Running title: Promoting peer interactions among persons with PIMD

Promoting social scaffolding behaviours in staff members and peer directed
behaviours among persons with profound intellectual and multiple disabilities:

An intervention study

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Abstract

Background Persons with profound intellectual and multiple disabilities (PIMD) present limited peer directed behaviours towards their peers with PIMD. It is not clear how staff can facilitate and promote the mutual peer directed behaviours between persons with PIMD.

Specific Aims In this study we explored if peer directed behaviours among persons with PIMD can be increased by an intervention, that is focused on training the staff in providing social scaffolding behaviours towards their clients.

Method An A-B-B'-C design was used in this study. A baseline condition was followed by two intervention conditions and a follow up. Four staff members participated in a training in which they were informed about peer interactions in persons with PIMD and learned how to promote these interactions. They developed a peer interaction supportive activity. This activity was provided to two persons with PIMD for ten weeks. Social scaffolding behaviours of staff as well as peer directed behaviours of persons with PIMD were coded during video-taped observations.

Findings A significant increase of social scaffolding behaviours of staff members was observed during the intervention with a significant decrease at follow up. Significantly more singular and less multiple peer directed behaviours of persons with PIMD were observed during the intervention. Both singular and multiple peer directed behaviours decreased again at follow up.

Discussion A short training of staff members already positively affects their social scaffolding behaviours, and increases the amount of peer directed behaviours of persons with PIMD. However, the amount of both behaviours decreased again at follow up. This argues to broadly apply this training in services and schools for persons with PIMD and to complement it with continuing staff coaching on this topic.

Introduction

A recent literature review demonstrated that persons with profound intellectual and multiple disabilities (PIMD) are able to engage in peer interactions, despite their multiple cognitive, motor, sensory, and communicative disabilities (Nijs & Maes, 2014). During peer interactions various peer directed behaviours are presented. An increased amount and more varied peer directed behaviours are presented by persons with PIMD during interactions with typically developing peers or with siblings compared to interactions with peers with PIMD (Foreman, Arthur-Kelly, Pascoe, & King, 2004; Hanline, 1993; Logan et al., 1998; Nijs & Maes, 2014; Nijs, Vlaskamp, & Maes, 2014a). These are mainly singular peer directed behaviours in which no combination of looking or directing at the peer with another action such as smiling, waving, or vocalizing is present, although attention for the peer is clearly present (Nijs et al., 2014a; Nijs, Penne, Vlaskamp, & Maes, 2015).

For typically developing infants, adults can support and facilitate peer interactions and peer directed behaviours by presenting social scaffolding behaviour (Williams, Mastergeorge, & Ontai, 2010). Earlier research however has demonstrated that staff members do not provide many opportunities or support for persons with PIMD to facilitate peer directed behaviours (Gleason, 1990; Hunt, Alwell, Farron-Davis, & Goetz, 1996; Logan et al., 1998; Nijs, Vlaskamp, & Maes, 2014b; Nijs et al., 2015). Staff members sometimes distract the attention of the peers away from each other or fail to support adequately social peer interactions among persons with PIMD (Nijs et al., 2014b, 2015). Additionally staff members do not pay a lot of attention to the positioning of persons with PIMD in a way that could facilitate peer interactions among persons with PIMD (Nijs et al., 2015).

In this study, we want to explore if peer directed behaviours among persons with PIMD can be increased by an intervention, focussed on the behaviour of staff members. This is important, since peer interactions can positively influence various developmental and quality of life

outcomes (e.g. Canevello & Crocker, 2010; Hartup & Stevens, 1997; Karelina & De Vries, 2011; Umberson & Montez, 2010). In the people with intellectual disabilities it is demonstrated that peer relationships are important for mental and physical health, quality of life and subjective wellbeing (Garvey & Kroese, 1991; Knox & Hickson, 2001; Schalock & Verdugo, 2002). In particular for persons with PIMD parents and direct support workers indicate interpersonal relationships as a key dimension of their quality of life (Petry, Maes, & Vlaskamp, 2005). In this study we have developed and implemented an intervention to support staff members to provide more opportunities for persons with PIMD to interact with their peers. First, we describe how the activities organised for persons with PIMD during the intervention differ from the activities as they were provided before the intervention. In particular we focus on the positioning of the persons with PIMD and on the nature of the activity. Second, we investigate if staff members present more social scaffolding behaviours during and after the intervention. Third, we investigate if the persons with PIMD present more peer directed behaviours during and after the intervention and if there is an association between the behaviour of staff members and the behaviour of the persons with PIMD.

Methods

Target behaviours

First, we were interested in peer directed behaviours as shown by persons with PIMD. In the coding scheme we used, a distinction between three main categories is made (Nijs et al., 2014a, 2014b). The first category, multiple peer directed behaviours, is coded when a person looks at or turns his head or body in the direction of the peer in combination with another behaviour such as vocalising or touching the peer. The second category, singular peer directed behaviour, is coded when this combination is not present. The person with PIMD looks at the peer or presents another behaviour towards the peer, for example, touching the peer without looking. For both the multiple and singular peer directed behaviours various modalities can be coded:

vocalising, making noises, moving in the direction of the peer, gestures, facial expression, object related behaviour, or touching the peer. The third category captures all non-peer directed behaviours, for example behaviour directed at the environment, not being alert or directed at the staff member.

Second, we were interested in scaffolding behaviour of staff (Nijs et al., 2014b). In the coding scheme three main categories are distinguished. Social scaffolding behaviour, the first category, is coded when the staff member provides guidance, feedback or support during peer interactions. The concrete social scaffolding behaviours are: naming social action (e.g. 'Give it to An'), initiating peer play (e.g. Facilitating ball throwing), including a child in a peer group (e.g. Interacting with the child, together with a peer), initiating proximity (e.g. Placing the children into each other's proximity, bringing two persons with PIMD together and let them feel each other's hands), and communicating about a peer (e.g. 'Look there is Ben'), his/her characteristics (e.g. 'Look, An is holding a ball') or his/her feelings (e.g. 'I think Ben looks sad'). Also offering time to interact and in the meanwhile observing the behaviours of the persons with PIMD is considered as a concrete social scaffolding behaviour. The second category, distracting behaviour, is coded when the staff member interrupts peer interactions. The last category, other behaviour, is coded when the staff member is for example organising the activity or interacts in a one-on-one interaction with one person with PIMD.

The coding was done by three independent observers who used the software package Media Coder 2008. The coding schemes were already applied in earlier research (Nijs et al., 2014a, 2014b). The Cohen's Kappa using a time window of three seconds was calculated for the three main groups. The Kappa coefficient reached a substantial agreement of .72 for the coding scheme for persons with PIMD and .70 for the coding scheme for staff members (Landis & Koch, 1977).

Participants

Four residential facilities for children and adults with PIMD in Flanders were contacted by phone and asked to participate in our study. All four facilities were willing to participate and they were asked to select dyads of persons with PIMD (Nakken & Vlaskamp, 2007) based on the following inclusion and exclusion criteria: (1) having a profound intellectual disability, (2) having severe motor disabilities, (3) peer familiarity of at least 12 months, peer familiarity can be understood as living in the same group home, and (4) having no diagnosis of autism. Persons with the diagnosis of autism were excluded because of the specific difficulties they encounter during social interactions. For every dyad a staff member (direct support worker or therapist) who knew the persons with PIMD for at least six months was asked to participate. We selected both staff categories because direct support workers as well as therapists do individual and group activities with persons with PIMD.

Representatives of all participating persons with PIMD and staff members were informed about the nature of the study, the anonymity, and the confidentiality of the obtained data. If they were willing to participate they were asked for their written consent. The intervention study was performed in coherence with the standards of the university ethical committee who reviewed and approved this study.

Sixteen persons with PIMD started the intervention. These 16 persons with PIMD were paired in eight dyads. For each dyad a staff member was selected, so eight staff members participated. Two staff members did not find the time to organise weekly the activity and for two dyads the weekly provision of the activity was interrupted for more than two weeks due to illness of one person with PIMD. These dyads ended the total intervention time before the tenth week. The data of four dyads were used in this study.

For every person with PIMD the staff member filled in a client information form and a communication profile. Three factors which relate to social interaction and communication of

the Inventory of Child Characteristics (Tadema & Vlaskamp, 2004; Tadema, Vlaskamp, & Ruijsenaars, 2005) for persons with PIMD were used in the communication profile: (1) the active directed behaviour on the environment and possibilities to recognise and react to events and sounds in the environment; (2) the expression of basic communicative behaviours; (3) the behaviour directed to others, searching for contact, and reacting on contact. A quartile score, which reflects the ability level as weak, moderate, reasonably strong, or strong in comparison with a reference group of persons with PIMD, was attributed for every child and each factor. All participants' information can be found in table 1.

< insert Table 1 about here >

Procedure

In this study an A-B-B'-C design was used: a baseline condition (A) is followed by an intervention condition (B) which is followed by a condition with a small variation of the same independent variable (B') (Wolery, Gast, & Ledford, 2014). A follow-up condition (C) finishes the design. Table 2 delivers an overview of the four conditions. The conditions are described in general and it is specified what happened in every condition for the four dyads.

< insert Table 2 about here >

The participating staff members attended a two hour training (start condition B) which was provided by the first author. The training consisted of three main parts. In the first part, theoretical background on peer interactions in persons with PIMD was provided. The concepts 'peer', 'communication and interaction' and 'peer directed behaviours' were explained. Some known influencing factors such as personal characteristics, the adult behaviour, the material context, the peers, and the sibling were discussed. In the second part, it was outlined how the staff members could possibly influence peer directed behaviours of persons with PIMD during the activities. Five main strategies were applied: (1) increase awareness and knowledge on peer

interactions in persons with PIMD and learn how to recognise peer directed behaviours of the persons with PIMD, (2) give persons with PIMD chances to meet their peers by bringing them together and giving them time to react, (3) bring them in a position so they can, if possible, see and touch their peer, (4) provide an activity which can motivate both persons, and (5) use social scaffolding strategies which exist of supporting peer interactions and communicating about the peer. Video fragments of group activities and dyads of persons with and without the direct support worker were used to provide concrete examples. In the third part of the training, a new activity to promote peer directed behaviours was designed, taking the various elements of the training and the personal characteristics of the participating clients into account.

When the activity was provided to the persons with PIMD for three weeks, a feedback session was organised (start condition B'). First the staff member was asked about the course of the activity the past three weeks and what her experiences were. Did they experience success or did they feel uncertain about something? What were the experiences of persons with PIMD during the activities? Afterwards we discussed more in detail the behaviours of the staff member and of the persons with PIMD. Some fragments of the video recordings made during the activity in week three were selected and presented to the staff member. Based on these fragments, we discussed which behaviours were successful or not in promoting peer directed behaviours in the persons with PIMD. Finally, the activity was evaluated and if necessary adapted based on the experiences of the past weeks.

Measurements

The measurements consisted of video observations during the activity for the two persons with PIMD provided by the staff member. In the baseline measurement(s) the staff member could choose the activity. During the intervention phase (week 3 and week 10) and at the follow up

measurement (week 16), they provided the activity which was designed during the training. Two cameras were used to make the video recording.

After every activity (week 1 to 10) the support worker was asked to fill in a short questionnaire about the mood of the participants during the activity, about peer directed behaviours of the persons with PIMD and about his/her own social scaffolding behaviours. Notable context factors were also mentioned by the support worker.

Analysis

The Media Coder files were imported in the software package The Observer XT 10.5 to calculate the percentages of time the various behaviours of the persons with PIMD and the staff members were coded in the video fragments. The percentages are visualised in a line chart for every participant. To investigate if we observed an evolution in the singular and multiple peer directed behaviours of the persons with PIMD a multilevel logistic regression analysis was done using SAS 9.4. Additionally, logistic regression analyses were done for every individual participant. The same was done for social scaffolding behaviours of staff members. First a multilevel logistic regression analysis over the group of staff members was done. Afterwards individual logistic regression analyses were done.

Results

Social scaffolding behaviours of staff members

Effect of the intervention

Social scaffolding behaviours increased significantly ($t = 29.08$; $p < 0.0001$) when comparing the baseline measurement(s) with the measurements during the intervention. Social scaffolding behaviours were seen 31.87% of the time during baseline and 53.49% of the time during the intervention. In staff members 1, 2, and 3 an increase of social scaffolding behaviours was observed after they participated in the training. Their social scaffolding behaviours increased

in week 3 as well as in week 10 compared with the baseline measurement(s). For staff member 1 ($t = 17.17$; $p < 0.05$) and 3 ($t = 9.94$; $p < 0.05$) this increase was significant. The amount of time staff member 4 presented social scaffolding behaviour decreased significantly ($t = -11.78$; $p < 0.05$) during the intervention (see Table 3). The column 'percentage of time' in the tables contains the percentage of time the behaviour was observed and in the next row the percentage of time this behaviour decreased or increased in the subsequent phase.

< insert Figure 1 about here >

< insert Table 3 about here >

Follow-up measurement

Significantly ($t = -26.19$; $p < 0.0001$) less social scaffolding behaviours were observed during the follow up measurement compared with the measurements during the intervention. Social scaffolding behaviour decreased from 51.50% of the time to 32.74% of the time. For all staff members the amount of time they presented social scaffolding behaviour decreased six weeks after the intervention. This decrease was significant for staff member 1 ($t = -15.20$; $p < 0.05$) and staff member 4 ($t = -14.09$; $p < 0.05$). In staff member 3 a slight increase was observed compared to week 10, although it did not increase above the amount of time social scaffolding behaviour was observed in week 3 (see figure 1 and table 4).

< insert Table 4 about here >

Peer directed behaviours of persons with PIMD

Effect of the intervention

If the participants presented peer directed behaviours it was mostly singular peer directed behaviour. In the category of singular peer directed behaviour as well as in the category of multiple peer directed behaviour, mostly touching the peer was observed.

< insert Figure 2 about here >

In three persons with PIMD (person 2, person 3, and person 4) there was an increase of singular peer directed behaviours when comparing the baseline with the measurement in week 3 as well as in week 10 separately (see figure 2). For the persons with PIMD in dyad 3 (person 5 and person 6) and person 1 an increase in singular peer directed behaviours was observed in week 3, although a decrease was observed in week 10. The amount of time the singular peer directed behaviours were observed for person 7 and person 8 decreased in week 3 but clearly increased for both persons in week 10 (see table 5). Over the four dyads, the singular peer directed behaviours increased from 13.24% of the time presented in the baseline to 23.51% of the time during the intervention (week 3 and 10). This increase is significant ($t = -20.50$; $p < 0.0001$). In every person with PIMD an increase in singular peer directed behaviour was observed when comparing the baseline measurement(s) with the measurements during the intervention (week 3 and 10). This increase was only significant for persons 2, 4 and 6 (Table 5).

The multiple peer directed behaviours decreased during the intervention for person 1, 7 and 8. For person 7 this decrease was significant. For the group of persons with PIMD a significant decrease ($t = -5.90$; $p < 0.0001$) in the amount of time the multiple peer directed behaviours were presented was observed (baseline= 3.45%; intervention= 2.41%).

< insert Figure 2 about here>

< insert Table 5 about here >

Follow-up measurement

A significant ($t = -9.04$; $p < 0.0001$) decrease of the singular peer directed behaviours was observed at follow up (see table 6). The singular peer directed behaviours decreased from 23.87 % of the time during the intervention (week 3 and 10) to 18.85% of the time at follow up. For five people (person 2, 3, 4, 6 and 7) a decrease was observed, for three (person 1, 5 and 8) an increase, but none of the differences was significant.

The amount of time the multiple peer directed behaviours were observed significantly ($t = -8.61$; $p < 0.0001$) decreased from 2.66% of the time during intervention to 1.26% of the time at the follow up measurement. For the same five people in which the singular peer directed behaviour decreased also the multiple peer directed behaviours decreased. And for the 3 people in which the singular peer directed behaviours increased at follow up also the multiple peer directed behaviours increased. None of these differences were however significant.

< insert Table 6 about here >

Link between the behaviour of the staff member and the behaviour of the persons with PIMD

The multivariate regression model to investigate the covariance between social scaffolding behaviours and singular or multiple peer directed behaviours was too complex to fit our dataset. To test the relationship between these behaviours a Pearson correlation coefficient was calculated. A significant positive correlation was found between the amount of social scaffolding behaviours of staff members and the amount of singular peer directed behaviours of persons with PIMD ($r = 0.375$, $N = 36$, $p < 0.05$). In addition, a significant positive correlation was found ($r = 0.532$, $N = 36$, $p < 0.001$) between social scaffolding behaviours and the amount of multiple peer directed behaviour.

Discussion

In this study we have developed and implemented an intervention to inform and train staff members to provide more opportunities for persons with PIMD to interact with their peers. Based on a training four staff members created a new activity or adapted one to promote peer directed behaviours in four dyads of persons with PIMD. They offered this activity during ten weeks. The study included an A-B-B'-C design, with one or two measurements during baseline, two measurements (week 3 and 10) during intervention and one follow up measurement (week

16). After week 3 a feedback session was organised to coach the staff member in social scaffolding behaviours and to adapt the activity when necessary.

Our first research question was whether the training had a positive effect on the organisation of the situation. For most staff members it was hard to find a position which was comfortable for all participants and at the same time could enable peer directed behaviours. In none of the activities during the intervention phase wheelchairs were used. All participants were lying or sitting close to each other so they could feel each other's warmth and were able to see and touch each other. For some persons supportive materials were used to create a good position and to increase the possibilities for peer interactions. For example a supportive cushion behind the back of the person to prevent the person to roll away from the peer. In the activities provided during baseline, staff members had a central role by reading stories, offering objects or letting the children experience various sensations. This shifted to activities in which the staff member takes a step back and does not provide objects or various experiences. They created an environment in which the persons with PIMD are able to meet each other and the provided activity is less central. The activities are used as facilitators for mutual interactions which become central.

The second research question was related to the effect of the training on social scaffolding behaviour of staff. During the training staff members learned how they could use social scaffolding behaviours to increase peer directed behaviours of persons with PIMD. The results show an increase of social scaffolding behaviours after training. During the follow up measurement, the peer interaction stimulating activity and the positioning were still provided, although the amount of support provided by staff members by presenting social scaffolding decreased again.

The third research question pertained to the effect of the intervention on peer directed behaviours of the participants. The persons with PIMD presented significantly more singular

and significantly less multiple peer directed behaviour during the intervention, compared to the baseline. Both singular and multiple peer directed behaviours decreased again at follow up. As was observed in previous studies (Nijs et al., 2014a, 2014b, 2015) persons with PIMD only present minor multiple peer directed behaviours. It is possible to increase these behaviours, although the singular peer directed behaviours seem to be the most frequently used manner for persons with PIMD to show their interest in their peers. This makes it important for staff members to not only focus on the multiple peer directed behaviours. They need to recognise the singular, more subtle, peer directed behaviours in order to support them during peer interactions.

A first important limitation is linked to the focus in this study on peer directed behaviours. This focus delivers only limited insight in the possible effects of the intervention on persons with PIMD. As staff members mentioned, the intervention also had a positive influence on for example the clients' wellbeing and muscle tension. We were not able to capture all these possible positive side effects of the intervention. Another limitation in this study is the practical difficulties staff members encountered. Due to illness, holidays, or organisational factors it was not easy to schedule the activity every week at the same time. This made it difficult to choose a moment in which both persons with PIMD were most motivated and alert. Due to these practical difficulties we were also unable to conduct multiple baselines for all participants. A third limitation of this study can be formulated with regard to the logistic regression models. The logistic regression models we used to investigate if the intervention had an effect on peer directed behaviours of persons with PIMD and on social scaffolding behaviours of staff members, did not seem to fit well to our data. There seems to be a lot of variability in peer directed behaviours of persons with PIMD between the different measurements. This problem of overdispersion must probably be attributed to other predictors than the intervention. Many variables can be a cause of this problem, for example illness, the emotional state of the client,

or the day or time the activity is provided. Additionally the small sample size and the variations in for example age, education of the staff members, years of experience of the staff members may potentially impact the findings. A last limitation is linked to the analyses used to investigate the connection between the behaviours of staff members and the behaviours of persons with PIMD. Our data did not fit a complex multivariate regression model. Therefore we used a Pearson correlation coefficient in order to test the relationship between these behaviours. This analysis does not take into account that dyads were formed.

Based on our results, we may conclude that a two hour training for staff members already has a positive short term effect on their social scaffolding behaviours as well as on peer directed behaviours of persons with PIMD. To make this positive effect last in the long term a combination of training and individual coaching or feedback seems to be necessary (van Oorsouw, Embregts, Bosman, & Jahoda, 2009). In practice, organising activities in order to promote peer directed behaviours is needed to increase the chances for persons with PIMD to get engaged in peer interactions and to broaden their social network. Peer interactions can take place all day long (McConnell, 2002; Rosenthal & Gatt, 2010) and can be part of various activities (McConnell, 2002). In order to generalise the results, a replication study of this intervention study is needed. This replication study must contain repeated measures in every phase of the intervention study and more participants are needed.

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Table 1
Participant's characteristics

Dyad 1			Dyad 2		
Person 1	Person 2	Staff member 1	Person 3	Person 4	Staff member 2
Female	Male	Female	Female	Female	Female
11 years, 8 months	9 years, 7 months	27 years, 2 months	11 years, 10 months	15 years, 2 months	32 years, 6 months
Blind Paralyzed in upper and lower limbs	Visual impairment and a motor disability		Moderate hearing loss and a motor disability (hypotonicity)	Paralysed in the lower limbs and hypotonicity	
Active directed behaviour: weak	Active directed behaviour: moderate	Vocational degree in child care	Active directed behaviour: reasonably strong	Active directed behaviour: moderate	Master's degree as social worker
Contact behaviour: weak	Contact behaviour: moderate		Contact behaviour: reasonably strong	Contact behaviour: reasonably strong	
Basal communicative behaviours: moderate	Basal communicative behaviours: strong	Seven years of experience with persons with PIMD	Basal communicative behaviours: reasonably strong	Basal communicative behaviours: weak	Five years of experience with persons with PIMD
Low functioning	Low functioning		Developmental age of 6 months	Developmental age of 5.5 months	

Table 1
Continued

Dyad 3			Dyad 4		
Person 5	Person 6	Staff member 3	Person 7	Person 8	Staff member 4
Female	Male	female	Male	Male	Female
37 years, 8 months	26 years, 3 months	51 years, 2 months	6 years, 11 months	5 years, 11 months	48 years, 7 months
Spastic in her under and upper limbs	Physical disability		Low vision and hypotonicity	Physical disability	
Active directed behaviour: moderate	Active directed behaviour: weak	Degree in physical education	Active directed behaviour: weak	Active directed behaviour: weak	Bachelor's degree as occupational therapist
Contact behaviour: reasonably strong	Contact behaviour: reasonably strong		Contact behaviour: weak	Contact behaviour: weak	
Basal communicative behaviours: reasonably strong	Basal communicative behaviours: Moderate	28 years of experience with persons with PIMD	Basal communicative behaviours: weak	Basal communicative behaviours: moderate	5 years of experience with persons with PIMD
Developmental age of 2.5 to 3 months	developmental age of 1 to 2 months		Developmental age of 5 months	Developmental age of 3 months	

Table 2

Overview of the conditions in the intervention study

	Dyad 1	Dyad 2	Dyad 3	Dyad 4
A: Baseline condition	<i>1 baseline measurement</i>	<i>1 baseline measurement</i>	<i>2 baseline measurements</i>	<i>2 baseline measurements</i>
Staff members were asked to organize an activity for a dyad of persons with PIMD which suits both persons.	A multisensory storytelling activity was provided. The persons with PIMD were sitting next to each other in their wheelchair while the staff member read a story and presented them alternating materials.	Staff member 2 had chosen to read a story for the two persons with PIMD during the baseline. The persons with PIMD were sitting next to each other in their wheelchairs. She showed them alternating the drawings in the book.	The baseline activity provided by staff member 3 took place at a big swing on which the persons with PIMD could lay down. The staff member talked to the persons and let them wobble on the swing. Sometimes she laid in between the persons with PIMD.	Staff member 4 laid the two persons with PIMD on a mat on the ground during the baseline conditions. She was sitting next to them and played and talked to the children.
B: intervention condition 1				
Staff members participated in a two-hour training, resulting in designing a new or adapting an existing activity for the two participating persons with PIMD. The activity was aimed to promote peer directed behaviours. Staff members provided this activity once a week for three weeks. The activity provided in the third week was video recorded.	The persons with PIMD were lying on their backs next to each other on a water bed. The staff member showed one object alternating to each of the persons. Afterwards, she put the object in between the persons. She waited and observed the persons with PIMD. She repeated this several times with different objects.	The persons were lying on a mat. The persons with PIMD were supported with pillows so they could lay on their side and easily see and touch their peer. Sometimes the staff member offered them one object, for example a music instrument, and placed this in between the persons.	The starting positioning was the same as during the baseline, however, the staff member changed the positioning during the activity to increase the possibilities for interactions. She retreated more to the background and did not take part in the activity.	Child 8 was lying in a supportive mattress which offered him more opportunities to see his peer. Child 7 could swing this mattress by punching it. The staff member followed and kept more distance.

Table 2
Continued

	Dyad 1	Dyad 2	Dyad 3	Dyad 4
B': intervention condition 2 Based on the video recordings made in the third week a feedback session was organized before the activity was provided in the fourth week. Afterwards, the staff members were asked to provide the activity for seven weeks, from week four until week ten.	During the feedback session, it was decided to use objects which make sounds, because this was the best way to attract the attention of both persons with PIMD.	After the feedback session the staff member used music to attract the attention and increase the motivation of the persons with PIMD.	The organization of the activity was not changed after the feedback session. The staff member focused more on the positioning of the persons with PIMD to make it possible to interact with each other.	During the feedback session the staff member was concerned about the big distance there sometimes was between her and the persons during the activity. We focused on how the staff member could help the children to touch each other or bring them closer together.
C: Follow up condition For six weeks the activity was not provided. After six weeks the staff member was asked to provide the activity designed during the training once more.

Figure 1. Percent of peer interaction influencing behaviour.

Table 3

Logistic regression analysis comparing baseline measures with intervention measures of social scaffolding behaviour

	Chi/df		Percentage of time (%)	Estimate (logistic scale)	SE (logistic scale)	DF	t-value	p
Total	103.86	Baseline	31.87	-0.75				
		Intervention	+ 21.62	0.89	0.03	19	29.08	<0.0001***
Staff member 1	0.35	Baseline	4.74	-3.00				
		Intervention	+ 35.87	2.63	0.15	1	17.17	0.04*
Staff member 2	23.82	Baseline	0.00	-18.13				
		Intervention	+ 62.24	18.62	346.41	1	0.05	0.96
Staff member 3	19.85	Baseline	19.78	-1.40				
		Intervention	+ 13.85	0.73	0.07	2	9.74	0.01**
Staff member 4	57.33	Baseline	85.82	1.81				
		Intervention	- 16.40	-0.98	0.08	2	-11.78	0.01**

*p < 0.05 ** p < 0.01 *** p < 0.001

Table 4

Logistic regression analysis comparing intervention measures with follow up measures of social scaffolding behaviour

	Chi/df		Percentage of time (%)	Estimate (logistic scale)	SE (logistic scale)	DF	t-value	p
Total	28.77	Intervention	51.50	0.06	0.22			
		Follow up	- 18.76	-0.79	0.03	15	-26.19	<0.0001***
Staff member 1	0.35	Intervention	40.61	-0.37	0.05			
		Follow up	- 26.67	-1.44	0.09	1	-15.2	0.04*
Staff member 2	23.82	Intervention	62.25	0.50	0.05			
		Follow up	- 12.25	-0.50	0.08	1	-5.97	0.11
Staff member 3	23.69	Intervention	33.63	-0.68	0.04			
		Follow up	- 1.33	-0.07	0.08	1	-0.83	0.56
Staff member 4	112.48	Intervention	69.42	0.83	0.05			
		Follow up	- 28.32	-1.18	0.08	1	-14.09	0.05*

*p < 0.05 ** p < 0.01 *** p < 0.001

Figure 2. Percent of peer directed behaviour.

Table 5

Logistic regression analysis comparing baseline measures with intervention measures of peer directed behaviour

	Chi/df		Percentage of time (%)	Estimate (logistic scale)	SE (logistic scale)	DF	t-value	p
Singular peer directed behaviour								
Total	93.75	Baseline	13.24	-1.88	0.18			
		Intervention	+ 10.27	0.70	0.03	19	20.5	<0.0001***
Person 1	13.47	Baseline	8.01	-2.44	0.11			
		Intervention	+ 5.22	0.56	0.13	1	4.25	0.15
Person 2	75.14	Baseline	5.95	-2.76	0.13			
		Intervention	+ 27.68	2.07	0.14	1	14.85	0.04*
Person 3	4.17	Baseline	0.00	-18.13	346.41			
		Intervention	+ 16.80	16.53	364.41	1	0.05	0.97
Person 4	746.12	Baseline	2.19	-3.79	0.27			
		Intervention	+ 40.37	3.48	0.28	1	12.55	0.05*
Person 5	44.74	Baseline	19.47	-1.42	0.06			
		Intervention	+ 2.63	0.15	0.08	2	1.94	0.19
Person 6	85.76	Baseline	15.71	-1.67	0.06			
		Intervention	+ 8.16	0.51	0.08	2	6.29	0.02*
Person 7	206.75	Baseline	26.12	-1.04	0.05			
		Intervention	+ 4.89	0.24	0.07	2	3.31	0.08
Person 8	220.39	Baseline	13.47	-1.85	0.07			
		Intervention	+ 1.21	0.09	0.09	2	0.94	0.44
Multiple peer directed behaviour								
Total	33.37	Baseline	3.42	-3.33	0.40			
		Intervention	- 1.01	-0.37	0.06	19	-5.9	<0.0001***
Person 1	0.41	Baseline	2.23	-3.79	0.21			
		Intervention	- 2.23	-2.50	0.56	1	-4.47	0.14
Person 2	16.71	Baseline	1.34	-4.30	0.27			
		Intervention	+ 2.44	1.07	0.29	1	3.63	0.17
Person 3	17.23	Baseline	0.00	-18.13	346.41			
		Intervention	+ 6.18	15.41	346.41	1	0.04	0.97
Person 4	131.24	Baseline	0.00	-18.13	346.41			
		Intervention	+ 9.30	15.85	346.41	1	0.05	0.97
Person 5	14.16	Baseline	0.92	-4.69	0.25			
		Intervention	+ 0.14	0.15	0.32	2	0.47	0.69
Person 6	33.6	Baseline	0.00	-5.27	0.33			
		Intervention	+ 2.87	1.75	0.36	2	4.92	0.04*
Person 7	16.18	Baseline	27.30	-0.98	0.05			
		Intervention	- 18.35	-1.33	0.10	2	-13.93	0.01**
Person 8	23.06	Baseline	5.95	-3.75	.16			
		Intervention	- 5.95	-15.79	403.47	2	-0.04	0.97

*p < 0.05 **p < 0.01 ***p < 0.001

Table 6

Logistic regression analysis comparing intervention measures with follow up measures of peer directed behaviour

	Chi/df		Percentage of time (%)	Estimate (logistic scale)	SE (logistic scale)	DF	t-value	p
Singular peer directed behaviour								
Total	93.75	Intervention	23.87	-1.15	0.18			
		Follow up	- 5.02	-0.30	0.03	15	-9.04	<0.0001***
Person 1	13.47	Intervention	13.24	-1.88	0.07			
		Follow up	+ 8.86	0.61	0.10	1	6.38	0.10
Person 2	75.14	Intervention	33.63	-0.69	0.05			
		Follow up	- 20.62	-1.20	0.10	1	-12.31	0.05*
Person 3	4.47	Intervention	16.79	-1.59	0.06			
		Follow up	- 9.21	-0.91	0.14	1	-6.33	0.10
Person 4	746.12	Intervention	42.56	-0.31	0.05			
		Follow up	- 24.91	-1.22	0.10	1	-12.04	0.05*
Person 5	77.39	Intervention	22.09	-1.27	0.05			
		Follow up	+ 3.25	0.19	0.09	1	2.12	0.28
Person 6	139.69	Intervention	23.87	-1.16	0.05			
		Follow up	- 1.43	-0.09	0.09	1	-0.94	0.51
Person 7	401.54	Intervention	31.00	-0.80	0.05			
		Follow up	- 18.43	-1.14	0.11	1	-10.16	0.06
Person 8	355.97	Intervention	14.68	-1.77	0.07			
		Follow up	+ 19.39	1.10	0.10	1	11.56	0.05*
Multiple peer directed behaviour								
Total	21.11	Intervention	2.66	-3.59	0.42			
		Follow up	+ 1.40	-0.77	0.09	15	-8.14	<0.0001***
Person 1	0.41	Intervention	0.00	-6.28	0.52			
		Follow up	+ 1.01	1.71	0.60	1	2.89	0.21
Person 2	16.71	Intervention	3.77	-3.23	0.12			
		Follow up	- 0.90	-0.30	0.21	1	-1.42	0.39
Person 3	17.23	Intervention	6.18	-2.72	0.10			
		Follow up	- 2,82	-0.64	0.21	1	-3.00	0.20
Person 4	131.24	Intervention	9.28	-2.28	0.08			
		Follow up	- 5.72	-1.03	0.20	1	-5.07	0.12
Person 5	7.89	Intervention	1.06	-4.54	0.21			
		Follow up	+ 2.17	1.14	0.28	1	4.14	0.15
Person 6	59.48	Intervention	2.87	-3.52	0.13			
		Follow up	- 2.88	-15.02	346.28	1	-0.04	0.97
Person 7	24.65	Intervention	9.11	-2.31	0.08			
		Follow up	- 9.11	-16.20	346.29	1	-0.05	0.97
Person 8	0.00	Intervention	0.00	-19.54	403.47			
		Follow up	+ 0.92	14.86	403.47	1	0.04	0.98

*p < 0.05 **p < 0.01 ***p < 0.001