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Relabelling behaviour

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Relabelling behaviour. The effects of psycho-education on the perceived severity and causes of challenging behaviour in people with profound intellectual and multiple disabilities

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Abstract

Background   Prevalence rates of challenging behaviour are high in children and adults with profound intellectual and multiple disabilities (PIMD). Moreover, many of these behaviours are observed daily. Direct support staff report that most challenging behaviour identified has little impact on the person with PIMD and attribute challenging behaviour in children and adults with PIMD mainly to a biomedical model. The purpose of this study was to evaluate whether an intervention (psycho-education) had any effect on direct support staff's assessment of challenging behaviour in terms of its severity and their biomedical causal explanations (attributions) for this behaviour.
Method   A stepped wedge study design was used to evaluate the effects of a psycho-education intervention on the perceived severity and the attributions offered for challenging behaviour of people with PIMD by 198 direct support staff. We used questionnaires assessing the perceived severity of challenging behaviour and staff views of its causes. Data on the dependent variables were collected at four 1-month intervals.
Results   The intervention was found to have an effect on the perceived severity of challenging behaviour

identified in people with PIMD in the sense that staff generally scored challenging behaviour as more severe in its consequences after the intervention. However, this effect was very small. No significant effects were found in terms of reduction in the biomedical scale scores.
Conclusion   No evidence for the effectiveness of a psycho-educational approach on the assessment of challenging behaviour in terms of severity and the biomedical attributions for behaviour was found. More research is required to explore further the effects of more elaborate training using methods to enable direct support staff to reflect on the behaviour of people with PIMD and on their own behaviour.

Keywords attribution, challenging behaviour, profound intellectual and multiple disabilities, psycho-education

Introduction

People with profound intellectual and multiple disabilities (PIMD) possess little or no ability to support themselves and are dependent on others to explain the world around them and to make the world accessible. This category of people has an estimated intelligence quotient of 25 points or less and severe or profound motor impairments, which is reflected in not being able to move independently and in having limited use of their hands and arms (Nakken &

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Vlaskamp 2007). They frequently suffer from sensory problems and many additional health problems (Böhmer *et al.* 2001; Codling & MacDonald 2009; Watt-Smith 2009; Van der Putten & Vlaskamp 2011). In addition, people with PIMD have difficulty expressing themselves owing to their inability to communicate verbally.

A study by Poppes *et al.* (2010) has shown that challenging behaviour is common in people with PIMD. According to this study, self-injurious and stereotypical behaviour is observed in 82% of people with PIMD, withdrawn behaviour in 98% and aggressive/destructive behaviour in 45% (Poppes *et al.* 2010, 2016a,b). Moreover, many of these behaviours are observed on a daily basis (Poppes *et al.* 2010). The effects of challenging behaviour can be far-reaching. Firstly, it can lead to physical injury – such as injury to the retina due for example to eye poking – injury to the skin and physical malformations, caused for example by the people hitting themselves or banging their heads. In addition, challenging behaviour, which occurs frequently, can limit their personal development and may hamper the establishment and maintenance of social relationships (González *et al.* 2009). Relationships with others are vital to people with PIMD, as through these relationships, they gain experience and can exert some influence over their lives (Vlaskamp & Van der Putten 2009). These relationships are threatened by challenging behaviour.

However, even though challenging behaviour is common in people with PIMD and occurs very regularly, these behaviours are usually reported as having little impact on the person with PIMD by direct support staff (Poppes *et al.* 2010). The beliefs/explanations held by direct support staff on the causes of challenging behaviour can impact on the actions they take in relation to people with intellectual disability (ID) who display challenging behaviour (Hastings 1997; Dowey *et al.* 2007). A recently conducted study on the attributions offered by the direct support staff for the behaviour of persons with PIMD demonstrated that staff found most of the causal models for challenging behaviour proposed by Hastings (1997) – learned behaviour (negative and positive reinforcement processes); emotions (e.g. anger, stress and fear); physical environment (e.g. auditory environment and bright lights); and self-stimulation (e.g. boredom and not being offered activities) – of little use in explaining challenging

behaviour in children and adults with PIMD. However, more than half of the participating direct support staff reported a biomedical model as being the most appropriate causal explanation of challenging behaviour (Poppes *et al.* 2016b). If direct support staff assume that challenging behaviour is caused by biomedical problems, this could mean that they view behaviour as 'belonging' to the person and will thus be less inclined to take other factors into account that could influence this behaviour. Furthermore, they might not notice the communicative function this behaviour can have. Moreover, direct support staff could be less likely to regard their own behaviour as a possible reinforcer of the onset or persistence of challenging behaviour (Tynan & Allen 2002). One of the consequences of these attributions and the low perceived severity of challenging behaviour by staff might be that these behaviours are not systematically addressed in daily practice (Poppes *et al.* 2014). It therefore seems necessary to offer training to direct support staff targeted at changing their beliefs and attitudes towards these behaviours in people with PIMD, before commencing training on the appropriate interventions to apply to reduce or prevent this behaviour.

Williams *et al.* (2012) reviewed the evidence of changes in the attributions offered by staff for the behaviour of people with ID following training in challenging and complex behaviour. The majority of the 11 studies included in this review focused on applied behavioural approaches (Williams *et al.* 2012). The key elements of this training consisted of trying to understand the behaviour and identifying factors that could influence it. The causal explanations that staff offered for challenging behaviour changed significantly after training as a result (Williams *et al.* 2012). The only study where no significant changes were observed in the attributions offered was for training where the focus was not on explaining the causes of challenging behaviour. Two studies did not stress a behavioural approach. In one study (Smidt *et al.* 2007), communication training was provided in which staff formulated their own communicative guidelines, and required them to challenge their attitudes and beliefs. Psycho-education on dementia was provided in the other study (Kalsy *et al.* 2007): information on the health problems associated with ageing and on the background, prevalence, presentation and course

of dementia was provided. These studies also found changes in attributions after training. The main conclusion of this review is that training (regardless of its specific content or duration) has a clear effect on attributions offered by staff. Williams *et al.* (2012) suggested that the process of acquiring information that enables the reformulation of a staff member's understanding of challenging behaviour in general or of a particular person is a key element in achieving changes in attributions.

The present study aimed to analyse the effects of psycho-education that considers the possible causes and consequences of challenging behaviour in people with PIMD and how direct support staff could affect this challenging behaviour. We hypothesised that this psycho-educational approach would result in a different assessment of challenging behaviour in terms of severity and discourage the use of biomedical causal explanations for this behaviour.

Method

Participants

A convenience sample of 198 direct support staff was retrieved from 10 organisations throughout the Netherlands. They all support people with PIMD. The 198 participating direct support staff were predominantly female (188), nine were male and gender information was missing for one participant. They had a mean age of 38.6 standard deviation (SD: 11.3, range:

20–64, missing: 1); see Table 1 for additional information on the participating direct support staff.

Direct support staff were each assigned by the healthcare psychologist or facility manager to a person with PIMD, defined on the basis of the following criteria:

- a profound ID (IQ of 25 or below)
- a profound or severe motor disability (manifest in an inability to move independently)
- aged 18 or younger at onset (Nakken & Vlaskamp 2007)
- informed consent, including the written permission for the people with PIMD in this study, obtained from the parents or legal guardians
- informed consent obtained from the direct support professional
- the direct support staff had worked with the person with PIMD for at least 2 months

Of the people with PIMD, 106 were male and 92 were female. Their mean age was 30.4 (SD: 16.1; range: 3–67; missing: 6). Table 2 presents information on their additional health problems.

Procedure

Organisations were asked to participate in this study via mailings and via information bulletins published by a national knowledge network in the field of people with PIMD in the Netherlands. A total of 12 organisations indicated that they wished to

Table 1 Sample characteristics of the direct support staff (*N* = 198)

	Mean (SD)	Missing (N/%)
Work experience (in years)		
With people with ID	13.7 (9.4)	2 (1.0)
With people with PIMD	11.0 (5.2)	1 (0.5)
With person	5.2 (4.6)	1 (0.5)
Working hours		
Working hours per week	26.6 (6.1)	5 (2.5)
Education level N (%)		
Senior secondary vocational education	122 (61.6)	19 (9.6)
Vocational college	57 (28.8)	

ID, intellectual disability; PIMD, profound intellectual and multiple disability.

Table 2 Characteristics of the participants with profound intellectual and multiple disability (*N* = 198)

	N	%	Missing (N/%)
Sensory problems			
Auditory	58	29.3	7 (3.5)
Visual	113	57.1	3 (1.5)
Tactile	80	40.4	8 (4.0)
Health problems			
Epilepsy	128	64.6	6 (3.0)
Bowel and abdominal problems	148	74.7	6 (3.0)
Sleeping problems	56	28.3	9 (4.5)
Lung and respiratory problems	50	25.3	6 (3.0)
Eating and drinking problems	132	66.7	5 (2.5)
Dental problems	56	28.3	6 (3.0)
Mental health problems	39	19.7	6 (3.0)

participate. They subsequently received a letter with more information about the study and practical guidelines. If they continued to wish to participate after having read the letter, arrangements were made to collect data and to implement the intervention. The participating organisations ensured approval for the study was obtained from their ethics committees, and informed consent was obtained from direct support staff and parents or legal guardians.

Beforehand, organisations pre-specified the number of people (those with PIMD and the direct support staff linked to them) that they thought could participate in the research. The organisations were then allocated to three clusters (A, B and C) of four organisations based on their size (three large organisations, three small organisations and six medium-sized organisations were allocated evenly across the four clusters), and the participating children and adults were distributed evenly across these clusters to reflect the study design. Of the 12 participating organisations, two organisations dropped out during the study owing to lack of time and financial cutbacks.

Design

A stepped wedge design was used in this study (Brown & Lilford 2006). Stepped wedge randomised trail designs involve a sequential roll-out of an intervention to participants (individuals or clusters) over a number of periods. By the end of the study, all the participants (or clusters) will have received the intervention, although the order in which participants receive the intervention is determined at random for each cluster. Every point at which a new cluster receives the intervention is called a 'step', and all the clusters will have received the intervention after the final step. The dependent variables of interest are measured for all clusters before and after each step. This design was chosen because it was impossible to deliver the intervention to all the participants or clusters simultaneously. The stepped wedge design enables us to model the effect of time on the effectiveness of an intervention by comparing between and within clusters differences (Brown & Lilford 2006).

The intervention was implemented in the three participating organisation clusters (A, B and C) in random order (see Table 3 for an outline of the study design). All three clusters started the study

simultaneously and acted as controls until the moment they were randomly determined to switch from control to intervention. Data regarding the dependent variables were collected at four points at 1-month intervals.

Intervention

The psycho-education was a 1.5 h workshop session, comprising experiential and didactic teaching. A total of 17 separate workshops were provided, and each training group averaged 8.5 participants (range 4–26). Each workshop was conducted by the same person at all organisations, and information was provided of fixed content, structure and sequence. Two main topics were discussed during the workshops: (1) information on people with PIMD and challenging behaviour and (2) direct support staff attributions. The following summarises the content of the workshop components:

1. Information on people with PIMD and challenging behaviour.
   - The characteristics of people with PIMD, their additional disabilities and health problems.
   - Background to challenging behaviour, including definitions, causes and consequences.
   - The prevalence and presentation of challenging behaviour in people with PIMD and discussion of the low perceived severity of these behaviours by direct support staff.
2. Direct support staff attributions.
   - Discussion of challenging behaviour on the basis of comments commonly heard in practice, for example, 'this behaviour is just part of him', 'this behaviour is part of her intellectual disability' and 'these behaviours cannot be changed'.
   - Video presentations on three people with PIMD displaying different types of self-injurious, stereotypical, withdrawn and aggressive or destructive behaviours. Discussion of whether this behaviour is problematic and whether it has serious effects.
   - Intervention options for when people with PIMD display challenging behaviour based on an Individual Support Programme specially developed for people with PIMD (Vlaskamp & Van der Putten 2009).

Table 3 The stepped wedge randomised controlled design.

Clusters		Time points			
A	T0 X	T1	T2	T3
B	T0	T1 X	T2	T3
C	T0	T1	T2 X	T3

T=measurement
X=intervention
White cells represent control periods and grey cells represent data collection after the intervention

- A case study to exemplify intervention options to reduce or prevent challenging behaviour in people with PIMD.

Data collection

Prevalence and perceived severity of challenging behaviour

The prevalence and perceived severity of different types of challenging behaviour was identified using the adapted version of the Behaviour Problem Inventory (BPI) (Rojahn *et al.* 2001), the BPI-PIMD (Poppes *et al.* 2016a). The BPI-PIMD is an informant-based scale that addresses four types of challenging behaviour: self-injurious, stereotypical, withdrawn and aggressive or destructive behaviour. Self-injurious behaviour is defined as 'behaviour that can cause damage to the person's own body and that occurs repeatedly and in an essentially unvarying manner' (Rojahn *et al.* 2001). Stereotypical behaviour is described as 'repeated uniform body movements or postures that are obviously not part of some goal-directed act' (Rojahn *et al.* 2001). Withdrawn behaviour is described as 'behaviour that is hardly outwardly directed and in which a defensive response is seen as a reaction to contact offered by others and/or a repelling response to stimuli is seen (regardless of the type of stimuli)' (Kraijer 2004; Poppes *et al.* 2010). Aggressive or destructive behaviour is defined as 'an offensive action or a deliberate overt attack directed towards people or objects' (Rojahn *et al.* 2001).

The BPI-PIMD consists of 58 items within the four specified categories: SIB (15 items), SB (22 items), WB (5 items) and ADB (12 items). Each sub-scale also contains an additional item allowing respondents to add any behaviour not included in the list of items, as long as it meets the definition of the targeted challenging behaviour. Direct support professionals were asked whether or not certain behaviour occurred (occurrence/non-occurrence). When behaviour did occur, direct support professionals were asked to rate the severity of the behaviour, in the range slight (1), medium (2) or severe (3).

The psychometric properties of the original BPI are good (Rojahn *et al.* 2001; González *et al.* 2009; Van Ingen *et al.* 2010; Mascitelli *et al.* 2015). These findings are in line with studies by Dumont *et al.* (2014) and Lambrechts & Maes (2009) into the psychometric properties of the Dutch translation of the BPI-01 for people with a profound ID. The internal consistency of the entire scale, measured using Cronbach's alpha (0.89), is good (Dumont *et al.* 2014). The internal consistency of the SIB sub-scale was moderate in all the aforementioned studies, ranging from 0.40 to 0.63. The test–retest reliability of the frequency scale was good to excellent (Lambrechts & Maes 2009). Because the BPI-PIMD had been altered and only used for people with PIMD, we calculated the internal consistency in general ($\alpha = 0.85$) and for the different sub-scales (SIB, $\alpha = 0.48$; SB, $\alpha = 0.81$; WB, $\alpha = 0.73$; ADB, $\alpha = 0.83$). These findings are in line with other research into the internal consistency of the BPI (Rojahn *et al.* 2001; Lambrechts & Maes 2009; Dumont *et al.* 2014; Mascitelli *et al.* 2015).

Attributions

Direct support staff attributions were analysed using the Dutch version of the Challenging Behaviour Attributions Scale (CHABA; Hastings 1997; Lambrechts *et al.* 2009). The questionnaire consists of 33 items, which each state a possible reason why people with ID engage in challenging behaviour. Direct support staff were asked to rate each of the 33 items on a 5-point scale (-2 = very unlikely, -1 = unlikely, 0 = equally likely/unlikely, 1 = likely and 2 = very likely) of how likely an explanation was of why a specific person engaged in challenging behaviour. The statements relate to five

causal models: learned behaviour (six items), medical/biological factors (six items), emotional factors (seven items), aspects of the physical environment (eight items) and self-stimulation (six items). Each sub-scale score was calculated by summing the number of individual items within a particular sub-scale and dividing this by the number of items. A sub-scale score above zero suggests that the particular causal model was considered applicable to the behaviour. A sub-scale score below zero suggests that the respondent considers the particular causal model as unlikely to apply to the behaviour. The internal consistency of the five sub-scales was assessed using Cronbach's alpha. The alpha values were between 0.75 and 0.80 for all five scales, meaning that the internal consistency can be described as acceptable (Field 2009). These alpha values compared favourably with the alpha values described in other studies (e.g. Hastings 1997; Tynan & Allen 2002; McGill *et al.* 2007). There are no specific studies on the validity of the CHABA; however, the instrument is used in a wide variety of research on staff attributions (e.g. Tynan & Allen 2002; Lowe *et al.* 2007; McGill *et al.* 2007; Lambrechts *et al.* 2009).

Analysis

First, the descriptive results on the prevalence of challenging behaviour were calculated on the basis of dichotomous (occurrence/non-occurrence) data.

Two dependent variables were then taken into account: the direct support staff's perceived severity scores for the challenging behaviour and the direct support staff's biomedical attributions for this behaviour.

The total severity scores on the BPI-PIMD were taken into account in the analysis. The mean severity scores (and range and SD) of the BPI-PIMD were calculated for the three clusters (A, B and C) and for each measurement point. The mean scores on the CHABA biomedical scale were also calculated at each measurement point. Both the mean severity scores and the mean scores on the biomedical scale were visualised using box plots.

Multilevel models were then used to estimate the effect of the intervention on the perceived severity of the observed problem behaviour, as well as the direct support staff's biomedical attitudes towards the problem behaviour. Three models were constructed for each of the dependent variables, one without explanatory variables (grand mean model), one using time of measurement as a fixed factor (time-dependent model) and the final model was constructed according to the description provided in Hussey & Hughes (2007). The model postulated by Hussey & Hughes (2007) includes a random cluster effect and fixed time and intervention effects. In addition to the model that Hussey & Hughes (2007) proposed, we relaxed the compound symmetry assumption between time points to allow for correlations between measurements over time. The covariance between the clusters was fixed at zero, as the study design rules out the possibility of correlations between clusters. As expected, no significant correlations were found between the clusters.

Finally, for comparative purposes, the final model was also estimated for individuals who were included in the study and were present during the intervention (per-protocol analysis). The residuals for the full model were inspected to check the model assumptions. We distinguished between these two groups in the analysis: all the participants fall within the 'intention to treat group', while those participants who actually attended the intervention are also part of the 'by protocol group'.

Results

Ten organisations participated in the research, divided into cluster A (three organisations), cluster B (four organisations) and cluster C (three organisations) with a total of 198 participants distributed across the three clusters. Three participants were excluded at T0 because they failed to complete the BPI-PIMD, meaning that a total of 195 participants ultimately participated (Table 4, first column).

Table 4 Overview of the number of participants at the four measurement points

Cluster	T0	T1	T2	T3
A	42	35	35	33
B	96	89	80	79
C	57	53	53	46

At the first measurement point, there were no significant differences between the three clusters in the mean scores on the dependent variable severity and on the biomedical scale. Table 4 has some missing data (missing BPI-PIMD and/or CHABA data) at various measurement points. There were relatively few dropouts, and the dropouts are randomly distributed across the clusters.

The majority of the participants in the three clusters (79%) attended the intervention. However, a small sample did not attend the psycho-education (for various reasons, such as illness), although they did complete the BPI-PIMD and the CHABA questionnaires before and after the intervention (Table 5). We distinguished between these two groups in the analysis: all the participants fall within the 'intention to treat group', while those participants who actually attended the intervention are also part of the 'by protocol group' (Table 5).

Table 5 Overview of participants who attended the intervention and those who did not

Cluster	Intention-to-treat	By-protocol
A	42	31
B	96	72
C	57	51
Total	195	154

Table 6 Severity scale scores per cluster per time point

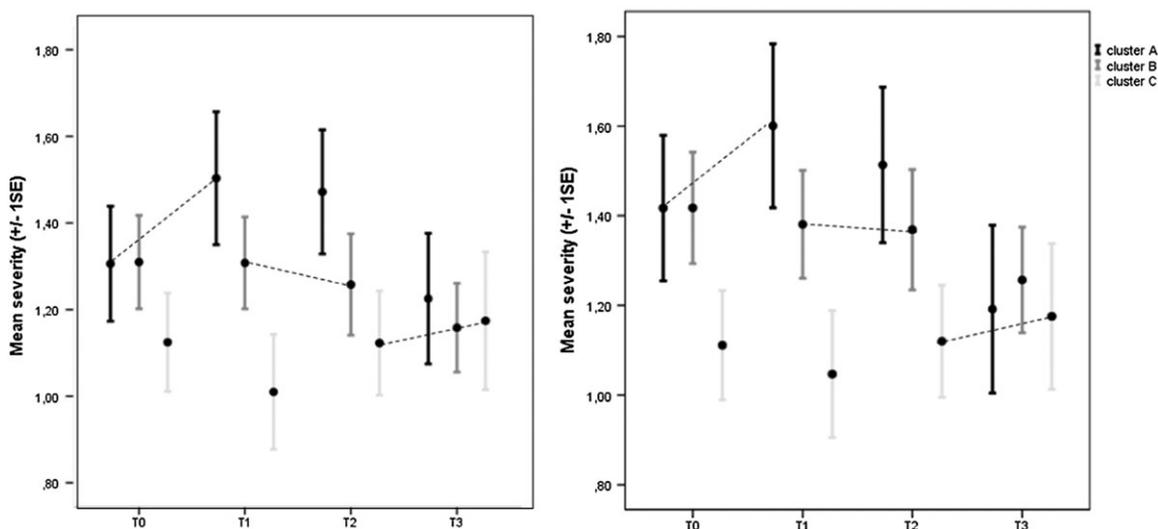|			Severity of challenging behaviour	
			Intention-to-treat	By protocol
Cluster A	T0	Mean (SD)	1.31 (0.86)	1.42 (0.90)
		N	42	31
	T1	Mean (SD)	1.50 (0.91)	1.60 (0.95)
		N	35	27
	T2	Mean (SD)	1.47 (0.85)	1.51 (0.87)
		N	35	25
	T3	Mean (SD)	1.23 (0.87)	1.19 (0.92)
		N	33	24
	Mean (SD) T1, T2 and T3		1.38 (0.84)	1.40 (0.85)
Cluster B	T0	Mean (SD)	1.31 (1.07)	1.42 (1.08)
		N	97	75
	T1	Mean (SD)	1.31 (1.00)	1.38 (1.04)
		N	89	75
	Mean (SD) T0 and T1		1.28 (0.98)	1.40 (1.02)
	T2	Mean (SD)	1.26 (1.05)	1.37 (1.09)
		N	80	66
	T3	Mean (SD)	1.16 (0.91)	1.26 (0.95)
		N	79	65
	Mean (SD) T2 and T3		1.22 (0.94)	1.32 (0.98)
Cluster C	T0	Mean (SD)	1.12 (0.86)	1.11 (0.87)
		N	57	51
	T1	Mean (SD)	1.00 (0.97)	1.05 (0.99)
		N	53	49
	T2	Mean (SD)	1.12 (0.88)	1.12 (0.89)
		N	53	51
	Mean (SD)T0, T1 and T2		1.09 (0.82)	1.09 (0.84)
	T3	Mean (SD)	1.17 (1.08)	1.18 (1.09)
		N	46	45

Prevalence of challenging behaviour

For all participants, one or more forms of challenging behaviour were identified with the BPI-PIMD. Self-injurious behaviour was identified in 84.9% ($n = 168$) of the participants, stereotypical behaviour in 93.4% ($n = 185$), withdrawn behaviour in 84.4% ($n = 167$) and aggressive/destructive behaviour in 47% ($n = 93$) of the participants with PIMD.

Perceived severity of challenging behaviour

Table 6 shows the mean challenging behaviour severity scores for the three clusters (A, B and C) at the four measurement points, divided into the 'intention to treat' and the 'by protocol' groups. In addition, this table shows mean scores for the pre-test and post-test periods [for example, the mean scores at T0 (pre-test) and mean scores for T1, T2 and T3 (post-test) are provided for cluster A]. Fig. 1a,b presents the mean severity over time per cluster for both groups.

Based on the sample descriptives, a small increase was observed in the severity scores in clusters A and C after the intervention (respectively after T0 for cluster A and after T2 for cluster C). This increase is most prominent in cluster A (dotted lines, Fig. 1a,b). A slight decrease in severity scores in cluster B was observed over time regardless of the intervention (see

Figure 1 (a) Intention-to-treat and (b) by-protocol: mean challenging behaviour severity scores for clusters A, B and C. The dotted lines in the figure represent the change in scores before and after the intervention.

Table 7 Multilevel analysis results of the observed challenging behaviour severity scores

	Grand mean model (intention-to-treat)	Time-dependent model (intention-to-treat)	Full model (intention-to-treat)	Full model (by-protocol)
Intercept	1.24 (0.062)	1.25 (0.068)	1.23 (0.067)	1.31 (0.077)
Time point$_1$		−0.01 (0.049)	−0.04 (0.049)	−0.05 (0.051)
Time point$_2$		−0.01 (0.050)	−0.12 (0.069)	−0.15 (0.073)*
Time point$_3$		−0.05 (0.051)	−0.20 (0.084)*	−0.27 (0.091)*
Intervention			0.16 (0.066)*	0.20 (0.072)*
N (time points)/total	699/792	699/792	699/792	580/624
Deviance (−2 LL)	1396.6	1395.5	1366.8	1136.3

*Significant at α = 0.05

also Table 6). The average score at T3 for clusters A and B is lower than at T0. This is not the case for cluster C: here, a slight increase is observed. Based on these box plots, there is no apparent difference between the intention-to-treat and the by-protocol groups within the clusters (see also Table 6).

Multilevel model for challenging behaviour severity

Table 7 shows the results of the multilevel analysis of the severity of challenging behaviour as predicted by time and intervention. The results show a downward trend in perceived severity over time, which is significant at the second and third measurement points. The direct support staff appear to be evaluating behaviour as less serious as time passes.

The results also show a significant positive effect for the intervention. The direct support staff appear to evaluate the behaviour as having more serious effects after the intervention, although this effect is very small. The full model is not a significant improvement over the grand mean model, χ^2 (20, $N = 699$) $= 29.8$, $P = 0.07$, but does show a significant improvement compared with the time-dependent model, χ^2 (17, $N = 699$) $= 28.7$, $P = 0.04$, as is evident from the differences we observed in deviance. Small differences were found between the 'intention to treat' and 'attended intervention' (by-protocol) models: specifically, if we exclude the direct support staff who did not attend the intervention, a small increase is observed in the severity scores after the intervention compared with the group that includes

Table 8 biomedical scale and severity scale scores per cluster per time point

			Biomedical	
			Intention-to-treat	By-protocol
Cluster A	T0	Mean (SD)	0.01 (0.97)	0.22 (0.87)
		N	38	30
	T1	Mean (SD)	0.14 (0.77)	0.25 (0.75)
		N	33	25
	T2	Mean (SD)	0.12 (0.66)	0.13 (0.68)
		N	32	22
	T3	Mean (SD)	0.20 (0.72)	0.21 (0.82).
		N	31	22
	Mean (SD) T1, T2 and T3		0.15 (0.59)	0.17 (0.63)
Cluster B	T0	Mean (SD)	0.15 (0.74)	0.14 (0.75)
		N	91	72
	T1	Mean (SD)	0.05 (0.84)	0.09 (0.78)
		N	85	73
	Mean (SD)T0 and T1		0.08 (0.73)	0.11 (0.71)
	T2	Mean (SD)	0.23 (0.75)	0.24 (0.74)
		N	75	64
	T3	Mean (SD)	0.03 (0.80)	0.08 (0.76)
		N	74	63
	Mean (SD) T2 and T3		0.10 (0.77)	0.15 (0.73)
Cluster C	T0	Mean (SD)	0.01 (0.94)	0.02 (0.98)
		N	52	47
	T1	Mean (SD)	−0.14 (0.87)	−0.11 (0.89)
		N	51	47
	T2	Mean (SD)	−0.04 (0.84)	−0.03 (0.87)
		N	50	48
	Mean (SD)T0, T1 and T2		−0.06 (0.85)	−0.04 (0.77)
	T3	Mean (SD)	−0.05 (0.86)	−0.05 (0.87)
		N	43	42

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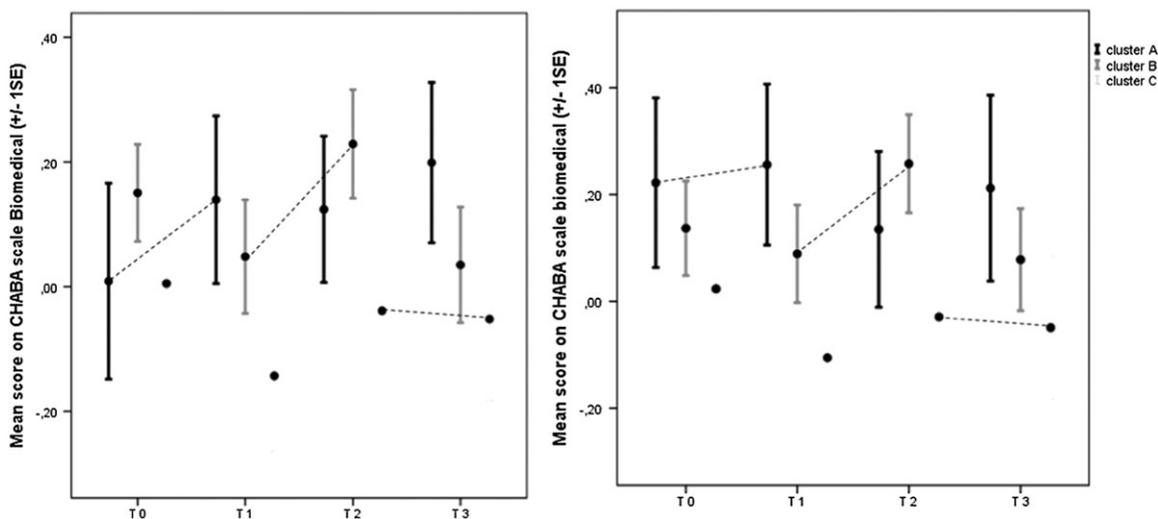
Figure 2 (a) Intention-to-treat and (b) by-protocol: mean biomedical scale scores for clusters A, B and C. The dotted lines in the figure represent the change in score before and after the intervention.

Table 9 Results of the multilevel analysis of the biomedical scores

	Grand mean model (intention-to-treat)	Time-dependent model (intention-to-treat)	Full model (intention-to-treat)	Full model (by-protocol)
Intercept	0.05 (0.052)	0.07 (0.060)	0.07 (0.062)	0.12 (0.068)
Time point$_1$		−0.06 (0.052)	−0.08 (0.060)	−0.08 (0.062)
Time point$_2$		−0.02 (0.054)	−0.05 (0.071)	−0.10 (0.074)
Time point$_3$		−0.04 (0.055)	−0.14 (0.088)	−0.20 (0.090)*
Intervention			0.10 (0.067)	0.12 (0.072)
N (time points)/total	655/792	655/792	655/792	552/624
Deviance (−2 LL)	1278.2	1275.2	1248.3	1016.9

*Significant at α = 0.05

direct support staff who did not attend the intervention.

Biomedical attribution

Table 8 presents the mean scores on the CHABA biomedical scale over time for the three clusters (A, B and C) at the four time points, divided into the intention-to-treat and the by-protocol groups. Mean scores, pre-test and post-test [for example, for cluster A, a mean score for T0 (pre-test) and a mean score for T1, T2 and T3 (post-test) are provided] are also presented. Fig. 2a,b visualises the mean biomedical scale scores per cluster for both groups.

Table 8 and Fig. 2a,b show that the scores on the biomedical scale increased after the intervention in clusters A and B. A small decrease is visible in cluster C. The clusters vary by mean scores at the different time points. Furthermore, the cluster A by-protocol group scored significantly higher on the biomedical scale than the cluster A intention-to-treat group at T0.

Multilevel model of direct support professionals challenging behaviour biomedical attributions

Table 9 shows the results of the analysis of the total biomedical scores as predicted by time and

intervention. The results show a small downward trend over time, which becomes significant at time point 3. No significant effect for the intervention was found. The full model is not a significant improvement over either the grand mean model, χ^2 (20, $N = 655$) = 29.9, $P = 0.07$, or the time-dependent model, χ^2 (17, $N = 655$) = 26.9, $P = 0.06$, as can be seen in the differences in deviance. There were small differences between the 'intention to treat' and the 'attended intervention' models (Table 8).

Conclusion and discussion

The present study examined the effect of a psycho-educational intervention covering two main topics. One targeted the prevalence and severity of various types of challenging behaviour and their possible consequences. The second targeted the possible causes for challenging behaviour (both internal and external). We hypothesised that this intervention would result in changes to direct support staff assessments of challenging behaviour in terms of its severity and the biomedical causal explanations offered for it. Our results show that severity scores display a downward trend over time with a small but significant increase in severity scores after the intervention. The downward trend in severity scores and the small increase following the intervention cannot be explained by differences between the clusters. There were no significant differences between the clusters at the baseline measurements. Moreover, the intervention was always carried out by the same person and in a similar format. No significant effects were found in the reductions in the biomedical scale scores. This is not in line with a review conducted by Williams *et al.* (2012), who found that training (regardless of its specific content or duration) had a clear effect on the attributions reported by direct support staff. They suggested that the process of obtaining information that enables the reformulation of the challenging behaviour of a particular person or in general is a key element to changing attributions. Although a statistical significant increase of severity scores was found after the intervention, this is reflected in a very small shift in the measures. Therefore, it remains unclear how clinically meaningful this change is.

When interpreting our results, the following issues should be considered. In intervention studies, like the one reported here, it is impossible to deliver the intervention to all the participants or clusters simultaneously by the same trainer. If more than one trainer would conduct the intervention, this could result in a bias of the results, which could pose a threat to the internal validity. Therefore, we opted for a stepped wedge design. The stepped wedge design enables us to model the effect of time on the effectiveness of an intervention by comparing between and within clusters differences (Brown & Lilford 2006). Within this design, there is a risk of contamination between parallel groups located at the same organisation, because people from different groups could exchange information and experiences, thereby potentially diminishing the differences in the responses elicited before and after intervention. We attempted to mitigate this contamination risk by implementing the intervention for all the groups within the same organisation simultaneously. Where the intervention was offered at different times within the same organisation, we ensured a substantial geographical distance between the groups. The probability that these groups were able to communicate with each other about the intervention was therefore reduced.

The organisations that participated in the research were not randomly selected. Although the range of participating organisations represents Dutch conditions, we can assume that organisations that voluntarily enrol are more eager to participate in research, which could distinguish them from the organisations that did not sign up. This could undermine the generalisability of the results. However, a total of 195 direct support staff from 10 organisations participated in the research. This number is substantial given the total population of adults with PIMD living in facilities in the Netherlands (Vugteveen *et al.* 2014).

We used a study design that had the dependent variables measured repeatedly. Direct support staff were required to complete the same questionnaires four times over a period of 4 months. It is possible that this repeated completion of the same questionnaire caused a learning effect to develop. This might have affected how staff perceived and responded to challenging behaviour in people with PIMD in daily practice. It is possible that the perceived severity of the behaviour decreased because the identified behaviour was dealt with in practice. However, given the relatively

short period and the persistence of challenging behaviour in people with PIMD, this seems unlikely.

Repeatedly completing the same questionnaires could also have led to questionnaire fatigue. However, relatively little data were missing from the severity and attribution scores, and we found no evidence that the missing data were related to specific characteristics of the organisations included in the clusters or individual participants. The only exception seems to be the participants who attended the intervention and their mean scores on attributions in cluster A. The eight participants from cluster A who did not attend the intervention scored significantly lower on the CHABA biomedical scale than the other direct support staff. The absence of this group from the intervention could have biased the results. Furthermore, the CHABA was used in this study as a tool to identify attributions for challenging behaviour in children and adults with PIMD. Although the reliability of this instrument has been investigated and approved, the validity has not yet been established. This could also explain our results. Future research could explore the validity of the instrument for staff working with children and adults with PIMD. In our research, data concerning challenging behaviour of a person with PIMD were collected by only one staff member. This might have compromised our results. In future research, it would be interesting to include the reports of several members of staff on the frequency and severity of challenging behaviour.

The intervention used was brief and only aimed at increasing direct support staff's knowledge; staff were not taught any specific skills that could be used in practice during the intervention. Although we were careful to maximise the potential benefit of the intervention and a specific methodology was used to ensure that the effects were measured carefully, our results showed that the intervention was not effective. Training staff using generic lectures, modelling and role play alone is insufficient to change the beliefs direct support staff hold about challenging behaviour in people with PIMD (e.g. Tierny *et al.* 2007; McDonnell *et al.* 2008). Embregts (2002, 2003) successfully used video feedback to achieve improvement in staff behaviour when dealing with challenging behaviour in children with mild ID. Lambrechts (2010) also used video feedback to encourage staff to reflect on their behaviour, and staff reported that they found this to be helpful. Extensive

training, presenting a bio-psychosocial framework from which behaviour can be interpreted, along with information on the causes and consequences of behaviour, should be combined with on-the-job training during which direct support staff can reflect on the behaviour of people with PIMD but also on their own behaviour. The effects of such training should be addressed in future research.

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