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THESIS

Focus on Functional Skills:

An evaluation of Conductive Education for people with Multiple Disabilities in South Africa

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Abstract

Conductive Education (CE) is a therapeutic task-oriented approach which aims to make people with multiple disabilities more independent, both emotionally and physically. During the therapy, functional skills that are adjusted to the individual's abilities and needs are trained. This study evaluated its effectiveness in a residential home and accompanying daycares in South Africa, by comparing a group that trained their skill during the therapy with a matched control group who did not train that skill (but who did train another skill). The effectiveness of CE was evaluated by measuring increases in skills during the therapy as well as in the daily situation. The long-term effects of the therapy were also investigated. Moreover, it was examined whether the effectiveness of CE was moderated by the amount of treatment adherence of the therapy or the initial level motor skills of the participant. The results show that participants who received CE performed significantly better than their matched controls who trained another skill. More improvement was made during the therapy when the main elements of the therapy were properly implemented. The effectiveness of the therapy was however not influenced by the initial motor skills of the participant measured before the start of the therapy, nor by the amount of CE therapy prior received by the participant. Conclusion of this study is that Conductive Education is an effective therapy, regardless of the individual differences between the participants, as long as the treatment adherence is monitored and goals are properly adjusted to the skills and needs of each participant.

Keywords: Cerebral Palsy, Conductive Education, disability, physical therapy, functional therapy

Many developing countries in the world still struggle to adequately care for people with Cerebral Palsy and related disorders due to the lack of specialist knowledge, especially in rural areas. Although it is tempting to send western specialists to these countries to help under the guise of development aid, on the long term it is much more effective to find interventions that can be adapted to the cultural, social, educational, and medical system of the host country and that can be implemented using only locally available resources, without the help of outsiders. This study will research the effectiveness of an intervention that meets these criteria, to examine the possibility for wider implementation in developing countries.

Cerebral Palsy (CP) is the most common cause of physical disability in early childhood (Krägeloh-Mann & Cans, 2009). It is a description, rather than a specific diagnosis, that covers a group of permanent disorders of the development of movement and posture, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor impairments caused by cerebral palsy are often accompanied by problems with sensation, perception, cognition, communication and behavior and by secondary problems in the musculoskeletal system (Ketelaar, Vermeer, 't Hart, Petegem–Van Beek & Helders, 2001; Rosenbaum, Paneth, Leviton, Goldstein & Bax, 2007). Additionally, because of their disabilities, people with CP often lack mastery motivation (Majnemer et al., 2013). Mastery motivation is driven by the need for autonomy, competence and relatedness (Ryan & Deci, 2000). These needs are not satisfied in people with CP or other disabilities, because of their dependence on others and their experiences with failure. This is very harmful because conversely, motivation is a key influence on the change in motor abilities for people with CP (Bartlett and Palisano, 2002).

In the present study, we looked at a therapy that strives to improve the functioning of people with CP and researched its effectiveness. Because people with CP show impairments over such a wide range of functions, a therapy with a multidimensional approach is needed to improve their functioning. A therapy also needs to enhance mastery motivation. According to Majnemer et al. (2013) a therapy could do this by 'being fun, self-directed and engaging, providing choices and creating opportunities for people to feel good about themselves and feel competent while acquiring new skills and interacting with others'.

Functional or goal-oriented therapies?

There are many therapies that strive to improve the functioning of people with CP. When looking at the main emphasis of these therapies, 2 basic principles can be recognized: 1) emphasis on normalization of the quality of movement or (2) emphasis on stimulating functional activities (Ketelaar et al., 2001). Therapies that place emphasis on the

normalization of the quality of movement attempt to teach the participant typical patterns of movement, in order to inhibit abnormal movements and posture and to promote more qualitative and efficient movement. By learning these “normal” patterns of movement, the participant should be able to perform more tasks which will reduce the limitations they experience in everyday life. However, research on therapies with emphasis on the normalization of the quality of movement (e.g. Mahoney, Robinson, & Perales, 2004; Novak et al., 2013; Palmer, 1997) has shown that these therapies aren't successful in improving the functioning of people with CP.

Therapies that place emphasis on functional activities, on the other hand, do not attempt to teach the participant normal patterns of movement. They rather focus on the participant being able to perform a functional task, regardless of whether the participant uses typical movements in order to achieve this. It is based on an active view of motor learning; people learn by actively attempting to solve the problems inherent to a functional task, rather than repetitively practicing normal patterns of movement. This also makes functional therapies perfect for improving the participant's mastery motivation, because they focus on making the participant more autonomous in their everyday life, which makes them less dependent on other people. The participant also experiences a lot less failure by focusing on what they can accomplish within the restraints that their disorder gives them rather than repetitively practicing normal patterns of movement, which they are very often not capable of.

But are functional therapies effective? A review study by Novak et al. (2013) looked at 64 types of interventions for CP, including functional therapies. The review study concluded that all of the studies that researched the effectiveness of functional therapies (e.g. Ketelaar et al., 2001; Novak, Cusick & Lannin, 2009; Sakzewski et al., 2011) found that functional therapies were indeed effective. Moreover, research by Bower, McLellan, Amey and Campbell (1996) has shown that the use of specific, individual, measurable goals rather than general goals is strongly associated with increased motor skill acquisition. We can therefore conclude that, when trying to improve the functioning of people with CP, it is best to take a functional approach using specific, individual goals.

Conductive Education

The functional therapy that was examined in the present study is Conductive Education (CE). CE is an intervention for children and adults with neurodevelopmental disorders, developed by the Hungarian neurologist and educationalist András Pető. As the name suggests, CE is not a therapy but an educational approach, which aims to teach and motivate the participant with CP to participate and function in society (Reddihough, King,

Coleman & Catanese, 1998), focusing on developing physical, social and intellectual aspects (Coles & Zsargo, 1998). Pető based the underlying theories of CE on the motor learning theories of Bernstein (Hari & Akos, 1971), whose work has provided much of the scientific foundations to the major motor learning theories that influence current traditional physiotherapeutic treatment methods. The underlying theory of CE is that the lack of muscular control that people with CP have is only a symptom of a much bigger brain disorder. Therapy should therefore focus on improving the brain's organizing and coordinating capacity and its problem-solving ability, instead of just training or exercising various muscle groups (Visser, Davies, Magyarszky & Stoffer, 2014). The therapy is carried out in groups rather than individually in order to facilitate psychosocial learning and increase the level of participation (Blank, von Kries, Hesse & von Voss, 2008).

Although the key principles of the therapy are based on well-established learning theories, research on the effectiveness of CE has been leaning to a non-effectiveness of CE. Blank et al. (2008) were the only ones that did find CE to be effective when comparing it to a group that received only special education. Other research comparing CE with traditional therapy methods like special education or physiotherapeutic interventions (Hur, 1997; Ödman & Öberg, 2006; Reddihough et al., 1998; Stiller, Marcoux & Olson, 2003) has found that CE was not more effective than those interventions. However, those studies investigated its effectiveness using questionnaires that all test a broad range of functions, not only various motor skills but also social functioning and communication. Since CE focuses on improving only one motor skill at the time, improvement can barely be assessed when using such a broad instrument. This means that these questionnaires are highly unreliable when trying to assess the improvement CE made. Therefore, observation using an individualized goal attainment scale focusing on the specific trained skill will be used in the present study to test the effectiveness of the therapy.

The present study researches the effectiveness of CE in a residential home in rural South Africa. This home is a residential facility for children and (young) adults with moderate to profound intellectual and physical disabilities (Visser et al., 2014). In addition to the residential facility, it also has an outreach program, including three daycare centers situated in the townships where the families with these children live. The residents of the residential facility are mainly orphans cared for by childcare workers who take care of the daily needs of the residents and also double as therapists (Visser et al., 2014). CE has been given to the residents of the home since 2003. Although the therapy given in the home is a modified version of the original therapy, this should not be a problem because CE programs have

always been modified to suit the cultural, social and educational system of the host country (Bourke-Taylor, O'Shea & Gaebler-Spira, 2007).

Prior pilot studies have been done to examine the effectiveness of CE in the residential home. Recent pilot studies (Twilhaar, van Beek and Magyarszeky, 2014; Spek, 2014), using individual GAS scores as outcome measures, have found a significant effect of CE on the participants' functioning. While Twilhaar et al. (2014) still found a relatively small effect, 39% of the participants not making any progress and most others not reaching the expected goal, Spek (2014), using an adapted procedure for goal setting in her study two years later, found that 76,5% had indeed reached their goal. This research follows up on the pilot studies and also focuses on the effectiveness of CE with the following research question: 'Is Conductive Education an effective intervention for people with developmental problems in a residential home in South Africa?' Based on the prior research, it is predicted that the participants would indeed profit from CE.

Study design

Both pilot studies investigated the effectiveness of CE by only using a pretest-posttest design. Because a control group design is much more favorable (Neuman, 2009), the present study compares results of CE intervention to a control group. Although earlier research on CE has used control groups before (e.g Ödman & Öberg, 2006; Stiller, Marcoux & Olson, 2003), they never used a control group that did not train their skill during the therapy, only control groups that received traditional interventions. That is why in the present study, a control group that trained another skill was used. This was done by assigning each participant two skills that could be trained and concurrently matching them with a participant who had a comparable level of competence and similar two training goals, creating a control group. Next, only one of the two skills that were set was trained during CE. The skill that was trained was different for the participants in each of the two groups, but the progression in both skills was tested. This allowed us to compare participants who had trained their skill during therapy with their matched control who had not trained that same skill during therapy. However, because their matched control did train the other skill, both of them still received therapy. This is a big (ethical) advantage of this design, because it means that even though it is possible to compare a group that trained their assigned skill during the therapy with a control group who did not train that skill, the control group trained another skill, which means that every participant still received therapy. Another big advantage of this design is that it allows for not only a between-group comparison between the trained group and their matched controls who trained another skill, but also for a within person comparison between their trained skill and their untrained

skill. Our first hypothesis was that participants who had trained their skill during therapy would perform significantly better than their matched controls who had not trained that skill during therapy. Our second hypothesis was that participants would perform significantly better on their trained skill than on their untrained skill.

Although they are important components to the effectiveness of a therapy (Flay et al., 2005), generalization and long-term maintenance of effects have not been researched in earlier studies on CE, making this the first study to take them into account. The generalization effect was examined by testing the trained skills both during the therapy and during the participants' daily functioning. It was hypothesized that there is indeed a generalization effect for CE to the daily situation. The long-term maintenance effect of the therapy was examined after nine months. It was hypothesized that CE has indeed a long-term effect on the functioning of the participants.

It was also observed whether the main elements of CE were properly implemented during the therapy. According to theory, the main elements of CE are: task-oriented learning with highly structured programs, rhythmic speaking, counting or singing and child-oriented group settings to facilitate psychosocial learning (Visser et al., 2014). This was observed not only to investigate whether the therapy was given the way it is supposed to, but the treatment adherence of the therapy was also studied as a potential moderator on the effectiveness of CE. It is useful to test whether the key elements of the intervention are really causing the progress in motor functioning, so that the therapy can be improved and the childcare workers can be trained in the best way possible. Based on research on the link between quality and effectiveness (Schoenwald, Sheidow & Letourneau, 2004), it was hypothesized that participants who receive CE with high treatment adherence improve more than participants who receive CE with low treatment adherence.

Lastly, it was researched whether some participants benefit more from CE than others. Ideally, a therapy like CE in which goals are adjusted to the participants' individual abilities should work for all participants regardless of individual differences. However, studies researching the effectiveness of CE have never taken into account the influence that some moderators may have on the effectiveness of the therapy. Therefore, the present study took into account the participants' initial fine and gross motor skills as potential moderators that might have an influence on the effectiveness of CE. It is expected that these are an influence on the effectiveness of the therapy because participants with less motor skills have low mastery motivation (Majnemer et al., 2013), even when goals are adjusted to their level of motor abilities. Based on the fact that mastery motivation has a key role in improving motor

skills in people with CP (Bartlett & Palisano, 2002), it seems probable that participants with low mastery motivation benefit less from CE. Therefore, it was hypothesized that participants with a lower initial motor level would benefit less from CE than participants with a higher initial motor level.

Methods

Participants

Participants were 37 children and (young) adults, of which 18 were living in the residential home in South Africa and 19 were attending one of three connected daycare centers. The participants in the daycares differed from those in the residential home in the respect that they were both younger on average, which means that they might have more brain plasticity and therefore more capacity for learning (Kalat, 2006), and that they had been receiving CE for a shorter period of time than the home-based participants, which means that they possibly had more room for improvement than the home-based participants. The group consisted of 16 boys and 21 girls, their age ranging from 4 to 38 years old ($M = 15.6$, $SD = 9.6$). Of these participants, 24 (64.9%) had from some type of Cerebral Palsy and 13 (35.1%) had some type of intellectual disability that was not caused by CP. Of the participants with CP, 2 participants (8.3%) had an additional visual/hearing impairment and 4 participants (16.7%) had additional epilepsy. Of the intellectually disabled participants, 1 participant (7.7%) had additional ADHD, 2 participants (15.4%) had an additional visual/hearing impairment, 1 participant (7.7%) had additional epilepsy and 1 participant (7.7%) had additional schizophrenia. Consent for participation in the study for the participants in the residential home was given by the manager of the home. Informed consent was given by a parent or guardian for the participants in the daycare.

Conductive Education (CE)

CE is led by a 'conductor' who combines the work of teacher and therapist, using rhyme and song to encourage movements and functional tasks (Reddihough et al., 1998). The participant always has to initiate all movements after which assistance is provided verbally, manually or mechanically (Visser et al., 2014). Emphasis lies on the achievement of functional skills: the program is highly structured and the tasks are always goal-directed and meaningful for the participant (Reddihough et al., 1998). The therapy took place every working day for one hour, led by two or three conductors. Each participant trained their specific skill two or three times per week. Because of the group-therapy nature of CE, it was not possible to assign the participants a fixed conductor, so each participant was trained by

several childcare workers.

Instruments

Goal attainment Scale (GAS). The GAS (Kiresuk & Sherman, 1968) is an observational instrument that measures development, using individualized goals that can be achieved by the participant. It is a criterion-referenced measurement of change. Every participant has a unique goal, with five pre-determined estimated expected levels of outcome (Turner-Strokes, 2009). A score of -2 represents the participant's baseline before the intervention, -1 less improvement than expected, 0 the expected improvement after the intervention and +1 en +2 represent slightly and considerably more improvement than expected after 20 sessions of CE (King, McDougall, Palisano, Gritzan & Tucker, 1999). The goals and descriptions for each step of the GAS for every individual participant are displayed in Appendix D. The inter-rater reliability of the GAS was calculated between two observers, observing 10 participants. An optimal score was found for the Cohen's Kappa, Pearson r and percentage agreement ($k = 1$, $r = 1$, 100% agreement).

Fine and Gross Motor Scales for people with severe multiple disabilities (FGMS). The Fine and Gross Motor Scales are instruments used to measure the motor abilities of a participant. Fine and gross motor abilities are measured separately on two different scales. The gross motor scale is based on various studies on motor development (e.g. Allen & Alexander, 1997; Frankenburg & Dodds, 1967; Husaini, et al., 2011). It consists of 13 gross motor milestones, such as sitting with and without support, rolling over and standing (for the full scale, see Appendix A). The number of mastered milestones is the total score for this scale. The fine motor scale is based on grasping patterns described by Halverson (1931, in Netelenbos, 1998) and Touwen (1997, in Netelenbos, 1998). It consists of seven sequential ways of reaching and grasping. The score was established by means of three objects in a small, medium and large size (see Appendix B) that the participant sequentially was asked to grasp, while sitting at a table or in a wheelchair with a table. If this was not possible, the object was offered on a hand with a flat palm. The participants got a score ranging from 0 to 6 for each object: no reaching or grasping (score = 0), several levels of reaching (Score = 1 to 3) and several levels of grasping (score = 4 to 6) (see Appendix B for the full scale). The total score on this scale is calculated by the mean of the three scores. The inter-rater reliability of the FGMS was calculated between two observers and was optimal for both scales ($k = 1$, $r = 1$, 100% agreement).

Conductive Education Integrity Scale (CEIS). The CEIS is developed by Spek (2014) to determine the treatment adherence of the CE intervention. It consists of two scales,

a 'Motivational elements' scale and a 'Required therapy actions' scale. The 'Motivational elements' scale consists of the items 'Gives positive reinforcement when the child did something right', 'Shows enthusiasm by verbal- and/or facial expression', 'Use of singing and rhythmic speech in the right way', 'Is responsive to the social cues of the child' and 'Creates a nice group atmosphere'. The 'Required therapy actions' scale consists of the items 'Challenges the child', 'Gives physical help adapted to the child's needs', 'Gives verbal instructions adapted to the child's needs', 'Good use of supportive objects when needed' and 'Is the action executed as intended and written in the protocol?'. It is scored on a 5-point Likert scale, ranging from 1 = 'never' to 5 = 'always'. For some items the option 6 = 'not applicable' was added, either because the element was not needed by the participant or because there was no reason to apply the element during the session (e.g. no physical help or supportive objects were needed when a participant was trained to walk faster, only verbal help). The total score for the CEIS was the mean score of all relevant items. The CEIS was measured for every participant receiving CE. The scoring form of the CEIS can be seen in Appendix 5. The CEIS had three measurement moments. The observations were done from a video recording of the first or second session of CE, the 10th session and the 20th session of CE. The therapist that was observed for the CEIS was not the same for each participant during each measurement moment. However, because no sizable differences were observed between the different therapists within a therapy group this was not deemed a problem.

The reliability of the CEIS was analyzed using the Cronbach's Alpha ($\alpha = .883$) for internal consistency. The internal consistency of the 'motivational elements' scale and the 'therapy action elements' scale was $\alpha = .933$ and $\alpha = .780$ respectively. For the inter-rater reliability a significant Pearson r was found ($r = .89$). The Cohen's Kappa and percentage agreement were calculated for each item ($k = .88$, $\% = 92,5\%$).

Design

A quasi-experimental design was used. Because the participants had to be carefully matched to another participant with comparable motor skills and -problems, random assignment to a match was not possible. It was, however, randomly assigned who of the matched participants trained which skill.

Each participant was given two skills that could be trained and was concurrently matched with a participant who had a comparable level of competence and similar two training goals, creating a control group. 32 participants were paired into 16 matched pairs. Next, only one of the two skills that were set was trained during CE. The skill that was trained was different for the participants in each of the two groups, but the progression in both skills

was tested. As a result, both groups were both the experimental group for one skill, and the control group for the other skill. Unfortunately, there were some participants that couldn't be matched or whose match fell away during the study due to unexpected circumstances (N=5). They still took part in the research but they were only taken into account when testing within-person differences between the trained and untrained skills.

Procedure

At the start of the research, before the start of the new CE therapy, the participant's previously trained skills were re-tested after an interval period of nine months. The goals for these skills were set during prior research and were further trained during the CE sessions since, although there were periods in which no therapy was given. The score on the GAS for these old goals was tested by the researcher and the development manager of the home during the therapy, using the same GAS that was used in the prior research.

Each participant was assigned two new skills that could be trained, for which five pre-determined estimated expected levels of outcome were formulated using the GAS, before the start of the intervention. This was mostly done by the researcher and the development manager of the residential home, although some goals were already set by a CE conductor prior to the arrival of the researcher in the residential home. The estimated feasibility of the trained skills was evaluated after two weeks of therapy, by watching the participants as they practiced their goals and by discussions with childcare workers. Based on this, the GAS was adjusted or a different goal was assigned if needed (N=8). The progression in performance of the specified goals was evaluated using the GAS after 10 and 20 sessions, by filming the 10th and 20th session of CE and determining the GAS score by observation.

In order to test the generalization effect, the progression in trained skills were also observed in a daily situation. Most of the goals were already functional and could be observed both during the therapy and the daily situation, but some goals needed some adjustment to make them fitting to the daily situation. For example, instead of standing while holding on to a ladder in the therapy setting, the participant had to hold on to their bed while standing in the daily situation. For the scales of the goals in the daily situation, see Appendix D. Only the participants in the home were observed during the therapy and in the daily situation, since it was not possible to observe the participants in the daycare at their homes. The observations in the daily situation were done within two days after the 10th and 20th training session took place.

Statistical analyses

Data were analyzed using SPSS 23 for Windows. To test the effectiveness of CE, both

a Chi-square analysis and a Wilcoxon Signed-Rank test were done. A Chi-square analysis was used to compare the results of the trained group with the results of the matched control group who trained another skill. For this analysis, the GAS was reduced from 5 steps to 3, since not enough participants scored +1 or +2 to comply with the assumption of Chi-Square that every cell has at least 5 variables. In this new scale, 0 represents the participant baseline before the intervention, 1 represents less improvement than expected and 2 represents the expected improvement after the intervention or more. A Wilcoxon Signed-Rank test was used to test within participants the difference in progression between the trained skill and the untrained goal. A Wilcoxon Signed-Rank test was also used to examine the maintenance effect of the therapy, as well as to examine the generalization effect of CE.

To measure the effect of fine motor skills and gross motor skills on the effectiveness of the therapy a simple regression was done. Another simple regression was done to measure the effect of the treatment adherence of the therapy on the effectiveness of the therapy. The results of the regression analyses should be interpreted with caution, since not all assumptions were met because the GAS was not normally distributed. It was decided to use a regression anyway because a lot of nuance in the data would have been lost if the scores on the FGMS and the CEIS would have to be split up into different groups for a Chi-Square analysis.

Because of the differences between the participants in the residential home and those in the daycares, it was investigated whether their scores were significantly different by comparing the scores of the participants in the residential home and the scores of those in the daycares using a Chi-Square analysis. For a table with the distribution of GAS-scores broken down by home and daycare, see appendix D. However, no significant differences in scores were found, which means that all analyses were done over the entire participant group.

Results

The effectiveness of the therapy

Trained group versus matched control group who trained another skill. Firstly, it was tested whether there was a difference between the GAS-scores of the participants in the trained group versus the participants in the matched control group who trained another skill after 10 and 20 sessions. This was done using a chi-square test (N=32). The distribution of scores after 10 sessions and 20 sessions can be found in table 1.

Table 1

Distribution of GAS-scores for the trained and control group after 10 and 20 sessions

	0	1	2	Total
<u>After 10 sessions</u>				
Trained group	18 (56.3%)	7 (21.9%)	7 (21.9%)	32
Control group	25 (78.1%)	4 (12.5%)	3 (9.4%)	32
<u>After 20 sessions</u>				
Trained group	11 (34.4%)	8 (25%)	13 (40.6%)	32
Control group	25 (78.1%)	4 (12.5%)	3 (9.4%)	32

Note. 0: baseline level before CE, 1: less improvement than the expected level of attainment after CE, 2: improvement as expected or more than expected

There was no significant difference between the experimental group and the control group after 10 sessions $\chi^2 (2) = 3.558, p = .169$. There was, however, a significant difference between the experimental group and the control group after 20 sessions $\chi^2 (2) = 13.028, p = .001$. Based on the odds ratio, the odds of a participant improving after 20 sessions were 6.82 times higher if they trained the skill than if the skill wasn't trained.

Repeated analyses. We also tested the individual differences in growth between the trained and untrained skill within each participant (N=37). The distribution of scores on the trained and untrained skills can be seen in table 2.

Table 2

Distribution of GAS-scores on trained and untrained skills after 10 and 20 sessions

	-2	-1	0	1	2	Total
<u>After 10 sessions</u>						
Trained skill	20 (54.1%)	9 (24.3%)	3 (8.1%)	2 (5.4%)	3 (8.1%)	37
Untrained skill	29 (78.4%)	5 (13.5%)	1 (2.7%)	1 (2.7%)	1 (2.7%)	37
<u>After 20 sessions</u>						
Trained skill	12 (32.4%)	9 (24.3%)	6 (16.2%)	2 (5.4%)	8 (21.6%)	37
Untrained skill	30 (81.1%)	4 (10.8%)	0	0	3 (8.1%)	37

Note. -2: baseline level before CE, -1: less improvement than the expected level of attainment after CE, 0: the expected level of attainment after CE, 1: slightly more improvement than the expected level, 2: clearly larger improvement than the expected level.

It was expected that participants scored higher on the GAS on their trained skill than on their untrained skill. Using a Wilcoxon Signed-Rank test it was found that the participants indeed scored significantly higher on the GAS on their trained skill than on their untrained skill, both after 10 sessions $z = -2.248, p = .025, r = -.36$ and after 20 sessions $z = -3.705, p < .001, r = -.60$, thereby confirming our hypothesis.

For the trained skills, GAS-scores were significantly higher after 10 sessions than at the beginning of the therapy $z = -3.785, p < .001$. They were also significantly higher after 20 sessions than after 10 sessions $z = -3.327, p = .001$. As expected, for the untrained skills it made no difference whether the participants had trained their trained skill for 10 therapy sessions or for 20 therapy sessions $z = -.213, p = .831$.

Generalization effect. To test our hypothesis that the participants would improve as much in the daily situation as they improved in the therapy, another Wilcoxon Signed-Rank test (N=15) was done, using only the participants in the home. The distribution of scores on the trained skill during the daily situation after 10 sessions and 20 sessions can be found in table 3.

Table 3

Distribution of GAS-scores on trained skills during the therapy and in the daily situation after 10 and 20 sessions

	-2	-1	0	1	2	Total
<u>After 10 sessions</u>						
Therapy	8 (53.3%)	3 (20%)	2 (13.3%)	0	2 (13.3%)	15
Daily situation	10 (66.7%)	1 (6.7%)	1 (6.7%)	1 (6.7%)	2 (13.3%)	15
<u>After 20 sessions</u>						
Therapy	4 (26.7%)	3 (20%)	2 (13.3%)	1 (6.7%)	5 (33.3%)	15
Daily situation	5 (33.3%)	2 (13.3%)	3 (20%)	3 (20%)	2 (13.3%)	15

Note. -2: baseline level before CE, -1: less improvement than the expected level of attainment after CE, 0: the expected level of attainment after CE, 1: slightly more improvement than the expected level, 2: clearly larger improvement than the expected level.

No significant difference was found between the participants' GAS-scores in the therapy and those in the daily situation. This was found both after 10 sessions $z = .000$, $p = 1.000$ and after 20 sessions $z = -1.890$, $p = .059$. This indicates that the skills attained in the therapy also are used in the daily situation, thereby confirming our hypothesis.

We also tested whether the participants improved significantly from baseline in the daily situation between 0 and 10 sessions as well as between 10 and 20 sessions, as they did during the therapy. This was done using another Wilcoxon Signed-Rank test ($N=15$). It was found that the participants' scores in the daily situation improved significantly between 0 and 10 sessions $z = -2.032$, $p = .042$. However, no significant further improvement was found between the participants' scores in the daily situation between 10 sessions and 20 sessions. Over the entirety of the therapy, between 0 and 20 sessions, the participants' scores in the daily situation did improve significantly $z = -2.821$, $p = .005$.

Maintenance effect. Next, it was tested whether there was a maintenance effect for CE from trained skills in the previous year. This was done using a Wilcoxon Signed-Rank test ($N=33$). The distribution of scores found by Spek and the scores found 9 months later can be found in table 4.

Table 4

GAS-scores found by Spek (2014) and GAS-scores found 9 months later

	-2	-1	0	1	2	Total
Spek (2014)	8 (24.2%)	8 (24.2%)	5 (15.2%)	5 (15.2%)	7 (21.2%)	33
9 months later	8 (24.2%)	4 (12.1%)	5 (15.2%)	6 (18.2%)	10 (30.3%)	33

Note. -2: baseline level before CE, -1: less improvement than the expected level of attainment after CE, 0: the expected level of attainment after CE, 1: slightly more improvement than the expected level, 2: clearly larger improvement than the expected level.

There was no significant difference found between the participants' GAS-scores found in the previous year and their scores nine months later $z = -1.198$, $p = .231$. This indicates that attained skills are maintained (but no longer increased) after nine months, confirming our hypothesis.

Effect of treatment adherence of the therapy

Next was examined whether the treatment adherence of the therapy had an effect on the participants' growth in performance. For the CEIS, the mean score and standard deviations and correlations between the different measurement moments are shown in in Table 5. As can be seen, the overall treatment adherence was quite high. Although therapists scored slightly lower on the 'Motivational Elements' subscale than on the 'Required Therapy Actions' subscale, their score was still respectable. Treatment adherence was also consistent over the different measurement moments, with a particularly high correlation between the in-between measurement and the end measurement.

Table 5

Mean, Standard Deviations and Correlations at the different measurement moments of the CEIS

	M	SD	Start	In-between	End
<u>Overall</u>					
Start measurement	3.79	.878	1		
In-between measurement	3.98	.885	.633**	1	
End measurement	4.04	.908	.501**	.798**	1
<u>'Motivational elements'</u>					
<u>subscale</u>					
Start measurement	3.36	1.15	1		
In-between measurement	3.59	1.18	.748**	1	
End measurement	3.65	1.17	.604**	.751**	1
<u>'Required therapy actions'</u>					
<u>subscale</u>					
Start measurement	4.24	.801	1		
In-between measurement	4.37	.868	.442**	1	
End measurement	4.42	.854	.430**	.862**	1

Note. Mean score calculated on a 5-point Likert scale. Range mean score: 2-5

** . Correlation is significant at the 0.01 level (two-tailed)

Analyses showed that the overall score of the CEIS significantly predicted the participants' performance during the therapy after 10 sessions, $b = .331$, $t(35) = 2.075$, $p = .045$ and after 20 sessions $b = .370$, $t(35) = 2.355$, $p = .024$. However, it was found that the amount of treatment adherence of the therapy did not affect the participants' performance during the daily situation (N=15).

To find out what part of the therapy had an effect on their performance, another regression was done, this time using the two subscales of the CEIS ('Motivational Elements' and 'Required therapy actions') as predictors. It was found that the 'Required therapy actions' subscale of the CEIS singlehandedly significantly predicted the participants' performance during the therapy after 10 sessions, $b = .462$, $t(34) = 2.618$, $p = .013$ and after 20 sessions $b = .561$, $t(34) = 3.021$, $p = .005$, whereas the "Motivational Elements' subscale did not

significantly predict anything. Neither of the subscales significantly predicted the participants' performance in the daily situation, both after 10 sessions and after 20 sessions.

Fine and gross motor skills

Subsequently, it was examined whether the progress made during CE was influenced by the initial motor performance of the participants (N=37). Mean, standard deviation and the range of scores for the FGMS can be seen in Table 6. The Fine and Gross motor scales correlated significantly ($r = .64, p < .001$).

Table 6

Mean, Standard Deviation, Minimum and Maximum for the Fine, Gross and Total Motor Skills.

	M	SD	Min	Max
Gross motor skills	8.92	4.21	0	13
Fine motor skills	2.84	2.09	0	5

Note. Range gross motor skills 0-13, Range fine motor skills 0-6

It was found that the participants' initial motor level did not significantly predict their GAS-scores. This was found for their scores after 10 and 20 sessions, both during the therapy and in the daily situation. This means that our initial hypothesis is rejected.

Discussion

The aim of the present study was to evaluate the effectiveness of Conductive Education. The main goal was to examine whether the therapy improved the participants' performance on their trained motor functioning skills.

As expected, the participants who trained their skill performed significantly better than their matched controls who did not train that skill. Each participant also performed significantly better on the trained skill than the untrained skill. After the therapy was completed, 70.2% of the children had made progress on their trained skill, and 43.2% had made as much progress as expected or more. These results are not in line with most of the earlier research on the effectiveness of CE (Ödman & Öberg, 2006; Stiller, Marcoux & Olson, 2003; Reddihough et al., 1998; Hur, 1997), which found no effect of CE when compared to a control group. Of course, these studies compared CE to a control group that received care as usual, such as physiotherapeutic interventions. They also, as described before, used broad measurement instruments that were not suitable for investigating the effectiveness of CE,

instead of the individualized GAS that was used in this study. It can therefore be questioned whether their findings can be compared to the findings of this study altogether.

It is questionable why only 70.2% of the participants made at least some progress on their trained skill and why an even lower amount (43.2%) made as much progress as expected or more, especially since it has been determined that individual differences should make no difference in the effectiveness of the therapy. Firstly, it could be possible that for some participants the GAS describing the predetermined levels of outcome was assessed too optimistically. Related to this is the fact that research on the effectiveness of CE has been done in this particular home for quite some time, using largely the same sample of participants every time. Because these participants have a limited learning potential, it is possible that some of them had reached the top of their abilities before the start of this research. Although the goals were evaluated to assess their feasibility, it is possible that an evaluation after 2 weeks is too early to establish this reliably. Future studies should therefore look into more ways to evaluate the feasibility of the goals for their participants. It is also advised to find a group of participants that have not been a part of prior research. Secondly, the lack of progress could also be explained by another moderating factor that has not been examined in the current study, for example the participants' initial level of mastery motivation. Future research should therefore look into more potential moderators that influence the effectiveness of the therapy. Lastly, the lack of progress of some participants could be explained by the fact that these participants need more than 20 therapy sessions to make progress. This notion is supported by other research that found that children with CP have a slower learning curve (e.g. Hung & Gordon, 2013). It should be examined whether the implementation of more sessions does improve the functioning of participants who did not yet make progress after 20 sessions, or if the fact that no progress is made after 20 sessions is an indicator that no progress will ever be made. The present study has already made an effort to examine this by taking into account the maintenance effect of the therapy after nine months. It was found, however, that although there was no significant difference between the participants' GAS-scores found in the previous year and their scores nine months later (which indicates that there is indeed a maintenance effect for CE), participants did not further improve any further in those nine months. It would be preferable that participants would improve even more instead of stagnating, especially when considered that a lot of participants in Spek's (2014) study also did not yet reach their goal during her research. However, the manner in which the therapy was given during the intermediate period could be an explanation for this lack of further progress. Although participants often did receive CE on the

same frequency during this period, there were gaps of time in which no therapy was given, i.e. during holidays and during a vacation of two months directly prior to the start of this study. Additionally, when CE was given during this time, treatment adherence was not always up to par, as it was less focused on training the individual skills of the participants, and more focused on the motivational elements of the therapy, such as the group atmosphere and singing. Considering this study found that the quality of required therapy actions of CE solely influenced its effectiveness, whereas the motivational elements did not have any effect, this approach possibly prevented the participants from potentially improving their functioning even further. It is a definite possibility that (more) progress can be attained, even after 20 sessions. However, for this to happen, it is necessary to give CE more continuously and to focus more on training the individual skill of the participant, rather than merely focusing on the motivational elements of the therapy.

Surprisingly, around 20% of the participants also made progress on their untrained skill. Because no other study used a control group this way, it is unknown whether this is usual. It could be possible that the goals that were determined before the start of the therapy were too accessible for some of the participants, even without training. Considering that the participants had a long vacation of two months directly prior to the start of this study, during which they did not receive any therapy, this is likely. This period without therapy might have temporarily weakened the muscles and the motivation of the participants, which might have made them look worse at the skills than they actually were. Another possible explanation is that participants made progress on their untrained skill because they watched their matched control train the skill during the therapy and learned from that. Especially children can learn a lot from watching their peers perform, without necessarily having to practice the skill themselves. Lastly, the progress made on the untrained skill could be explained by the fact that the participants' muscle strength increased by the practicing of their trained skills during the therapy. Although it was tried to make sure that the trained and untrained skills involved different muscle groups, some participants used their whole body when training their skill, which might have resulted in an overall improvement of their muscle functioning, which in turn led to a better performance on their untrained skill.

The difference between the intervention group and the control group was seen after 20 therapy sessions, but not yet after 10 therapy sessions, which indicates that people with Cerebral Palsy need quite a lot of therapy sessions before progress is visible. This is in line with earlier abovementioned research that found that children with CP have a slower learning curve (Hung & Gordon, 2013). For further implementation of CE, both in research and

clinical practice, it is therefore advised that the client receives at least 20 therapy sessions, preferably even more for those who have not yet made (enough) progress after these 20 sessions, to maximize the effect of the therapy.

The progress made in the therapy was also shown in the daily situation. This indicates that CE is not only effective during the therapy, but the children benefit from this progress in their daily functioning. What was surprising, however, is that the participants did improve between 0 and 10 therapy sessions, but did not further improve between 10 and 20 sessions. This contradicts the results found during the therapy, in which participants improved even more between 10 and 20 sessions. This lack of improvement between 10 and 20 sessions could be explained by the lack of support by the childcare worker in the daily situation. As this study found, the treatment adherence of the therapy, and more specifically the amount of support when training the individual goal (“Required Therapy Actions”), influences the performance of the participants. Although this study found no effect of treatment adherence on the participants’ performance during the daily situation, this was likely caused by the fact that the observations during the daily situation were done without the presence of a childcare worker. It seems quite likely that the quality of the support of the childcare worker only has an effect on the performance of the participant when it is given during the performance of the skill. The participant is not able to intrinsically remember the support they got during the therapy when they are on their own, and without direct support. While the first few steps of improvement can be made without much help, further improvement requires support. This need for more assistance may be caused by the lack of mastery motivation that the participants have, which means they need an outside source of support to keep them going. By also giving support to participants when performing their skill in the daily situation, more improvement between 10 and 20 sessions can probably be made. We therefore further emphasize the importance of supporting the participants when they are training their skill, not only during the therapy but also during the daily situation.

Another possible explanation for these results is that our sample (15 participants) was too small to reliably test the outcome measurement, especially when using a non-parametric test like the Wilcoxon Signed-Rank test. For future research it is therefore recommended that larger sample sizes are used to research the generalization effect of the therapy.

We found that the treatment adherence of the therapy is indeed an important influence on its effectiveness. This is an important finding, because it stresses the importance of good, well-trained conductors. What should be taken into consideration however, is that this might not be a one-way causal relation. The effectiveness of the therapy, or lack thereof, on a

participant could also have an impact on the motivation of the therapists, which in turn influences the way they give therapy. Another possibility is that the participant shows such little reaction to the efforts of the therapist that high treatment adherence is not possible. The possibility of a mutual influence between these variables should be further looked into in future research. This can be done by assigning a participant who has shown to receive therapy with low treatment adherence to different therapists who are more or less motivated (e.g. the usual therapist and a researcher) and observing whether there is a difference in the amount of treatment adherence between the therapists. If a highly motivated therapist also is not able to give therapy with high treatment adherence to the participant, it indicates that the participant influences the treatment adherence rather than the other way around.

Moderating factors

Contrary to hypothesis, the initial motor skills of the participants did not predict their performance during neither the therapy nor the daily situation. Additionally, it made no difference to the participants' performance whether they were from the home or from the daycares. These findings are not surprising however, as they are consistent with the ideas of the developer of CE, Andràs Petö. According to Petö, CE should and can be adjusted to the individual needs and abilities of every participant, independent of individual differences. The present study shows that when that is done correctly it is possible for the therapy to be effective for a wide range of participants, regardless of the motor abilities and age of the participants, or the amount of CE they have previously received.

Strengths, limitations and future directions

Although this study is a clear step forward in the research on the effectiveness of Conductive Education with the use of the GAS, which is a much more appropriate individualized instrument than the ones used in earlier studies, the use of a matched control group that trained another skill, the testing of both the maintenance- and the generalization effect of the therapy, and the inclusion of several factors that might influence the effectiveness of the therapy into the research, it also has its limitations. The first limitation is that the course of the therapy and the data collection were interrupted multiple times for several days by different unanticipated circumstances. These circumstances include strikes by childcare workers, armed protests in the townships where the daycares are situated, and the passing of a resident. This meant that the participants did not always receive therapy on a continuous basis, which might have compromised the effectiveness of the therapy. A second limitation is that the participants had a long vacation of two months directly prior to the start of the study during which they did not receive any therapy. The participants' muscle strength and

motivation might have decreased after sitting still for so long, which negatively influences their performance at the beginning of the study, when therapy goals were set and maintenance effects were researched. This might have caused an underestimation of both the participants' ability to reach their goals and the maintenance effect of the therapy. Although in the future it would be best, both for research and for the participants' health, to continue therapy during vacation, this might not be possible due to practical reasons. In that case it is advised that goals should be set and maintenance effects should be researched after participants have again received several weeks of training, to make sure their muscle functioning and motivation is not compromised and the results are more reliable. Another limitation to this study was the relatively small sample size. Although this did not cause a problem on our main analyses on the effectiveness of CE, it did cause the power of some of our other analyses, for which we could only use part of our sample, to be quite low. For future research, it is therefore advised to find a larger sample size of participants that have not been a part of prior research, to ensure more power in all the analyses.

This study proves that even when CE is changed to adapt to the cultural, social and educational system of the host country and implemented using only local uneducated childcare workers, it is an effective therapy. Further implementation in other developing countries should therefore be looked into. For effective implementation, however, it is important that enough supervision and attention are paid to the treatment adherence and frequency of the therapy, especially when working with local, uneducated therapists, as adherence to therapy guidelines proved to be related to success.

Conclusion

The overall conclusion of this study is that Conductive Education is an effective therapy as long as goals are well enough adjusted to the skills and needs of each participant, irrespective of individual differences between the participants. This, on top of its great adaptability into the system of the host country, indicates that CE has the definite possibility of being a great therapy to implement in developing countries. Albeit that the treatment adherence of the therapy should be ascertained as it influences success.

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Appendix A
Scoring form Gross Motor Skills FGMS

Name child:

Mark the gross motor milestones with either a ✓ or a ✗, when the milestone is respectively mastered or not and add up the number of mastered milestones.

Gross motor milestones	Mastered?
1. Fetal position	
2. Lifting head	
3. Sit with support	
4. Sit with support; head steady	
5. Roll over from prone to supine position	
6. Roll over from supine to prone position	
7. Sit without support; body is not upright	
8. Sit without support; body is upright	
9. Creep	
10. Crawl	
11. Standing with support	
12. Walking with support	
13. Walking without support	
Total of mastered milestones	

Appendix B
Scoring form for fine motor scales FGMS

The used objects



Picture 1. Pin (small object)



Picture 2. Crayon (middle object)



Picture 3. Block (big object)

7 milestones in reaching and grasping behaviour



Reaching, but no contact (1)



Contact only, no grasping (2)



Primitive squeeze (3)



Hand grasp (4)



Inferior pincer grasp (5)



Superior grasp (6)

Mark the fine motor milestones that are shown after presenting the object with a ✓. The italic number in brackets forms the score for the fine motor subscale.

Fine motor milestones	Showed way of reaching/grasping
0. No reaching	
1. Reaching, but no contact	
2. Contact only (no grasping)	
3. Primitive squeeze: palm and fingers enclose the object	
4. Hand grasp: claw-like move from above, with fingers and thumb in a parallel position	
5. Inferior pincer grasp: grasping with a stretched thumb and several fingers	
6. Superior pincer grasp: grasping with a bended thumb and forefinger	
Number of the showed way of reaching or grasping	

Appendix C

Scoring form of Conductive Education Integrity Scale (CEIS)

Date of observation:						
Measurement:						
Name child:						
Name childcare worker:						
Motivational elements	Never	Sometimes	Regularly	Often	Always	N.A.
1. Give positive reinforcement when the child did something right by facial expression, verbal expression and vocalisation.	<input type="radio"/>					
2. Shows enthusiasm by verbal- and/or facial expression.	<input type="radio"/>					
3. Use of singing and rhythmic speech in the right way.	<input type="radio"/>					
4. Is responsive to the social cues of the child.	<input type="radio"/>					
5. Creates a nice group atmosphere.	<input type="radio"/>					
Therapy action elements	Never	Sometimes	Regularly	Often	Always	N.A.
6. Challenges the child.	<input type="radio"/>					
7. Gives physical help adapted to the child's needs.	<input type="radio"/>					
8. Gives verbal instructions adapted to the child's needs.	<input type="radio"/>					
9. Good use of supportive objects when needed.	<input type="radio"/>					
10. Is the action executed as intended and written in the protocol?	<input type="radio"/>					
Overall impression of the quality:	Poor	Moderate	Average	Above average	Good	
	<input type="radio"/>					

Scoring for each item:

Item 1 Gives positive reinforcement when the child does something right by facial expression, verbal expression and vocalisation.

Never: Gives no positive reinforcement at all when the child does something right.

Sometimes: Gives some positive reinforcement.

Regularly: Gives positive reinforcement half of the time when the child does something right.

Often: Gives most of the time a positive reinforcement when the child does something right.

Always: Gives positive reinforcement every time the child does something right.

N.A.: The child does nothing right, so there is no reason for positive reinforcement.

Item 2 Shows enthusiasm by verbal- and/or facial expression.

Never: Shows no enthusiasm towards the child.

Sometimes: Shows some enthusiasm during the practicing of the goal.

Regularly: Shows enthusiasm half of the time during the practicing of the goal.

Often: Shows enthusiasm most of the time during the practicing of the goal.

Always: Shows enthusiasm the whole time during the practicing of the goal.

Item 3 Use of singing and rhythmic speech in the right way.

Never: No use of singing or rhythmic speech during the practicing of the goal.

Sometimes: Some use of singing or rhythmic speech during the practicing of the goal.

Regularly: Use of singing or rhythmic speech half of the time during the practicing of the goal.

Often: Use of singing or rhythmic speech, most of the time during the practicing of the goal.

Always: Use of singing or rhythmic speech the whole time during the practicing of the goal.

Item 4 The childcare worker is responsive to the social cues of child. Social responsiveness means that the childcare worker responds adequately to the child's social cues, either negative or positive (Brune & Woodward, 2007), whereby a positive social cue stimulates similar actions of the childcare worker and a negative social cue stops or changes the ongoing action of the childcare

Never: Is not socially responsive at all.

Sometimes: Is very rarely socially responsive.

Regularly: Is socially responsive half of the time.

Often: Is socially responsive towards the child most of the time.

Always: Is socially responsive all of the time.

Item 5 Creates a nice group atmosphere.

Never: Makes no effort to create a nice group atmosphere.

Sometimes: Makes some effort to create a nice group atmosphere, but rarely.

Regularly: Makes some effort to create a nice group atmosphere.

Often: Creates a nice group atmosphere most of the time.

Always: Creates a nice group atmosphere all the time.

Item 6 Challenges the child.

Never: Does not challenge the child at all.

Sometimes: Challenges the child sometimes.

Regularly: Challenges the child some times during the session.

Often: Challenges the child most of the time, but not always when possible.

Always: Always challenges the child to reach their full potential.

Item 7 Gives physical help adapted to the child's needs.

Never: Gives no physical help, whilst the child does need it.

Sometimes: Gives some physical help, but not adjusted to the child's needs.

Regularly: Gives some physical help, half of the time when the child needs it.

Often: Gives physical help most of the time when needed.

Always: Gives physical help the whole time during the practicing of the goal, adjusted to the child's needs.

N.A.: No physical help was needed during the practicing of the goal.

Item 8 Gives verbal instructions adapted to the child's needs.

Never: Gives no verbal instructions, whilst the child does need it.

Sometimes: Gives some verbal instructions, but not adjusted to the child's needs.

Regularly: Gives some verbal instructions, half of the time when the child needs it.

Often: Gives verbal instructions most of the time when needed.

Always: Gives verbal instructions the whole time during the practicing of the goal, adjusted to the child's needs.

N.A.: No verbal instructions where needed during the practicing of the goal.

Item 9 Good use of supportive objects when needed.

Never: There were no supportive objects used, whilst they were needed.

Sometimes: Supportive objects were used, but in the wrong way or only sometimes.

Regularly: There were supportive objects used, but only half of the time during the practicing of the goal.

Often: Supportive objects were used most of the time, but not all the time, during the practicing of the goal.

Always: Good use of supportive objects the whole time during the practicing of the goal.

N.A.: No supportive objects were needed during the practicing of the goal.

Item 10 Is the action executed as intended and written in the described goal?

Never: The action was not executed as intended and written in the protocol at all.

Sometimes: The action was executed badly, but it was tried to do it as written in the protocol.

Regularly: The action was executed moderately, but it was tried to do it as was written in the protocol.

Often: The action was executed good, but not exactly as it was written in the protocol.

Always: The action was executed as intended and written in the protocol.

Reference

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Appendix D

Individual CE Goals and specific outcomes

Matched controls

Pair 1

1.

1. -2 Stand holding on to a small chair fixed against the wall independently with his head up for 5 seconds
 -1 Stand holding on to a small chair fixed against the wall independently with his head up for 10 seconds
 0 Stand holding on to a small chair fixed against the wall independently with his head up for 15 seconds
 1 Stand holding on to a small chair fixed against the wall independently with his head up for 20 seconds
 2 Stand holding on to a small chair fixed against the wall independently with his head up for 25 seconds

2. -2 Creep independently for a length of 10 metres with verbal motivation
 -1 Creep independently for a length of 15 metres with verbal motivation
 0 Creep independently for a length of 20 metres with verbal motivation
 1 Creep independently for a length of 25 metres with verbal motivation
 2 Creep independently for a length of 30 metres with verbal motivation

Daily situation

- 2 Creep independently from the therapy room to the bathroom with verbal motivation
- 1 Creep independently from the therapy room to the community room with verbal motivation
- 0 Creep independently from the therapy room to the bedroom with verbal motivation
- 1 Creep independently from the therapy room to the bedroom and back to the community room with verbal motivation
- 2 Creep independently from the therapy room to the bedroom and back

with verbal motivation

2.

1.
 - 2 Stand up with little physical help from sitting and hold herself facing forward for a period of 5 seconds at the ladder
 - 1 Stand up with little physical help from sitting and hold herself facing forward for a period of 10 seconds at the ladder
 - 0 Stand up independently from sitting and hold herself facing forward for a period of 10 seconds at the ladder
 - 1 Stand up independently from sitting and hold herself facing forward for a period of 20 seconds at the ladder
 - 2 Stand up independently from sitting and hold herself facing forward for a period of 30 seconds at the ladder

Note: legs will not be straight

Daily situation:

- 2 Stand up with little physical help from sitting on the floor and hold herself facing forward for a period of 5 seconds at the end of her bed
 - 1 Stand up with little physical help from sitting on the floor and hold herself facing forward for a period of 10 seconds at the end of her bed
 - 0 Stand up independently from sitting on the floor and hold herself facing forward for a period of 10 seconds at the end of her bed
 - 1 Stand up independently from sitting on the floor and hold herself facing forward for a period of 20 seconds at the end of her bed
 - 2 Stand up independently from sitting on the floor and hold herself facing forward for a period of 30 seconds at the end of her bed
-
2.
 - 2 Crawl reciprocally for a length of 10 metres with verbal motivation
 - 1 Crawl reciprocally for a length of 15 metres with verbal motivation
 - 0 Crawl reciprocally for a length of 20 metres with verbal motivation
 - 1 Crawl reciprocally for a length of 25 metres with verbal motivation
 - 2 Crawl reciprocally for a length of 30 metres with verbal motivation

Pair 2

3.

1.
 - 2 Pick up a paintbrush, put it in the paint and then make marks on a piece of paper with hand-over-hand support
 - 1 Pick up a paintbrush, put it in the paint and then make marks on a piece of paper with some physical support
 - 0 Consistently pick up a paintbrush, put it in the paint and then make marks on a piece of paper with verbal instructions only
 - 1 Consistently pick up a paintbrush, put it in the paint and then make marks on a piece of paper with no support, do this 2 times
 - 2 Consistently pick up a paintbrush, put it in the paint and then make marks on a piece of paper with no support, do this 4 times

Daily situation:

- 2 Pick up a paintbrush, put it in the paint and then make marks on a piece of paper with hand-over-hand support
 - 1 Pick up a paintbrush, put it in the paint and then make marks on a piece of paper with little support
 - 0 Consistently pick up a paintbrush, put it in the paint and then make marks on a piece of paper with no support
 - 1 Consistently pick up a paintbrush, put it in the paint and then make marks on a piece of paper with no support, do this 2 times
 - 2 Consistently pick up a paintbrush, put it in the paint and then make marks on a piece of paper with no support, do this 4 times

2.
 - 2 Remove a push on – pull off lid and put an object inside with verbal instructions only, without replacing the lid on top of the jar
 - 1 Independently remove a push on – pull off lid and put an object inside before replacing the lid loosely but accurately with verbal instructions only
 - 0 Independently remove a push on – pull off lid and put an object inside before replacing the lid loosely but accurately
 - 1 Independently remove a push on – pull off lid and put an object inside before replacing the lid firmly
 - 2 Independently remove a push on – pull off lid and put an object inside,

replacing the lid firmly before repeating the process with a second object

4.

1.
 - 2 Use 1 colour in a painting, using the correct brush for every colour, picking up and replacing brushes accurately in the correct tray
 - 1 Use 2 colours in a painting, using the correct brush for every colour, picking up and replacing brushes accurately in the correct tray
 - 0 Use 3 colours in a painting, using the correct brush for every colour, picking up and replacing brushes accurately in the correct tray
 - 1 Use 4 colours in a painting, using the correct brush for every colour, picking up and replacing brushes accurately in the correct tray
 - 2 Use 5 colours in a painting, using the correct brush for every colour, picking up and replacing brushes accurately in the correct tray

2.
 - 2 Open a screw jar by pulling off the lid, not twisting
 - 1 Unscrew a half loosened screw lid from a plastic jar and remove an item with verbal instructions only, without replacing the lid back on top of the jar
 - 0 Unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar with verbal instructions only
 - 1 Unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar and making some effort to re-screw it with verbal instructions only
 - 2 Unscrew a half loosened screw lid from a plastic jar and remove an item before re-screwing the lid on top of the jar with verbal instructions only

Daily situation:

- 2 Unscrew a half loosened screw lid from a plastic jar and remove an item with verbal instructions only, without replacing the lid back on top of the jar
- 1 Unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar with verbal instructions only

0 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar

1 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar and making some effort to re-screw it

2 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before re-screwing the lid on top of the jar

Pair 3

5.

1.
 - 2 Creep a distance of 0,5 metre with verbal encouragement
 - 1 Creep a distance of 1 metres with verbal encouragement
 - 0 Creep a distance of 2 metres with verbal encouragement
 - 1 Creep a distance of 2,5 metres with verbal encouragement
 - 2 Creep a distance of 3 metres with verbal encouragement

Daily situation:

- 2 Creep a distance of 0,5 metre with verbal encouragement
- 1 Creep a distance of 1 metres with verbal encouragement
- 0 Creep a distance of 2 metres with verbal encouragement
- 1 Creep a distance of 2,5 metres with verbal encouragement
- 2 Creep a distance of 3 metres with verbal encouragement

2.
 - 2 Sit on the black chair and kick a ball 1-2 times in 5 minutes
 - 1 Sit on the black chair and kick a ball 3-4 times in 5 minutes
 - 0 Sit on the black chair and kick a ball 5-6 times in 5 minutes
 - 1 Sit on the black chair and kick a ball 7-8 times in 5 minutes
 - 2 Sit on the black chair and kick a ball 9-10 times in 5 minutes

6.

1.
 - 2 Creep a distance of 1 metre with verbal encouragement
 - 1 Creep a distance of 3 metres with verbal encouragement

- 0 Creep a distance of 5 metres with verbal encouragement
- 1 Creep a distance of 7 metres with verbal encouragement
- 2 Creep a distance of 9 metres with verbal encouragement

- 2.
- 2 Sit on a roll for 7 minutes with an adult behind her and within that time hold her balance without physical support for a period of 1 second 3 times
 - 1 Sit on a roll for 7 minutes with an adult behind her and within that time hold her balance without physical support for a period of 3 seconds 3 times
 - 0 Sit on a roll for 10 minutes with an adult behind her and within that time hold her balance without physical support for a period of 3 seconds 3 times
 - 1 Sit on a roll for 10 minutes with an adult behind her and within that time hold her balance without physical support for a period of 5 seconds 3 times
 - 2 Sit on a roll for 10 minutes with an adult behind her and within that time hold her balance without physical support for a period of 7 seconds 3 times

Note: The adult will need to spend time settling her and gradually reducing their support before attempting to let go of her and should remain seated behind her throughout.

Daily situation:

- 2 Sit on the CE chair for 7 minutes with an adult behind her and within that time hold her balance without physical support for a period of 1 second 3 times
- 1 Sit on the CE chair for 7 minutes with an adult behind her and within that time hold her balance without physical support for a period of 3 seconds 3 times
- 0 Sit on the CE chair for 10 minutes with an adult behind her and within that time hold her balance without physical support for a period of 3 seconds 3 times
- 1 Sit on the CE chair for 10 minutes with an adult behind her and within that time hold her balance without physical support for a period of 5 seconds 3 times
- 2 Sit on the CE chair for 10 minutes with an adult behind her and within that time hold her balance without physical support for a period of 7 seconds 3 times

times

Note: The adult will need to spend time settling her and gradually reducing their support before attempting to let go of her and should remain seated behind her throughout.

Pair 4

7.

1.
 - 2 Respond to a motivating object e.g. ball when lying on the floor
 - 1 Respond and attempt to go after a motivating object e.g. ball when lying on the floor
 - 0 Respond and go after a motivating object e.g. ball when lying on the floor for 0,5 metre
 - 1 Respond and go after a motivating object e.g. ball when lying on the floor for 1 metre
 - 2 Respond and go after a motivating object e.g. ball when lying on the floor for 2 metres

Daily situation:

- 2 Respond to a motivating object e.g. ball when lying on the floor of Ekhayaletu
 - 1 Respond and attempt to go after a motivating object e.g. ball when lying on the floor of Ekhayaletu
 - 0 Consistently respond and attempt to go after a motivating object e.g. ball when lying on the floor of Ekhayaletu
 - 1 Consistently respond and attempt to go after 2 motivating objects e.g. ball when lying on the floor of Ekhayaletu
 - 2 Consistently respond and attempt to go after 3 amotivating objects e.g. ball when lying on the floor of Ekhayaletu
2.
 - 2 Sit on a large roll with little physical support for a period of 3 minutes
 - 1 Sit on a large roll with little physical support for a period of 5 minutes
 - 0 Sit on a large roll with no physical support for a period of 5 minutes
 - 1 Sit on a large roll with no physical support for a period of 7 minutes
 - 2 Sit on a large roll with no physical support for a period of 10 minutes

Note: The adult will need to hold the roll in place

8.

1.
 - 2 Consistently visually locate a motivating object that appears from 1 direction with a sound
 - 1 Consistently visually locate a motivating object that appears from 2 directions with a sound
 - 0 Consistently visually locate a motivating object that may appear from 3 directions with a sound
 - 1 Consistently visually locate a motivating object that may appear from 3 directions with and without a sound
 - 2 Consistently visually locate a motivating object that may appear from 4 or more directions with and without a sound

2.
 - 2 Sit on a large roll with little physical support for a period of 3 minutes
 - 1 Sit on a large roll with little physical support for a period of 5 minutes
 - 0 Sit on a large roll with no physical support for a period of 5 minutes
 - 1 Sit on a large roll with no physical support for a period of 7 minutes
 - 2 Sit on a large roll with no physical support for a period of 10 minutes

Note: The adult will need to hold the roll in place

Daily situation:

- 2 Sit on a large roll with little physical support for a period of 3 minutes
- 1 Sit on a large roll with little physical support for a period of 5 minutes
- 0 Sit on a large roll with no physical support for a period of 5 minutes
- 1 Sit on a large roll with no physical support for a period of 7 minutes
- 2 Sit on a large roll with no physical support for a period of 10 minutes

Pair 5

9.

1.
 - 2 Lift his head for 1 second whilst lying on his tummy over a wedge with little physical and verbal support
 - 1 Lift his head for 2 seconds whilst lying on his tummy over a wedge with little physical and verbal support

0 Lift his head for 2 seconds whilst lying on his tummy over a wedge with verbal support only

1 Lift his head for 3 seconds whilst lying on his tummy over a wedge with verbal support only

2 Lift his head for 5 seconds whilst lying on his tummy over a wedge with verbal support only

Daily situation:

-2 Lift his head for 1 second whilst lying in bed on his tummy over a wedge with little physical and verbal support

-1 Lift his head for 2 seconds whilst lying in bed on his tummy over a wedge with little physical and verbal support

0 Lift his head for 2 seconds whilst lying in bed on his tummy over a wedge with verbal support only

1 Independently lift his head for 3 seconds whilst lying in bed on his tummy over a wedge with verbal support only

2 Independently lift his head for 5 seconds whilst lying in bed on his tummy over a wedge with verbal support only

2.
 - 2 Maintain a four point kneeling position with support at the hips, whilst wearing arm and hand splints for a period of 1 minute
 - 1 Maintain a four point kneeling position with minimal support at the hips, whilst wearing arm and hand splints for a period of 1 minute
 - 0 Maintain a four point kneeling position with minimal support at the hips, whilst wearing arm and hand splints for a period of 2 minutes
 - 1 Maintain a four point kneeling position with minimal support at the hips, whilst wearing arm and hand splints for a period of 3 minutes
 - 2 Maintain a four point kneeling position with minimal support at the hips, whilst wearing arm and hand splints for a period of 4 minutes

10.

1.
 - 2 High-kneel at a large roll and remain engaged with her head up for 1 minutes

-1 High-kneel at a large roll and remain engaged with her head up for 2 minutes

0 High-kneel at a large roll and remain engaged with her head up for 3 minutes

1 High-kneel at a large roll and remain engaged with her head up for 4 minutes

2 High-kneel at a large roll and remain engaged with her head up for 5 minutes

2. -2 Stand at a ladder looking up for 1 minute with little physical support

-1 Stand at a ladder looking up for 2 minutes with little physical support

0 Stand independently at a ladder looking up for 2 minutes

1 Stand independently at a ladder looking up for 3 minutes

2 Stand independently at a ladder looking up for 4 minutes

Note: Will need initial adult assistance to grasp the ladder and to obtain an optimal standing position – once stood the adult must remove physical support but should hold onto the ladder to prevent it from tipping

Daily situation:

-2 Stand at her bed looking up for 1 minute with little physical support

-1 Stand at her bed looking up for 2 minutes with little physical support

0 Stand independently at her bed looking up for 2 minutes

1 Stand independently at her bed looking up for 3 minutes

2 Stand independently at her bed looking up for 4 minutes

Pair 6

11.

1. -2 Colour a shape of $\pm 10 \times 10$ cm, but colouring outside the lines of the shape a lot

-1 Correctly colour a shape of $\pm 10 \times 10$ cm, only colouring outside the lines of the shape for a maximum of 3 cm

0 Correctly colour a shape of $\pm 10 \times 10$ cm, staying within the lines of the shape

1 Correctly colour a shape of $\pm 7 \times 7$ cm, staying within the lines of the shape

2 Correctly colour a shape of $\pm 5 \times 5$ cm, staying within the lines of the shape

Daily situation:

-2 Colour a shape of $\pm 10 \times 10$ cm, but colouring outside the lines of the shape a lot

-1 Correctly colour a shape of $\pm 10 \times 10$ cm, only colouring outside the lines of the shape for a maximum of 3 cm

0 Correctly colour a shape of $\pm 10 \times 10$ cm, staying within the lines of the shape

1 Correctly colour a shape of $\pm 7 \times 7$ cm, staying within the lines of the shape

2 Correctly colour a shape of $\pm 5 \times 5$ cm, staying within the lines of the shape

2. -2 Correctly and consistently point out 3 numbers from 0 to 10 when shown to her

-1 Correctly and consistently point out 6 numbers from 0 to 10 when shown to her

0 Correctly and consistently point out all the numbers from 0 to 10 when shown to her

1 Correctly and consistently point out all the numbers from 0 to 12 when shown to her

2 Correctly and consistently point out all the numbers from 0 to 15 when shown to her

12.

1. -2 Correctly and consistently point out 1 letter from her own name when shown to her

-1 Correctly and consistently point out 3 letters from her own name when shown to her

0 Correctly and consistently point out the letters from her own name when

shown to her

1 Correctly and consistently point out the letters from her own name and the letters A, B and C when shown to her

2 Correctly and consistently point out the letters from her own name and the letters A - F when shown to her

2. -2 Correctly colour a certain number from 0-7 on a paper with different numbers when asked to

-1 Correctly colour a certain number from 0-10 on a paper with different numbers when asked to

0 Correctly colour a certain number from 0-15 on a paper with different numbers when asked to

1 Correctly colour a certain number from 0-17 on a paper with different numbers when asked to

2 Correctly colour a certain number from 0-20 on a paper with different numbers when asked to

Daily situation:

-2 Correctly colour a certain number from 0-7 on a paper with different numbers when asked to

-1 Correctly colour a certain number from 0-10 on a paper with different numbers when asked to

0 Correctly colour a certain number from 0-15 on a paper with different numbers when asked to

1 Correctly colour a certain number from 0-17 on a paper with different numbers when asked to

2 Correctly colour a certain number from 0-20 on a paper with different numbers when asked to

Pair 7

13.

1. 2 Colour a shape of $\pm 10 \times 10$ cm, but colouring outside the lines of the shape a lot

-1 Correctly colour a shape of $\pm 10 \times 10$ cm, only colouring outside the lines of the shape for a maximum of 3 cm

0 Correctly colour a shape of $\pm 10 \times 10$ cm, staying within the lines of the shape

1 Correctly colour a shape of $\pm 7 \times 7$ cm, staying within the lines of the shape

2 Correctly colour a shape of $\pm 5 \times 5$ cm, staying within the lines of the shape

2. -2 Try to open a half loosened screw lid from a plastic jar

-1 Unscrew a half loosened screw lid from a plastic jar and remove an item with verbal instructions only, without replacing the lid back on top of the jar

0 Unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar with verbal instructions only

1 Unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar and making some effort to re-screw it with verbal instructions only

2 Unscrew a half loosened screw lid from a plastic jar and remove an item before re-screwing the lid on top of the jar with verbal instructions only

Daily situation:

-2 Unscrew a half loosened screw lid from a plastic jar and remove an item with verbal instructions only, without replacing the lid back on top of the jar

-1 Unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar with verbal instructions only

0 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar

1 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar and making some effort to re-screw it

2 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before re-screwing the lid on top of the jar

14.

1. -2 Sit on the small blue-striped roll for 1 minute with verbal support only

- 1 Sit on the small blue-striped roll for 2 minutes with verbal support only
- 0 Sit on the small blue-striped roll for 4 minutes with verbal support only
- 1 Sit on the small blue-striped roll for 6 minutes with verbal support only
- 2 Sit on the small blue-striped roll for 8 minutes with verbal support only

Daily situation:

- 2 Sit in Ekhayaletu on the small blue-striped roll for 1 minute with verbal support only
- 1 Sit in Ekhayaletu on the small blue-striped roll for 2 minutes with verbal support only
- 0 Sit in Ekhayaletu on the small blue-striped roll for 4 minutes with verbal support only
- 1 Sit in Ekhayaletu on the small blue-striped roll for 6 minutes with verbal support only
- 2 Sit in Ekhayaletu on the small blue-striped roll for 8 minute with verbal support only

2.
 - 2 Unscrew a half loosened screw lid from a plastic jar and remove an item with verbal instructions only, without replacing the lid back on top of the jar
 - 1 Unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar with verbal instructions only
 - 0 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar
 - 1 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before replacing the lid on top of the jar and making some effort to re-screw it
 - 2 Independently unscrew a half loosened screw lid from a plastic jar and remove an item before re-screwing the lid on top of the jar

Pair 8

15.

1.
 - 2 Jump over 1 wedge without touching it or falling

- 1 Jump over 3 wedges without touching them or falling
- 0 Jump over 4 wedges without touching them or falling
- 1 Jump over 5 wedges without touching them or falling
- 2 Jump over 6 wedges without touching them or falling

- 2.
 - 2 Stand on 1 leg for 1 second
 - 1 Stand on 1 leg for 3 seconds
 - 0 Stand on 1 leg for 5 seconds
 - 1 Stand on 1 leg for 7 seconds
 - 2 Stand on 1 leg for 10 seconds

16.

- 1.
 - 2 Jump over 2 wedges without standing on them or falling
 - 1 Jump over 4 wedges without standing on them or falling
 - 0 Jump over 6 wedges without standing on them or falling
 - 1 Jump over 8 wedges without standing on them or falling
 - 2 Jump over 10 wedges without standing on them or falling

- 2.
 - 2 Stand on 1 leg for 5 seconds
 - 1 Stand on 1 leg for 7 seconds
 - 0 Stand on 1 leg for 10 seconds
 - 1 Stand on 1 leg for 13 seconds
 - 2 Stand on 1 leg for 15 seconds

Pair 9**17.**

- 1.
 - 2 Throw 1 out of 8 balls into a bin from a distance of 3 metres
 - 1 Throw 3 out of 8 balls into a bin from a distance of 3 metres
 - 0 Throw 5 out of 8 balls into a bin from a distance of 3 metres
 - 1 Throw 7 out of 8 balls into a bin from a distance of 3 metres

2 Throw 8 out of 8 balls into a bin from a distance of 3 metres

2. -2 Jump 2 times in a skipping rope without failing
 -1 Jump 3 times in a skipping rope without failing
 0 Jump 4 times in a skipping rope without failing
 1 Jump 5 times in a skipping rope without failing
 2 Jump 6 times in a skipping rope without failing

18.

1. -2 Throw 1 out of 8 balls into a bin from a distance of 3 metres
 -1 Throw 3 out of 8 balls into a bin from a distance of 3 metres
 0 Throw 5 out of 8 balls into a bin from a distance of 3 metres
 1 Throw 7 out of 8 balls into a bin from a distance of 3 metres
 2 Throw 8 out of 8 balls into a bin from a distance of 3 metres
2. -2 Jump 4 times in a skipping rope without failing
 -1 Jump 5 times in a skipping rope without failing
 0 Jump 6 times in a skipping rope without failing
 1 Jump 7 times in a skipping rope without failing
 2 Jump 8 times in a skipping rope without failing

Pair 10

19.

1. -2 Throw 1 out of 8 balls into a bin from a distance of 3 metres
 -1 Throw 3 out of 8 balls into a bin from a distance of 3 metres
 0 Throw 5 out of 8 balls into a bin from a distance of 3 metres
 1 Throw 7 out of 8 balls into a bin from a distance of 3 metres
 2 Throw 8 out of 8 balls into a bin from a distance of 3 metres
2. -2 Jump 2 times in a skipping rope without failing
 -1 Jump 3 times in a skipping rope without failing

- 0 Jump 4 times in a skipping rope without failing
- 1 Jump 5 times in a skipping rope without failing
- 2 Jump 6 times in a skipping rope without failing

20.

1.
 - 2 Throw 1 out of 8 balls into a bin from a distance of 3 metres
 - 1 Throw 3 out of 8 balls into a bin from a distance of 3 metres
 - 0 Throw 5 out of 8 balls into a bin from a distance of 3 metres
 - 1 Throw 7 out of 8 balls into a bin from a distance of 3 metres
 - 2 Throw 8 out of 8 balls into a bin from a distance of 3 metres

2.
 - 2 Jump 2 times in a skipping rope without failing
 - 1 Jump 3 times in a skipping rope without failing
 - 0 Jump 4 times in a skipping rope without failing
 - 1 Jump 5 times in a skipping rope without failing
 - 2 Jump 6 times in a skipping rope without failing

Pair 11**21.**

1.
 - 2 Hold an object for 5 seconds
 - 1 Hold an object for 10 seconds
 - 0 Hold an object for 15 seconds
 - 1 Hold an object for 20 seconds
 - 2 Hold an object for 25 seconds

2.
 - 2 Roll the ball to an adult 1 times in 5 minutes
 - 1 Roll the ball to an adult 2 times in 5 minutes
 - 0 Roll the ball to an adult 3 times in 5 minutes
 - 1 Roll the ball to an adult 4 times in 5 minutes
 - 2 Roll the ball to an adult 5 times in 5 minutes

22.

1.
 - 2 Hold an object with her right hand for 5 seconds
 - 1 Hold an object with her right hand for 7 seconds

- 0 Hold an object with her right hand for 10 seconds
- 1 Hold an object with her right hand for 15 seconds
- 2 Hold an object with her right hand for 20 seconds

- 2.
 - 2 Kick the ball to an adult 1 time in 5 minutes
 - 1 Kick the ball to an adult 2 times in 5 minutes
 - 0 Kick the ball to an adult 3 times in 5 minutes
 - 1 Kick the ball to an adult 4 times in 5 minutes
 - 2 Kick the ball to an adult 5 times in 5 minutes

Note: she has to sit on a chair while kicking the ball

Pair 12

23.

- 1.
 - 2 Jump 1 time in a skipping rope without failing
 - 1 Jump 2 times in a skipping rope without failing
 - 0 Jump 3 times in a skipping rope without failing
 - 1 Jump 4 times in a skipping rope without failing
 - 2 Jump 5 times in a skipping rope without failing

- 2.
 - 2 Roll 1/10 marbles into a cup on the floor
 - 1 Roll 3/10 marbles into a cup on the floor
 - 0 Roll 5/10 marbles into a cup on the floor
 - 1 Roll 7/10 marbles into a cup on the floor
 - 2 Roll 9/10 marbles into a cup on the floor

24.

- 1.
 - 2 Roll 1/10 marbles into a cup on the floor
 - 1 Roll 3/10 marbles into a cup on the floor
 - 0 Roll 5/10 marbles into a cup on the floor
 - 1 Roll 7/10 marbles into a cup on the floor
 - 2 Roll 9/10 marbles into a cup on the floor

2.
 - 2 Jump 1 time in a skipping rope without failing
 - 1 Jump 2 times in a skipping rope without failing
 - 0 Jump 3 times in a skipping rope without failing
 - 1 Jump 4 times in a skipping rope without failing
 - 2 Jump 5 times in a skipping rope without failing

Pair 13

25.

1.
 - 2 W-sit with her hands in front of her for 2 seconds
 - 1 W-sit with her hands in front of her for 4 seconds
 - 0 W-sit with her hands in front of her for 6 seconds
 - 1 W-sit with her hands in front of her for 8 seconds
 - 2 W-sit with her hands in front of her for 10 seconds

2.
 - 2 Sit with straight legs for 5 seconds
 - 1 Sit with straight legs for 7 seconds
 - 0 Sit with straight legs for 10 seconds
 - 1 Sit with straight legs for 15 seconds
 - 2 Sit with straight legs for 20 seconds

26.

1.
 - 2 Lie on her stomach on the big ball and lift her head for 30 seconds
 - 1 Lie on her stomach on the big ball and lift her head for 50 seconds
 - 0 Lie on her stomach on the big ball and lift her head for 1,10 minute
 - 1 Lie on her stomach on the big ball and lift her head for 1 ½ minute
 - 2 Lie on her stomach on the big ball and lift her head for 2 minutes

Note: head should not be overly tilted to the side

2.
 - 2 Sit crossed legged against the wall with support from cushions for 5 minutes without whining
 - 1 Sit crossed legged against the wall with support from cushions for 6 minutes without whining
 - 0 Sit crossed legged against the wall with support from cushions for 7 minutes

without whining

1 Sit crossed legged against the wall with support from cushions for 8 minutes without whining

2 Sit crossed legged against the wall with support from cushions for 9 minutes without whining

Pair 14

27.

1.
 - 2 With her left hand, pick up 2 lego pieces that are lying outside of the box and put them in the box in 5 minutes
 - 1 With her left hand, pick up 4 lego pieces that are lying outside of the box and put them in the box in 5 minutes
 - 0 With her left hand, pick up 6 lego pieces that are lying outside of the box and put them in the box in 5 minutes
 - 1 With her left hand, pick up 8 lego pieces that are lying outside of the box and put them in the box in 5 minutes
 - 2 With her left hand, pick up 10 lego pieces that are lying outside of the box and put them in the box in 5 minutes

2.
 - 2 Whilst lying on her back, get up into a sitting position with physical help in 2 minutes
 - 1 Whilst lying on her back, get up into a sitting position with little help in 2 minutes
 - 0 Whilst lying on her back, get up into a sitting position independently in 2 minutes
 - 1 Whilst lying on her back, get up into a sitting position independently in 1,5 minute
 - 2 Whilst lying on her back, get up into a sitting position independently in 1 minute

28.

1.
 - 2 Stand as straight as possible for 20 seconds
 - 1 Stand as straight as possible for 30 seconds

- 0 Stand as straight as possible for 45 seconds
- 1 Stand as straight as possible for 1 minute
- 2 Stand as straight as possible for 1,5 minute

- 2.
 - 2 Grab things with her right hand with physical help
 - 1 Grab things with her right hand with little physical help
 - 0 Grab things with her right hand with little physical help with her thumb
 - 1 Grab things with her right hand with verbal help only
 - 2 Independently grab things with her right hand

Pair 15

29.

- 1.
 - 2 Walk from the wall to the gate and back in 3 ½ minutes
 - 1 Walk from the wall to the gate and back in 2 ½ minutes
 - 0 Walk from the wall to the gate and back in 2 minutes
 - 1 Walk from the wall to the gate and back in 1 ½ minute
 - 2 Walk from the wall to the gate and back in 1 minute

- 2.
 - 2 Stand on 1 leg for 1 second
 - 1 Stand on 1 leg for 3 seconds
 - 0 Stand on 1 leg for 5 seconds
 - 1 Stand on 1 leg for 7 seconds
 - 2 Stand on 1 leg for 10 seconds

30.

- 1.
 - 2 Stand on 1 leg without support for 1 second
 - 1 Stand on 1 leg without support for 3 seconds
 - 0 Stand on 1 leg without support for 5 seconds
 - 1 Stand on 1 leg without support for 7 seconds
 - 2 Stand on 1 leg without support for 10 seconds

- 2.
 - 2 Jump with 2 legs at the time 3 times without losing balance
 - 1 Jump with 2 legs at the time 5 times without losing balance
 - 0 Jump with 2 legs at the time 7 times without losing balance

- 1 Jump with 2 legs at the time 9 times without losing balance
- 2 Jump with 2 legs at the time 11 times without losing balance

Pair 16**31.**

- 1.
 - 2 Stand on 1 leg without support for 1 second
 - 1 Stand on 1 leg without support for 3 seconds
 - 0 Stand on 1 leg without support for 5 seconds
 - 1 Stand on 1 leg without support for 7 seconds
 - 2 Stand on 1 leg without support for 10 seconds

- 2.
 - 2 Jump with 2 legs at the time 1 time without losing balance
 - 1 Jump with 2 legs at the time 2 times without losing balance
 - 0 Jump with 2 legs at the time 3 times without losing balance
 - 1 Jump with 2 legs at the time 4 times without losing balance
 - 2 Jump with 2 legs at the time 5 times without losing balance

32.

- 1.
 - 2 Stand on 1 leg without support for 1 second
 - 1 Stand on 1 leg without support for 3 seconds
 - 0 Stand on 1 leg without support for 5 seconds
 - 1 Stand on 1 leg without support for 7 seconds
 - 2 Stand on 1 leg without support for 10 seconds

- 2.
 - 2 Jump with 2 legs at the time 3 time without losing balance
 - 1 Jump with 2 legs at the time 5 times without losing balance
 - 0 Jump with 2 legs at the time 7 times without losing balance
 - 1 Jump with 2 legs at the time 9 times without losing balance
 - 2 Jump with 2 legs at the time 11 times without losing balance

Singles

33.

1.
 - 2 Sit on her knees with her bum on her heels (w-sitting) for 1 minute
 - 1 Sit on her knees with her bum on her heels (w-sitting) for 1,5 minute
 - 0 Sit on her knees with her bum on her heels (w-sitting) for 2 minutes
 - 1 Sit on her knees with her bum on her heels (w-sitting) for 2,5 minute
 - 2 Sit on her knees with her bum on her heels (w-sitting) for 3 minutes

2.
 - 2 Sit with straight legs for 10 seconds
 - 1 Sit with straight legs for 20 seconds
 - 0 Sit with straight legs for 30 seconds
 - 1 Sit with straight legs for 40 seconds
 - 2 Sit with straight legs for 50 seconds

34.

1.
 - 2 Roll 1/7 marbles into a cup on a table
 - 1 Roll 3/7 marbles into a cup on a table
 - 0 Roll 4/7 marbles into a cup on a table
 - 1 Roll 5/7 marbles into a cup on a table
 - 2 Roll 6/7 marbles into a cup on a table

2.
 - 2 Close all the buttons on a blouse in x minutes
 - 1 Close all the buttons on a blouse in x minutes
 - 0 Close all the buttons on a blouse in x minutes
 - 1 Close all the buttons on a blouse in x minutes
 - 2 Close all the buttons on a blouse in x minutes

35.

1.
 - 2 With her left hand, pick up 10 different small objects and place them in the indented area of her table in 2 ½ minutes
 - 1 With her left hand, pick up 10 different small objects and place them in the indented area of her table in 2 minutes
 - 0 With her left hand, pick up 10 different small objects and place them in the

indented area of her table in 1 ½ minute

1 With her left hand, pick up 10 different small objects and place them in the indented area of her table in 1 minute

2 With her left hand, pick up 10 different small objects and place them in the indented area of her table in 30 seconds

2. -2 Step over wedges, not jumping
 -1 Jump over 1 wedge without falling
 0 Jump over 2 wedges without falling
 1 Jump over 3 wedges without falling

36.

1. -2 Sit on his knees with his bum on his heels (w-sitting) for 5 seconds
 -1 Sit on his knees with his bum on his heels (w-sitting) for 7 seconds
 0 Sit on his knees with his bum on his heels (w-sitting) for 10 seconds
 1 Sit on his knees with his bum on his heels (w-sitting) for 12 seconds
 2 Sit on his knees with his bum on his heels (w-sitting) for 15 seconds
2. -2 Consistently sit crossed legged against the wall with his back straight for 5 seconds
 -1 Consistently sit crossed legged against the wall with his back straight for 10 seconds
 0 Consistently sit crossed legged against the wall with his back straight for 15 seconds
 1 Consistently sit crossed legged against the wall with his back straight for 20 seconds
 2 Consistently sit crossed legged against the wall with his back straight for 25 seconds

37.

1. -2 Move one of her hands in order to remove a cloth obstructing her face with

little physical help and verbal instructions

-1 Move one of her hands in order to remove a cloth obstructing her face with verbal instructions only

0 Purposefully move one of her hands in order to remove a cloth obstructing her face

1 Incidentally purposefully move one of her hands in order to reach towards a familiar object and to remove a cloth obstructing her face

2 Consistently and purposefully move one of her hands in order to reach towards a familiar object and to remove a cloth obstructing her face

Daily situation:

-2 Move one of her hands in order to remove a cloth obstructing her face with little physical help and verbal instructions

-1 Move one of her hands in order to remove a cloth obstructing her face with verbal instructions only

0 Purposefully move one of her hands in order to remove a cloth obstructing her face

1 Purposefully move one of her hands in order to reach towards a familiar object or remove a cloth obstructing her face

2 Consistently and purposefully move one of her hands in order to reach towards a familiar object or remove a cloth obstructing her face

2. -2 Consistently, whilst lying on her tummy, look at a familiar object or mirror

-1 Consistently, whilst lying on her tummy, visually track a familiar object or mirror from left to right

0 Consistently, whilst lying on her tummy, visually track a familiar object or mirror from left to right and back again

1 Consistently, whilst lying on her tummy, visually track a familiar object or mirror from left to right and back again twice

2 Consistently, whilst lying on her tummy, visually track a familiar object or mirror from left to right and up and down

Appendix D

GAS-scores on trained skills after 10 and 20 sessions, broken down by home and daycares

	-2	-1	0	1	2	Total
<u>After 10 sessions</u>						
Home	9 (50%)	5 (27.8%)	2 (11.1%)	0	2 (11.1%)	18
Daycares	11 (57.9%)	4 (21.2%)	1 (5.3%)	2 (10.5%)	1 (5.3%)	19
<u>After 20 sessions</u>						
Home	5 (27.8%)	4 (22.2%)	3 (16.7%)	1 (5.6%)	5 (27.8%)	18
Daycares	7 (36.8%)	4 (26.3%)	3 (15.8%)	1 (5.3%)	2 (15.8%)	19

Note. -2: baseline level before CE, -1: less improvement than the expected level of attainment after CE, 0: the expected level of attainment after CE, 1: slightly more improvement than the expected level, 2: clearly larger improvement than the expected level.