair light in front and then it’s if you are paralyzed it’s really hard to to really, to work with it and when you are sitting in a rotated pelvic but then the upper body doesn’t come forward. And then you have also if you have err tensed hamstrings, if you’re stiff with your muscles you can’t go forward.

Yeah, you can’t lean.
Actually if your feet are here. So if you have for for example a a [quart(??)] tetraplegic.. it could be hard to make the wheelchair perfect. And it’s hard if you can’t if you can’t use your upper body it it’s hard to adjust the rolling and turning resistance with the balance perfect.
You understand?

Can someone with a, with that high err paraplegia.. sit in, in an active wheelchair like this?
Yeah if course, they can. But err, usually they can’t.. it depends.. because if if you talk about the trunk I see it that you have two, two two two err what do you say? You can lean from your hip here. A big err a big err moment forward and then you have a small one from the thoracal part. You see here? [moves shoulders forward]

Uhu
This is a small one and that’s is a big one [moves complete upper body forward from the hip]

Yeah
Many many [quods(??)] what I lift here as is sit here with a rotated pelvic they, they they will get a big movement from here [points towards shoulders] you see? And then they can have.. it doesn’t feel good and then it, I don’t think it’s so good but you can see people it look likes they have cut of the back..

Yeah
you understand?

Yeah
Yeah and and err then err so the trunk is important and you can look up on the [ab??] too too err err [talks in Swedish and flexes his elbows] This is it?

Joints?
Joint! Yeah! One joint here and one joint here. So the small adjustments here and the big adjustments here.

Okay. And what do you do if someone can’t make this move?
Oh, it depends why. If he’s fat I send him to a dietist. 

*[laughs] Go fitness!*

and if he’s err stiff in the hamstrings err sometime they can take err medication err or they can go to the fysio and and do stretching

**okay**

and I can put err the footrest if I put the feet here *[pretends like he fixed footrests on the side of the wheels, which enables the legs to rest backwards on both sides of the wheels]* they can lean forward

**okay.. can you.. do you have wheelchairs with the err foot on the side?**

Yeah I I have a play.. I have a err footrest with legs I can put on the.. err yeah it’s rather common if you look on multiple sclerosis and and neurological diseases. I think maybe, it’s hard to say numbers but maybe two out of five, has problems to lean forward.

**Okay.**

Yeah. I can show you..

**And is it err will they have their legs on the side all day long? Or is it ..**

No no no then they will be even stiffer. But when they when they are going to manoeuvre the wheelchair, they need to to have their feet under the seat.

**Okay. Well, interesting! That’s nice!**

good

**Oh no. it stopped recording!**

This will always be my book

**do you have it? Okay. good. let’s see. Okay, I think it’s continuing. Err alright. Great.**

**Err so.. is there, are that all the parts that are important when you look at handgrip patterns?**

Is it, err excuse me ?

**Err, we were looking at the, the principle of patterns…**

Yeah

**With your hands. Is is it, is this all the important stuff about that?**

Yeah, I think it’s the hands the arms and the trunk. That’s the major thing.

**Yeah**

To to have.

**Yeah. Okay. Good. And then we were err there was the principle of the basic skills, that you talked about.**

Yea yeah basic skill is to manoeuvre the wheelchair forward, backwards, turning, rotating, uphill and downhill.

**Uhu**

Yeah I think all that

**And is there some kind of err levelling in that? Like: first you need to be able to move forward and backward.**

No err pff of course it’s more important to move forward but it’s err especially if you have the wheelchair nerve.. if you have a nervous wheelchair.. it’s tipping. Ad then when you go backwards you fall backwards. So you need to to to train on those basic skills. Err yeah.

**Yeah, and and what what kind of things are you focusing on when training basic skills?**
Good questions! Errr.. focusing on… Of course the patterns. This is one thing. Everything is is combined so it’s hard to just say.. er.. it depends. Sometimes I.. err.. I don’t think I can.. it it depends. Err. Those things are so basic. You need to of course err you have different.. if you go backwards it’s important that you don’t push all the way behind the sitting bar; small. And then when you stop to slide on them before you can grip it and you will go backwards. That’s one thing I look when you go backwards. When you go forward off course you go back to the patterns. Ho how do your arms work and and how’s your grip and the trunk and ands.. so you look on the patterns a a all the time. And err same when you ro.. whe when you do corners or you make turns it’s about the grip and the position of the trunk and so it’s hard to say it’s one thing that you look upon. You have to look on many things.

Yeah. Alright. Yeah I think.. that’s pretty clear right? Uhu alright. But it’s just thos basic skill, cause you can’t leave them and take them later on. That’s what you have to start with.

Yeah. And yesterday you were talking about the energy consumption as well.

Yeah. Like how do you, err, how do you make sure that you’re not using too much energy on getting your wheelchair accelerated, like on speed. Err.. is that, do you see this as one of the basic skills as well? Using your energy in a good way?

with the energy? Yeah but the energy comes in in if you have a, if you have a good.. if if everything is adjusted and and you learn how to use the wheelchair, you you will use, err, low energy. So it’s not.. It comes in with everything. But it’s err sometimes it’s just a habit that they push push push and and you don’t, err, understand what you are doing so it’s just, it’s err, yeah…

So if the basic skills are allright you’re automatically using the lowest amount of energy you can use?

Yeah but it’s err, it’s hard to say just. It’s the basic skills but err everybody err everything combines to to err.. but I think, if you can push the wheelchairs with so little load on the front coasters all the time then then , that will cost less energy. (38:43) so that’s err..

Okay alright. Yeah.

Yeah, clear.

Alright, that’s clear. Then we can go to the next part which is the back wheel balance.

Yeah. Back wheel balancing is really really important, and you can, err, err, you know different kind. The way I see different kind of steps, how to to improve and it’s much easier to to learn back wheel balancing if you have a good posture and the wheelchair is well balanced. (39:23) then it’s easier to to learn.

Yeah

And eeh the antitip is really really really important, training eeh you can put them in different kind of training position so uhhhh you need to have good antitippers just for start the training otherwise somebody has to protect you and that’s uhh hard. Soo but ehhh its uhh important just to start up to flip it up then to find the balance and if you can balance 3 seconds and everything is oke thennnn then it’s to motivate the patients to continue because the problem is if you can’t find the balance for 2 or 3 seconds then it's hard, but can you balance 3 seconds then you can balance 5 seconds and then you can balance 10 and then it's just to to continue. But uhh the more, if you’re a unit, you and the wheelchair then everything will be easier and the backwheel balance is an important thing.
So you think the backwheel balance helps you getting 1 with the wheelchair. Yeah I think it’s a major thing to to be a good unit. Yeah oke, cause yesterday you started actually with the uhhh the backwheel balance. Yeah, even before you did any of the basic training.
Yeah but that was no, uhh yeah, because every… all of the patients you met I have been adjusting the balance so the wheelchair doesn’t work the way they were used to. So uhhh they need to feel everything before they start the training. And uhh I also want to know which… them to understand how important it’s. So I think it’s good to start with, especially when you have an adjusted the wheelchair.
Yeah.
And then I get a little point of their skills and so on.
So it also gives you a view on their skills.
Mmmm yeah.
Alright, that’s nice. And do you always start a training with backwheel balancing?
Yeah.
Or is this just the first time?
Yeah I think I, yeah, yeah I do, because I don’t think I… haven’t met a patient that’s from the top level on backwheel balancing so it’s uhh, you saw like yesterday the guy in the afternoon he was rather good but he… he has come a good way for, but not to be a.
Not from the top level?
Yeah, so you can just to uhh… and that’s… it’s good if I have a group that can start and they train with that and then I can… and then another one can be on a higher level and another on an even higher level and then everything together.
Yeah oke
so uhh so uhmm first you have the backwheel balancing hmmhm in uhhh then driving I drive all the time and then when, when you can do it… See I sit in driving position all the time. And then, then when you have reached the top skills then you go to the sliding thing, like you do like this. *shows it* hmmhm
It’s to slide, sliding position is the thing you do when you go down it’s like that.
So there’s a couple of levels?
Yeah, I think it’s that, thers a couple of levels and uhh it’s the driving and the sliding part.
So if you’re really good at it you will slide your hoops while being in backwheel balancing?
Yeah I can slide and do different things and it will help me to get to obstacles and it will help me all the time. And if you talk to backwheel balance you also have those, I think they call it a partial wheelie you do it like, you just lift like, like this *shows it* you see,
hmmhm
this is what they call a partial wheelie. You see, like this you only have control over the lifting thing and then I see that’s a part of the backwheel balancing. So it’s yeah, yeah I hope you understand. Yeah.
So its uhh the (....) backwheel balancing, backwheelbalancing while driving, backwheel balancing while sliding.
Yeah and when do you decide to put the anti tippers up more high? What makes you do that? Uhmmm I ask them if they feel secure and uhmm and so on, and then I can put it
up a little a bit. **Oke, cause it also makes it harder to uhh make a wheelie, make the backwheel balance when the anti tippers are more low, right?**
Yeah, it's harder. It's easier if the anti tippers are high, but it's more scary when they fall backwards. So you need to find … for each person how it works. Because some people are so satisfied, so you can put it in a good training position and then it will be hard to… so you will have to… sometimes it takes 1 or 2 or 3 or 4 times, before they dare to put up. Sometimes they need more security and I stay behind them and I put my hand on their shoulder so they feel secure. And I try to find different kind of … say… how to make them secure and uhhmm to continue. So that’s also interesting how to, how to work with it, with the people with the people that have big difficulties.

**Anyone else have some questions?**
Yeah, can we conclude from this that the antitippers will only be moved upwards or moved away when you have discussed it with the participant? Or is it only that you see that they feel secure so you move them away?
Uhhhh I don’t think I understood the question.
Yeah , no problem. **Is the decision of moving the anti tippers away No not away is it your decision – or upwards.**
Up and down. Yes we are talking up and down first.

**Yeah. Is it a combined decision, so do you decide together with the participant that they will be moved up.**
Yeah I say I will move them, but sometimes I’m in charge. Because many people, I won’t do it. But I put my hand on their shoulder and say ‘I think you can do it’ and then I put it down. And then I try to flip them backwards on the anti tippers and back again, so they feel secure.

**Yeah.**
I can never do… what do you say… uhhmm…

**you can not force them.**
Yeah I can’t uhhmm… but we need to do it together, sometimes by words and sometimes I just see. I think it works well, but sometimes and I can see, especially if they are leaning forward a lot, then the antitippers will dip in earlier. But it's uhhmm in some case it’s one way and in another case it’s another way. It's a lot of, if they get terrified or scared then you can’t do anything. So it's uhm, you have to be smooth and uh. But sometimes they can just go in… it's hard to explain.

**It’s what you said yesterday I think. Living on the edge, to make the best improvement.**
Yeah you need to be. Because it’s very often not that uhm not that I… I don't think I ever met a man that said I can do this and then I couldn’t balance before, but not today. But many women say I could do a wheelie before but I can not do it today. But I met men also that has they haven’t, they have not improved but what’s what’s the difference, the opposite uhhmm.
They have done like this, and after a while it gets this, there skills get in the wrong way. So you need to be on the edge to, to be. Because if you take away the anti tippers and you are not secure, you will do this range of what you can do *shows it* on the backwheel balancing, but after a month maybe it's like this *shows it*. Because you need to be on the edge and fall on the anti tippers in the beginning. So the brain… It’s all about teaching the brain positions. So uhhh I don’t know if it was an answer to the question.

**Yeah, it was.**
So you need to be on the edge when you're learning and you have anti tippers.
I think that's enough. And then there is the last part of the training which was obstacles?

Obstacles yeah, I try to, the way I work today, I try to wait with curbs and things and work with those basic skills as far as I can. And usually they are really eager to start with uhmm... but uhmm if you have all those things we have talked about, rather good, then we can start with obstacles and uh. And then you have uhmm... then it’s important the backwheel skills and how you move even more how you move your trunk and how much you push. Like you saw on the, on the ladder. Yeah. How we used the force and the biomechanical things, comes when you work against curbs. And uhmm curbs and thresholds and stairs and all of those kind of uh things you need to force.

So uhmm... Do I hear you say that obstacles is actually the last thing you are starting to train? Yeah. Yeah, so cause I think I heard you say yesterday that there is too much focus on obstacles

Yeah, because that's what all that people see, obstacles all the time. But if you working as a physio you don’t start to walking stairs before you can walk on, on a flat surface. So I think you need to be in control of the wheelchair when you start with the obstacles. And uhmm yeah, and I think that many people think that obstacles is the main thing that you need to learn. Of course you need to learn it but if I look on one day that I'm using the wheelchair, on an ordinary day I don’t get over 1 obstacle almost. But I push all the time uphill, downhill and so on. So obstacles oke it’s really important to fix high curb and so on, in case of. But today I haven’t forced. Oke when I showed you maybe, but otherwise I don’t force any curbs during an ordinary day. But I can be on the wheelchair for maybe 10k, long distance. So it’s, the basic thing is how to move the wheelchair of course it’s important. Important with curbs and things like that, but to get good skills on the other parts, then you can start with curbs.

clear story.

alright. And then there is the last part.

Yeah the last part, I think the last thing is the uh. Teaching the patients, or to get the patients to understand about the wheelchair and everything around it. It's patient education. So that’s really important so they, the perfect thing is when you get the patients so interested in the wheelchair so they will develop. That's... then I have done a really good job. But they need to know how to work with, how to to uhmm keep the wheelchair oke. To clean it and to see that the function is oke is really really important. How you put uhh how you put uhh air in the tires. Can they do that by themselves? Where are they going to fix it? Who is going to fix it? How high pressure will they have? So that's something we have to teach them, because I meet many people that say 'ohhh do I need to put air in the tires' nobody has told them. So that's important about the knowledge of this. And uhmm what kind of (54:40 ???). And if I have a bag, where do I put my things. How will I fix with that. And usually we do some education with uhmm with electrical support for the wheelchair and some small things. Electric things you can put on the wheelchair and is also good to know about power chairs and scooters and things like that. Many of the people have uhhh degenerative, they get like Multiple Sclerosis, they don’t need a scooter today, but maybe they will need a scooter later on. Yeah.

So I try to.. so it’s all about wheelchairs and everything around it. And it’s also important on the first lessons that start with, it’s good if they know a bit about the ergonomics and the posture and the rolling and turning resistance. Otherwise they can go to a professional that
doesn’t know anything at all. So it’s good that if, hopefully the professional knows a lot, but sometimes they don’t and then it’s good if the patients know what they need.

**Yeah. And do you explain a lot as well during the training.**
Yeah, we have once a week those theoretical lessons. But then it’s... when I talk to them and sometimes a person is more into, interested and want more. And some people aren’t so interested and it’s more use to talk about more common things. So it’s more individual things.  
**So the most of this last thing, happens during the first theoretical explanations with the powerpoints and when you are talking to them?**  
I don’t understand.

**It’s like, so this, how do you say that. So this patient education, this is mostly done during the first powerpoints theoretical parts.**
It’s once a week, every week. Not always I have powerpoints, but we have a program every week to.. about the things that I talked about. But then it’s during the training that people ask me and uhm and then it’s really hard because it’s a big range of interest. And some people are really really interested and some are not interested at all. So uhm... so it’s a lot of one person information. But that person doesn’t get it, because others don’t want it. So it’s not so nice to have a lecture and 1 is interested and the others aren’t.

**Well I think that’s very clear.**
Yeah.

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**Interview Åke Norsten – Part 2 – 14-03-2017**

**So, we had a couple of questions left.**
yeah

**uhm, we like to know some things about the setting, so we can write in in our introduction. To have a more clear view on what is this rehab station, how does it work together with you. And we also had some general questions and some more specific on what we saw during the observations. Uhm, so we wanted to start with the setting actually.**
yeah

**uhm, more about rehab station, so can you maybe tell us which disciplines work at rehab station specifically?**
yeah, if you talk about the physical training it’s eeh OT’s, PT’s and rehab instructors. And rehab instructors is maybe the thing that differ us from other rehab stations and eeh then we have doctors, eeeh social workers, psychologist, eeeh ..... and we have nurses, so nurses and undernurses. And eeh eh we have those people who work with eh the paperwork eeh documentation and uhm the economical part and I don’t know exactly what, what they do.

**more administration, financial**
yeah, yeah, yeah, administration and we also have people that work with uhm research and stuff like that.

**Alright, and uhm for instance, doctors uhm is there one doctor in the whole centre or are there more doctors**
I think there are seven, I'm not quiet sure, I think there are seven.

**So there are a lot. And are they all specific for?**
Not all of them, but some are neurologists
mhmm okay, great. And then you, you told us about the eeeh target groups that you have in rehab station, for instance spinal cord injury was one of them I think.

yeah, we have different kind of teams

mhmm yeah, what teams do you have?
yeah so all of the spinal cord injuries will come first to Karolinska and after a period of time, I think not everybody but almost everybody is coming to us and then we have eeh, uhmm and they will stay here for a couple of weeks, maybe a month. And some are kind of injury and so after that they go to Spinalis and eh for day training.

yeah

and eh they eeh then the patient will have uhm, their doctors here and their fysio, so they, if they, when they go home if they have any problems with anything, they call Spinalis. So, they can get in contact with the doctor, or OT or, and so it’s eeh the spinal part is rather big part of it but we have other team, teams also, so uhm we’ll work with multiple sclerosis and uhm all different kind of neurological diseases.

Okay

Brain damage is also

yeah, alright uhm and in which way is the wheelchair school part of the rehabilitation program?
it’s a small program and sometimes if, if, if persons in, in other teams see the need of wheelchair training, they can, can later on come to the wheelchair school. Uhm otherwise the, the wheelchair school gets a separate part, but sometimes I go work a little bit in the other teams but eeh most, I, the wheelchair school…..

So, it’s not that ehm when you for instance are in the spinal cord injury team, uhm that you also automatically get wheelchair training.
No, no yeah they get wheelchair training of course, but not in, in wheelchair school.

Okay

Later on, they have eeh the rehab instructors and eeh fysio’s work with adjustment and eeh and wheelchair

Alright so someone else does that, within the other teams?
yeah the work with it, but not as much as I do and not as specific in same way.
But they work with it.

Okay, alright uhm and we were also interested what do you think about the rooms you give the training.
the rooms?

mhmm, you have three rooms.
yeah, I think, it’s I, I, it’s rather good for what I’m doing in the wheelchair school.
A quarter of the sportshal and eh the down hill and up hill area and the sitting clinic uhm. So I think it’s, it’s, it’s really good.

Okay, And do you, cause we were wondering eeh there’s a lot of things happening in de sportshal because you have all the people being there at the same time. Is that a problem for you, or is it something you just..?

uhmm, usually it’sn’t a problem, but I could be, some of the patients are really, they have problems with noises and things like that but then we can arrange we can be in the clinic. So uhm it’s a, it works.

It’s not a problem
maybe, if we only had the sportshal it could be a problem, but some of the patients because
of the noise and....

for interest how it will be in the new building, will you have three rooms as well, or ....
no, it’s not, I will uh larger, the sitting clinic will be much larger and um I, I, hope it will, so
mainly we will be in the clinic, but I think there will be other areas that we can use hopefully,
but ehh we’re moving July and I think it will be... as good as it’s today.

yeah, okay, great, so that is everything we want to know about the setting actually.
And then we had some general questions, for instance: what was your reason for
setting up the wheelchair school? Why did you start the wheelchair school?
Well, it’s eeh, it’s eeeh, if you work with rehab it’s a lot of focus on, on, on the walking ability,
and the wheelchair is my legs and it’s, it’s, you can say it’s as important if you are in a
wheelchair, it’s so important to, to take part of the society and everything so it’s so important
and I know it for myself it’s been good thing that my skills are, have been, are rather high and
it can help me a lot and I thought it was eeeh good to work with it for all ages and different
kind of diagnosis, so that’s.....

so maybe you missed it during your own uhmm rehabilitation program or?
I think I was rather young and, and maybe it’s a little bit easier to, to learn skills when you
are younger, many of the patients that come to the wheelchair school are elderly, so uhmm it’s
a little bit harder to, to learn new skills and new patterns and things like that, so it’s really
needed.

hmm, and what do you think, because the main difference between you giving the
wheelchair training and for instance the rehab instructors eeh at the spinal cord injury
unit.
I have much, much more time and uhmm the program needs much time. Uhm when you come
in for rehab it’s lot of other things that you need to work with. So they don’t have as much
time as I have. So that is a major thing.

Yeah, they don’t fully focus on wheelchair...

yeah they focus on it, but they focus on other things. I just focus on the wheelchair and the
wheelchair skills, so, so that’s the difference.

okay, and do you think it has an influence that you are in a wheelchair yourself as
well?
I think it’s easier for me to understand the importance of it and it’s eeeeh, I think I, I
try wheelchairs all the time, different adjustments and so on, so I can eeeeh use what I learn
for myself or my patients. So maybe it’s eeh

yeah, and do you also think that people like take your advice more seriously or?

Because of the wheelchair or?

because you are, yeah you’re an expert.

I, I, I think it’s an advantage if I compare it to a person that’s not using the wheelchair. I think
advantage they believe in me, hopefully

Cause we were thinking like, if we’re gonna do this kind of training then we, we don’t
have the experience like because we’re in it every day. So maybe that’s ...

Yeah, I think you can, think you can do almost good a job as I’m doing uhmm I couldn’t say
otherwise because I worked as a PE teacher for 9 years and I couldn’t show eeh the high
jump or the long jump or things so I needed to, to try to find other ways to teach the ablebody
students I think, think okay, it's an advantage but I think eh a walking OT or PT could do almost the same job.

Alright, that's good to hear! We're also wondering what do you base your exercises on?
Real life it's everything we do in the wheelchair school is eeh, you can take it with you at home and work and outside environment and things like that …
So is it from your own experience that you thought oww these are the kind of obstacles that are really hard for me or?
yeah, it's from my own experience and the experience from the patients I work with.
So they also come with questions like…
yeah because I, I have a good injury to be in a wheelchair and, and many of the patients have more difficulties then I have. So some of the things I learned directly from the patients, because it's eeh, it's a bit aside from how I can work in my wheelchair.
And can you maybe give an example of that?
For example if you work with stroke and they, they use one arm and one leg, to, to, that's nothing that I can do.
Yeah, and then how do you teach them? Do you just explain it or?
try to explain it and, and uhm sometimes you have a person with uhm (the staff) can help me to show, but it’s not to big a problem I think, I think, we'll find a way to work with it.
yeah, and did you learn about all the different uhmm uhmm, how do you say that, uhmm ‘ziektebeelden’?
Diagnosis
Diagnosis, did you learn about all the different diagnosis during your work…
yeah
In the wheelchair school or?
I think. In the beginning, the 80’s, the mind, I worked mostly with spinal cord injury and amputees and uhm, but it’s almost the same thing, if you’re work with your arms if you have multiple sclerosis or muscle dystrophy, it’s rather similar, it’s not exactly the same thing but it’s rather similar to, to, so you have to do small adjustments but mainly it’s, it’s, it’s not exactly the same thing but almost.
Uhm, we were also wondering why you have your focus on this type of wheelchair, cause you have a lot of different types of wheelchairs, but you only focus on the most active eeeeh
It’s uhmmmm In, in, you know you have those Eerrrr errr, you know you have those hjelpmiddelcentral? Err and we and they have err.. if you work with active wheelchairs. And I I work mostly whith active whee, wheelchairs, and if you want to prescribe an wheelchair err they have some, you have to start with err, you have to work with mostly with the things that they have bought, err, so it’s the most common active wheelchairs we are working with.
Uhu
Yeah, so, err, so that’s the way we have to do, because if I want to work with other wheelchairs it's, err, it's rather complicated. and and err.. yeaah i can't do that but it, it's a good wheelchair and we have lot of of spare parts and we can adjust it the way it's so, err, as far as I know the whee.. it's so much focus on the wheelchair, but I think it should be more focus on the, more focus on how you adjust it and how you learn the skills. Because many people think it's all about the wheelchair. Okay it's nice to have a good wheelchair, but you
can have a good wheelchair that is adjusted wrongly and then it’s a bad wheelchair. So I’m satisfied with the wheelchairs we work with and all the try out wheelchairs we have and so on.

**Uhu. But for instance is it a specific choice that you don’t use the wheelchairs with the high backs a lot?**

Sometimes I need. I need to work with the high backs. It depends on on the disability.

**Okay**

Errr, the patients you saw on this group, I don’t think anybody needed high backrests.. err, but sometimes, if you’re paralyzed from the chest and down, of course you need a high backrest, otherwise you can’t, you can’t use the wheelchair.

**Yeah okay, and err, what is the.. what is the value of having a low backrest compared to a high backrest?**

It all depends on on, some of the people, many of the people that I work with walk indoors and then they use the wheelchair for outdoor activities. And it’s easier with the low, it’s easier if you have muscle in your trunk it’s easier to adjust, err, lower back rest and.. not easier but it’s, err, its, err.. If you have a, If you manage to to use the lower backrest it’s easier to change the center of gravity for example if you go downhill you can lean backwards. You get more comfortable.

**you have more space**

but of course, yeah, but but if you are paralyzed you need to to get support with a higher backrest. And I think some of the patients had, okay maybe it’s rather low, err, backrests this specific time but, err, sometimes we need higher backrests.

**Uhu. And is it a specific choice as well that you don’t use, for instance, electrical wheelchairs? Cause they need to learn skills as well..**

Yeah I, err, I have had persons in electrical wheelchairs a long time ago, but, err, I think there are many OT’s here in Stockholm that are specialized on on electrical wheelchairs, so err, I don’t work with it here. But err, on the theoretical parts we discuss electrical wheelchairs and scooters and smart drive and firefly and all those obstacles that you can, the the, electrical obstacles, err electrical parts you can put on the wheelchair to to help with the driving. So we discuss it and show it and, but we don’t train it.

**Okay, alright. Err okay. And we were also wondering: what are the inclusion criteria for entering the wheelchair school? You just told about you mainly focus on the active wheelchairs, err, but are there any other inclusion criteria?**

Err, I don’t tink so. I think, err, if I get the referral from from the doctor and it will, it’s okay, they come to the wheelchair school for a first introduction and checkup and, err, I think it’s okay. For for, see I don’t think there are anything that says you can’t come to the wheelchair school. Err, okay, it’s hard if the cognition is really really bad but I don’t think.. everybody can join if they are in a wheelchair and if the referral’s okay. So it’s..

**And if you say: if the cognition is very bad it’s more hard to teach them..**

Yeah of course, err, that’s err…

**But it’s not a reason for you to exclude people?**

No it’s, it could could be but I don’t think there has been anybody that’s been excluded. Of course it’s much harder to work with people with cognition disorders, err, because they don’t always do it the way I want them to do, but err, I remember some with difficulties and they didn’t know that everything was much better, but I saw the wheelchair was rolling easier, but
some, sometimes… but it’s not so often that there are people with, err, big cognition problems. It’s err, not so often but sometimes, err, I think it’s err, I think they can be helped also in some way, so.

And are there maybe any things that make you exclude people? A.. I think you told about pressure ulcers.

Yeah that that will be, that will be excluded. Because, err, with the first meeting we always ask about the pressure ulcers and if they say that they have anything I will send them to Madeleine [wound expert] for a checkup and then, and there we have people that have been excluded, yeah.

Okay and are there maybe other thing that that you, that people tell you during the intake and..

I have, err, not excluded but sometimes we have started the wheelchair school and after three our four times we see this doesn’t work out. For example, err, I have people with a diagnose of EDS. You know it?

No, I don’t know it.

Yeah I know it. It’s Ehlers Danlos Syndrome. Hypermobility.

Aahh hypermobility, okay.

And then combined with other, not just hypermobility.

And the shoulders luxate. So yeah, and then we have to stop because it’s not a good thing.

Uhu

It’s really hard for some of the people. It’s not a good thing to walk and it’s not a good thing to use the wheelchair. And then we have to stop it. So so but you can’t stop it before you really know, you can have the suspicion: this won’t work out but err then we have to stop it after a couple of times.

Yeah okay. Very clear. And what kind of topics are you discussing during the intake?

It’s a bit of, we have a, it’s a…

You have a list?

Hmm?

You have a list?

Yeah we, we, that we work out, it’s about their body. How the diagnose affects them, their body. And the how they life and how their home situation, work situation err, so we have to do a good screening… about that and how they are using the wheelchair today. How many wheelchairs they have and it’s a lot background things we need to to check before we start so we know that we are doing the right thing.

Okay. And for instance work situation or house situation.. what do you do with that information? What do you use it for?

Yeah for example if the apartment is accessible for the wheelchair. Cause some people have walking abilities and err how it, how they, the working situation if they are using the wheelchair at work or sometimes err people use power wheelchairs or they walk at work and they use the wheelchair sometimes and er… yeah. So I can get a picture of on how everything is working out for the patient

And do you also do physical examination on the body?

Yeah, Emilie does, the fysio.

Okay, and what does she check. Do you know that?

Yeah. She.. it’s a lot about the pelvic and the joints and the muscles.
Okay. And do you also maybe measure the height and the the width of people?
I ask them, I ask them about the weight and how tall they are and if the weight is stable. So it’s, cause if you prescribe a wheelchair and they will gain or loose weight we will, with the wheelchair will be… it won’t be okay but but err we just ask them. And some of the wheelchair is is you need to be under a hundrd kilo’s. so you need to know it.

So you will give the the right wheelchair for, err,
Yeah cause of them, if you’re 120, you can’t have a wheelchair that says you can only be hundred kilo’s.

Yeah of course. Yeah, okay. Alright. Err, and so you told about, you do with the fysio together. Do you the whole, do you do the whole intake together with the fysiotherapist?
Yeah

Okay. And how long does an intake normally take?
Usually we meet two persons at the same time, first start fifteen minutes, around fifteen minutes, all the background things.

Fifteen, of fifty?
Fifteen.

Okay yeah.
But maybe twenty minutes.

Hm.
And, and then we switch and I will meet one patient for maybe an hour and Emilie will meet the patient also, so err yeah.

And you aks the same kind of things during that hour?
Err together. We do it together, the first things, all the background things. And then Emilie checks out on the bench… if they are stiff, if the muscles.. and all that kind are stiff. These things. And I check more about how they are sitting in the wheelchair, and which skills and patterns and things like that. And then we make a plan.

And do you do that together with the patients? Or..
Err, pff.. the plan is yeah a little bit with the patients but, but I think maybe I’m in charge or what do you say, I I… usually they really don’t know what to do and they can’t see what that could be make with the wheelchair and what you can, okay some has a like one girl in this group she wanted to learn how to, a good technique to take the wheelchair into the car. So so that’s err..

So they also have personal goals when they come, sometimes.
Yeah yeah of course, but mainly it’s, about the adjustment of the wheelchair is.. okay it’s together with the patient but err.. yeah.

Yeah, okay. Alright. Err, and then we were at the introduction lesson and the you let people tell about their diagnosis. Why do you do that?
Yeah err I said If you want you can tell the reason why you are using the wheelchair. So err if they don’t want to it’s no problem at all. But usually it, people want to tell why they are in a wheelchair but if they don’t want then it it’s okay.

No, okay. Cause we thought maybe it’s a thing about group bonding or..
No.. it’s, but I can’t force them to to do things. Err. But it’s a .. we will work together for three and a half weeks and it’s a little bit strange. If if err.. they will, for example this group in the morning, it’s five persons, they will take their coffee together and they will discuss when it’s
breaks and and... in many times it’s, it’s hard, you sometimes have people with the same diagnosis and, err, some of them have never met a person with the same diagnosis and then it’s a lot of talking so, so, err. It’s important, err... the group thing.

**Yeah. And are you stimulating that in any way?**

How do you mean?

**The the group bonding. To make it. Yeah. To make them talk to each other and make them really one group. Are you stimulating that in any way?**

I don’t know how, stimulate, uhhmm… hard question. I think it’s good, I can see if the group is a little bit larger it’s really good because you have that group dynamic thing. But it’s really hard when the group is big, it’s a lot with the wheelchairs and it’s uhh so it’s uhhh but in someway it’s... I think it’s uhhmm because when there is a bigger group people look on each other and get motivated to train and things like that. And sometimes when the groups are smaller and different in skills you miss a little bit of the group dynamic thing. I don’t know if that’s an answer to your question.

**We thought maybe you for instance make a choice to have a lot of fika.**

A lot of...?

**Fika, like coffeebreaks.**

Yeah, no it’s uhh I try to have my plan, but sometimes if some people get really exhausted and they have fatigue then maybe I will have more breaks and uhhmm.

**Because that’s a group bonding thing as well.**

Yeah, Yeah it’s. So, so, but I don’t think I notice that the group thing is really important. But it’s not the major thing in my work.

**Oke, alright. And uhhmm is it a substantiated choice that you have different levels in the same group? Cause it can sometimes...**

ah it’s when the referral comes in it’s uhh of course it should be wonderfull if I have 500 referrals and I can put the groups together the way I want to. But usually it’s uhh I have, for example to this, when we started up now it was 9 referrals and I, and they have, they can choose if they want go in the morning or in the afternoon. And I was thinking if I have lots of referrals I can put spinal cords together but it’s sometimes when I start up and I see the group and I think oh this should be, this won’t be so good and then it will be fantastic. And sometimes is the other way that I think this will be a perfect group and then it won’t be as good as I thought. So it’s really hard when you work with group dynamics. You really don’t know how people, how people will be when they stay together.

**Interact.**

Yeah so it’s uhh it’s about the grouping, it’s not so often that it’s the way that I thought it would be.

**So if you had the opportunity to place people together the way you think it will be best, would you do it? Or would you just keep it like this?**

Nahh I think I would try to do it. For example it would be interesting to have a group with for example 4 or 5 with MS that never used the wheelchair before. Could maybe that then they won’t see a person that has used it for a time. But if I have the opportunity I will try to, but I don’t know if I will succeed, if it will be better then it’s today. I don’t know. But umm of course especially when you work with hemiplegia it will be good to have a group that’s kicking, I think I will try to. Or maybe have a group with low skills maybe, and a group with high skills. Maybe it will be...
so not only diagnosis groups, but also maybe level?
Yeah I think I will try, but I think it’s rather good the way it’s today. So you can never be... but maybe if I had the opportunity I would learn a bit more about how I would put the groups together

Alright, nice. And we saw you during a couple of theory lessons and also more practical lessons where they practiced their skills and we were wondering in the theory lessons, what kind of theory do you cover during these lessons?
First we have, the first where you were in, where we have a bit of the basic thing about ergonomics and the way you’re thinking so they know a little bit about the wheelchair and what we are going to do and basic things about posture and ergonomics and uhhm mechanics, rolling and turning resistance so they know a little bit about it. And then we have 1 time, when you joined, about how to take care of the wheelchair, how to put air in the tires and how to fix with the small wheels.

The hair.
How to keep everything in, so the wheelchair is oke. And then we have uhh one time we talk about what type of gloves you can be using, bags, how you can carry things on the wheelchair. Backpacks and to make uhhm so the persons can make a plan on how to carry things. And then we have one hour that we talk about power wheelchairs, scooters, smartdrive all those different kind of electrical chairs and electrical things you can put on a wheelchair to get help with the pushing. Cause I think it’s important, some of them don’t need a power wheelchair today but many of the persons, the patients, are getting worse. Like MS and ALS and things like that. So it’s good to have uhm to know a little bit about what kind of electrical choice you can have. And beside that it’s .... When we are training people are asking and some are really interested in things and so... things I talk about now is to everybody. But some persons need specific answers on specific questions that other people aren’t interested in. so it’s important to have that patients lessons also.

And uhm, you said that you sometimes give individual advice, but you also sometimes give individual therapy right? For skill training?
Yeah.

When do you start giving individual training?
It differs a lot how everything is. Before I always have 1 individual session, everytime. But I think with the setting, the sportshall, it some kind of individual training with each person also. it’s a group training with individual training also. but sometimes I go to the clinic and work individually if I see that it’s needed.

Oke and it’s for people that need extra help or is it also for people...
Yeah. And it’s a little bit easier to do that after a while, because, like you see now, we have arranged everything, they know what to train on and it’s easier for me to be absent with one patient. So never in the beginning, it’s hard in the beginning because then the others don’t know what to do. So it’s tend to be more, it could be individual more after a couple of times, if needed.

Oke, alright.
But I think when we work down there I go there for 10 minutes or 15 minutes and that’s individual training also.

yeah that’s true. Right. Uhhm and then the last question already. Why do you wait a couple of lessons to adjust the wheelchair to a better backwheelbalance position?
Because you talked about that yesterday that a couple of wheelchairs were a little bit heavy and you wait a couple of lessons to make it better.

Yeah yeah, you can’t make... if you make the wheelchair that is like mine in the beginning you can’t train. So you need to take it, you need to adjust it a little bit every time. Not every time but if I meet one of the patients, you met also, and I have adjusted the wheelchair the way mine is, they couldn’t go to work, they couldn’t go to home because they couldn’t control their wheelchair. So you need to make it less load on the frontwheels uhm...

**step by step.**

Yeah in steps. So yeah you need to do it that way. So that's a big problem if I.. it’s not so often but when I meet the patients for 1 hour and make an adjustment I can't do a good adjustment because you need to adjust and train and then adjust again. So you find exactly the way you want the wheelchair to be. How it should be adjusted.

**Oke, because what will happen if you do it directly? Will they go in backwheelbalance all the time, or will they fall backwards?**

Yeah, they couldn’t use the wheelchair. And especially when they are using the wheelchair if they go home. But even if they were staying at rehab station all the time I wouldn't be, it’s not possible to make it uhm really nervous the... easy to to, **cause you would flip all the time?**

Yeah because they can’t control it. So you need to take it in steps. And some of the people they can’t handle a wheelchair that’s really light in the front and sometimes you need to go back again. For example if you leave in a really hilly area they will try the wheelchair at home and sometimes they come back and say it doesn’t work so good at home. So you need to uhhmmm.. so when the program is finished then we really know. Because I have adjusted the wheelchair and they have tried the wheelchair at home and they have come back. And so uhm it’s really good after 12 times, I’m secure that it’s the way that they want the wheelchair. It’s not the way uhm.. then they are in charge, maybe I’m in charge in the beginning because I want to try different things. Sometimes I try things and it’s no good. But then I know. But in the end they decide and sometimes it’s not the way I think but they are going to be in the wheelchair, it’s their choice. But uhm hopefully they know why. But usually we have agreed. Because sometimes when you have 24 inches or 25 inches, both is oke. They decide. If they want armrests or sideguards, it’s the patient that’s going to stay in the wheelchair not me. So it’s their choice. But in the beginning I want to try everything and then I’m a bit more in charge of what we are going to do. But in the end it’s the patients that decide.

**Make them experience different things and yeah. Alright nice. Oke, do you have any additional questions.**

yeah just a short one actually, about the spinalis. Is it like an outpatient clinic?

Yeah.

**In rehab station?**

Yeah. I think maybe you can read. I can see if I can find anything you can read about it. Maybe you can find a little bit about it on our website.

**Yeah probably. Oke. and do you maybe have any additional things you think we need to know. That we didn’t talk about?**

No, anything... maybe later on. When I can see what you have written.

**Alright, thank you!**