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Making a difference? A comparison between multi-sensory and regular storytelling for persons with profound intellectual and multiple disabilities

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Abstract

Background Multi-sensory storytelling (MSST) was developed to include persons with profound intellectual and multiple disabilities in storytelling culture. In order to increase the listeners' attention, MSST stories are individualised and use multiple sensory stimuli to support the verbal text. In order to determine the value of MSST, this study compared listeners' attention under two conditions: (**1**) being read MSST books and (**2**) being read regular stories.

Method A non-randomised control study was executed in which the intervention group read MSST books ($n = 45$) and a comparison group ($n = 31$) read regular books. Books were read 10 times during a 5-week period. The 1st, 5th and 10th storytelling sessions were recorded on video in both groups, and the percentage of attention directed to the book and/or stimuli and to the storyteller was scored by a trained and independent rater. Two repeated measure analyses (with the storytelling condition as a between-subject factor and the three measurements as factor) were performed to determine the difference between the groups in terms of attention directed to the book/stimuli (first analysis) and storyteller (second analysis). A further analysis established whether the level of attention changed between the reading sessions and whether there was an interaction effect between the repetition of the book and the storytelling condition.

Results The attention directed to the book and/or the stimuli was significantly higher in the MSST group than in the comparison group. No significant difference between the two groups was found in the attention directed to the storyteller. For MSST stories, most attention was observed during the fifth reading session, while for regular stories, the fifth session gained least attentiveness from the listener.

Conclusion The persons with profound intellectual and multiple disabilities paid more attention to the book and/or stimuli in the MSST condition compared with the regular story telling group. Being more attentive towards the book and stimuli might give persons with PIMD the opportunity to apprehend the story and to be included in storytelling culture.

Keywords evidence-based practice, implementation, intervention, multi-sensory storytelling (MSST), reading, stimuli

Introduction

Persons with profound intellectual and multiple disabilities (PIMD) have profound intellectual

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disabilities (IDs) (developmental age of less than 24 months or an estimated IQ below 20–25 points) in combination with severe or profound motor and/or sensory disabilities. They have limited abilities to move around and limited functional use of their arms and hands. Also, persons with PIMD do have no or minimal use and understanding of verbal language and communicate, for example, using gestures, facial expressions or utterings (Grove *et al.* 1999). They frequently suffer from general health problems and sensory impairments (van Timmeren, van der Schans, van der Putten, Krijnen, Steenbergen, van Schrojenstein Lantman-de Valk & Waninge, under review). Persons with PIMD do therefore fully depend on their environment (Nakken & Vlaskamp 2007).

Storytelling is not a common practice for this target group; the severe and complex disabilities of persons with PIMD possibly make that storytelling is often considered an unsuitable activity (Lyons & Mundy-Taylor 2012). Purpose and function of literary texts are seen as fundamental to do with emotional engagement and creativity, rather than as an adjunct to the development of intellectual judgements. As Grove (2011) states: 'apprehension precedes comprehension; we start by apprehending through senses and feelings, only later we do evaluative judgement' (Grove 2011, p. 131). In case of persons with PIMD, it is unknown if such evaluative judgements are possible. Accessing the text of a story seems to pose an insuperable problem for persons whose understanding of language is mainly preverbal, but we have to realise that language is an art form like music, emphasising pattern, rhythm and intonation (Grove 2011). There is a range of approaches to storytelling, like 'interactive storytelling' (poetry with a strong focus on rhythm, Park 2004), 'Storysharing'™ (aiming at enabling persons with severe communication difficulties to tell their personal story, Grove 2010), or Sensitive Stories (individual stories on a sensitive subject, such as illness or death, Young *et al.* 2011). Another example is multi-sensory stories (MSST), these are individualised stories and have as distinctive feature the use of individualised-tuned sensory stimuli (e.g. tactile or visual stimuli), which support the verbal text. MSST was the brainchild of Fuller (1990) and Park (1998), who wanted to include persons with PIMD in the storytelling culture. MSST was further developed by PAMIS (Lambe & Hogg 2011).

According to the general guidelines for MSST (Lambe & Hogg 2011), a story should consist of 6 to 16 short sentences, which are supported by six to eight stimuli. Every one or two sentences are linked to one stimulus. The stimuli are selected according to the content of the sentence and the assumed preferences and abilities of the individual with PIMD. A reference stimulus is presented to the listener when the story starts thus making the activity recognisable to the listener. The use of individually adapted stimuli in MSST books is a crucial aspect of adjusting the book to the listeners' needs: whereas regular books (from the bookstore) activate the auditory and possibly the visual sense, MSST books use stimuli that can activate nearly all the senses (e.g. using tactile or olfactory stimuli). This makes stories accessible to people who cannot be captivated by the voice of the storyteller and pictures alone. Not only the stimuli are personalised, each book also has a reading instruction in which essential information about the listener is given. An example of an MSST book can be found in Fig. 1. The aim of an MSST book is not necessarily for the person with PIMD to fully comprehend the story but rather to 'apprehend' its atmosphere (Grove 1998).

Multi-sensory stories were introduced in England, Scotland, Belgium and the Netherlands without supporting scientific evidence. However, the body of research into the use of MSST has grown in the last few years (Grove & Park 1996; Young *et al.* 2011; Penne *et al.* 2012; ten Brug *et al.* 2012; ten Brug *et al.* 2013; Preece & Zhao 2014; ten Brug *et al.* 2015; ten Brug *et al.* 2015). These studies focused at listeners' responses to stories, such as their engagement (Young *et al.* 2011), attentiveness (ten Brug *et al.* 2015) and alertness (ten Brug *et al.* 2015) during MSST sessions. These studies showed promising results: listeners' attentiveness, engagement and alertness were more frequently observed during MSST sessions. Research has been conducted into stories with different aims, like stories aimed at achieving specific learning targets like choice making (Lambe & Hogg 2011), or at dealing with sensitive topics like understanding period pains or reduction of anxiety when being alone in a room (Young *et al.* 2011). Research also showed that the effects found on described variables do relate to the different components of the storytelling, such as the repetition of the story (Young *et al.* 2011; ten Brug *et al.* 2015; ten Brug *et al.* 2015) and the way stimuli are presented

Mia is going to sing us a song

Reference stimulus
Toy tambourine

Reading instruction
The reader is close to Mia and speaks with a quiet voice, the objects are presented close by Mia. Mia is most alert in the morning after dinner. Sit down in the multi-sensory environment and let Mia sit in her wheelchair, with the lights turned on. Mia does need around 10 seconds to react, make sure that the story does not take much longer than 4 minutes otherwise she will be tired. Although Mia will be unable to grasp the stimuli, she can grab them and she likes to touch them. Blow the balloon before reading, it belongs to the last page.

Text
Mia, do you like a bit of perfume?
Spray perfume on Mia, first a bit on her hands (let her smell it!) and then a bit on her cheek.
You're about to perform!

You look beautiful!
Keep the mirror at about 10 inches from her face, then place it at her desk.

We're going to decorate the room.
Let the streamers go up and down slowly, let Mia touch them only if she initiates it.
Look, we use streamers and balloons.

Are you going to sing for us?
Make noise ("ooeeehh") in the microphone, give it to Mia and hold the microphone together while you make the same sound. Let Mia for a while do what she wants with the microphone.

That's nice, give me a hug
Touch Mia's arm as an announcement, then give her a hug.
You did that very well!

Now we're going to clean up.
Put a (blown up) balloon at Mia's lap and let it deflate.
We're done!

Figure 1 Example of an multi-sensory storytelling book.

by the storyteller (in an active or a passive way, ten Brug *et al.* 2015; ten Brug *et al.* 2015).

If persons with PIMD are to apprehend the story, attentiveness towards the book and its stimuli is a precondition. However, the level of attention can be affected by several aspects. For example, attention can increase when the stimuli have a high salience (Mitchell & Le Pelley, 2010). Salience implies that something stands out from its environment and therefore obtains more attention. In addition, the degree to which the story captures the listeners' attention plays a part in the level of attention over the course of the repeated storytelling sessions; an attentive listener learns to recognise the story and so ascribe meaning to the story. Things we ascribe meaning to gain more attention, which leads to a further increase in attention. However, once something has been fully explored and therefore becomes a good predictor of events, the attention decreases (Mackintosh 1975; Pearce & Hall 1980; Pearce & Mackintosh 2010).

A listeners' level of attention to the story and/or storyteller might also relate to the individual character of MSST, as the content of the story is personalised and the stimuli are selected and presented according to the abilities and preferences of the individual with PIMD. Because preferred stimuli can be used to reinforce behaviour (Piazza *et al.* 1996), the use of preferential stimuli is assumed to increase the listeners' engagement during the storytelling session.

To start, we are interested whether MSST stories gain more attention compared with regular books. As the amount of attention directed to the book affects the listeners' level of attention over the course of the storytelling sessions, we want to analyse whether there are differences in this course of attention between MSST books and regular books.

If the difference between both ways of storytelling is minimal, the added value of making an MSST book, which is a time-consuming process, might be limited. In order to understand the benefits of MSST books when compared with regular ones that are not

adjusted to the listeners' preferences and abilities and do not contain multi-sensory stimuli, we compared listener attentiveness during these two storytelling conditions.

Methods

In total, 76 participants with PIMD were included and divided into two groups: a group being read regular books ($n = 31$) and a group being read MSST books ($n = 45$). From each participant, the 1st, 5th and 10th reading sessions were recorded, and listeners' attention was observed using these recordings.

Participants

The aim and background of the study was presented for approval to the institutional review board of the residential facilities that were asked to participate in this study. After approval was granted, support persons working with persons with PIMD were informed about the aim of the study. In addition, parents or legal representatives of the persons with PIMD were asked to give their written informed consent. As a result, a total of 76 volunteered to participate in this research. Information on the demographic characteristics of the storytellers (e.g. age, gender and work experience) was collected using a short questionnaire. The participants (dyads of a support person and a person with PIMD) came from Belgium ($n = 18$) and the Netherlands ($n = 58$) and worked in 30 different settings and locations: activity centres, schools and residential facilities. The age of the storytellers (support persons) varied between 20 and 65 years [mean: 36.9, standard deviation (SD): 10.71 years]. Most worked as direct support professionals (61.8%) or speech therapists (14.5%), but others were teachers (3.9%), assistant support staff (2.6%) or interns (5.3%). Information about the function of nine participants was missing. Most of the storytellers had a vocational (39.5%) or higher vocational (39.5%) qualification. Two (2.6%) had an academic degree, and one (1.3%) had only completed secondary education. The remaining storytellers did not provide details on their education.

All storytellers selected a person with PIMD whom they knew well and to whom they would read a book. Nakken & Vlaskamp's (2007) description was used as criterion for inclusion, meaning that all participants were diagnosed with a developmental age below 2 years, and having severe or profound motor disabilities. Information on the characteristics of the people with PIMD such as the level of the ID and severity of the motor abilities was collected to ensure that all participants indeed fell within the definition of the target group (Nakken & Vlaskamp 2007).

Forty-five (59.2%) of the participants with PIMD were above 18 years of age. The average length of time the storyteller had known the person with PIMD was 4.2 years (SD: 5.01).

The storytellers were divided into two groups based on order of registration: the first registered storytellers were assigned to the MSST group. Once this group had reached 50, it was considered full. For a variety of reasons, such as lack of time and lack of written informed consent from parents, five of these storytellers ended up not participating after being assigned to the MSST group. The remaining storytellers ($n = 31$) were assigned to the regular storytelling group (comparison group).

The two groups were compared on the storytellers' experience (with both the listener and persons with PIMD in general), function and level of education as well as on the age group of the person with PIMD. There was no significant difference in the distribution of the listeners' age group between the storytelling conditions (chi (1) = 2.07, $p = 0.15$). In an independent sample t-test, no significant difference was found between working experience with the listener ($t(63) = 0.96$, $p > 0.05$) nor with persons with PIMD in general ($t(65) = 0.69$, $p > 0.05$). A Fisher's exact test was used to compare the two groups of storytellers on their function and educational level; no statistically significant difference was found in educational level ($p = 0.47$), but there was a significant difference between the groups in the storytellers' function ($p = 0.043$). The group that read the regular books contained more direct support persons than the group that read the MSST books (83.3% compared with 59.5%), whereas the MSST group comprised more speech and language therapists, teachers and assistant support staff.

Procedure

The support persons (storytellers) of the MSST group were familiarised with MSST in a 6-h workshop. The workshop included theoretical

information about MSST and a presentation on how to develop an MSST book, explaining the rationale behind the guidelines (as mentioned in the section on Introduction) (ten Brug *et al.* 2012). The storytellers then spent the rest of the workshop writing their MSST books, in which they fully adapted the content of the book and the stimuli used to the abilities of each individual with PIMD. Each book also contained instructions for the storyteller explaining the ideal setting (e.g. environmental noise and preferable size of the room) and the best way to tell the story (e.g. tone of voice and distance to the listener). In addition, in the instructions, information is also provided about the listener (e.g. ideal posture and the time the person with PIMD need to focus). In order to adjust the story to the preferences and abilities of the listener, we used a structured questionnaire called the 'Inventory for tuning activities and situations to the abilities and Preferences of persons with Profound intellectual and multiple disabilities' (IPP, Tadema *et al.* 2005; Van der Putten *et al.* 2011), which was filled in by the storyteller. The aim of the IPP is to organise the present knowledge about the preferences and abilities of the person with PIMD in a convenient way that enables the direct support persons (DSP) to use this knowledge while creating an activity (Vlaskamp *et al.* 2007). By using the IPP, information was collected about the sensory preferences and abilities (vision, hearing, touch and the olfactory senses), gross motor abilities and contextual preferences (when, where and how a story should be read).

The storytellers finished their books after the workshop but were given the book covers and neutral backgrounds. Velcro and elastic bands were also provided; these are used to attach the stimuli to the neutral boards to make the stimuli more visible. Although the storytellers were informed about the guidelines and their importance, they were not corrected if they deviated from these in their stories.

The second group of storytellers (comparison group) was asked to select a regular book for the person with PIMD. This needed to be a book that could be bought in a shop or borrowed from the library rather than a self-penned one. The storytellers were asked to select books they thought the listeners would enjoy but not books the listeners were familiar with and would recognise, as this would influence their attentiveness. As indicated, the content of the MSST books was also new to the listeners in the MSST group. We had no requirements for the level of difficulty; a book could be adjusted to the developmental or the chronological age of the listener and/or to the preferences of the storyteller. The storytellers were told that the story should preferably take between 2 and 15 min, which were comparable to the duration of an MSST book. The storytellers were free to select any kind of story: a chapter of a book, a whole book, one or multiple short stories or a story book. They could also adjust the reading conditions (e.g. time and place) to the preferences and abilities of the listener.

Data and instruments

The storytellers were told to read the book 10 times during a 5-week period to the person with PIMD. The 1st, 5th and 10th reading sessions were recorded on video by the main researcher and a small number of (under)graduate students. For each person with PIMD, an individual behavioural profile was written in order to enable the observer to interpret the behaviour of this person as adequately as possible. The storytellers were asked to give the researcher specific details on the behaviour the listener exhibits when he or she is attentive towards an object and/or a person as an aid to interpret the listeners' behaviour. The storytellers reported on the behaviours the listeners would normally show when attentive towards the story (e.g. 'looks at the stimulus', 'turns his or her head towards the stimulus/book', 'makes eye contact', 'leans forwards' and 'reaches towards the stimulus'). These details on individual behaviour of the person with PIMD were provided by the storyteller.

The degree (in terms of directionality) of attention paid to the book and/or the stimuli or to the storyteller was scored by one independent rater using momentary interval coding (Yoder & Symons 2010). This involved stopping the recording every 2 s and observing the listeners' behaviour at that particular moment. The details provided by the storytellers on the listeners' behaviour were used in these observations. The listeners' attention was every 2 s assigned to one of the following three categories: (**1**) attention directed to the storyteller, for example, looking, bending towards or pointing at the storyteller; (**2**) attention directed to the book and/or stimuli, for example, looking, reaching or pointing at the book's box before a stimulus is presented or

looking at or manipulating a stimulus; (**3**) other, for example, attention is on something else in the room (e.g. the camera or another person) or the listener is not paying attention at all and is exhibiting withdrawn behaviour or dozing off.

Both storyteller and persons with PIMD were filmed in such a way that the whole body of both could be observed. Dependent of the individual situation, the camera was placed on a tripod or held by the person who recorded the videos. If necessary or desirable for the storyteller or the listener, the observer left the room when the storytelling session took place. In total, 216 recordings were made, with 12 recordings missing because of illness of the person with PIMD, holidays and one dropout from the research project.

In an earlier study, the reliability of this scoring system in attentiveness during storytelling sessions was analysed. This inter-observer reliability was based on 23 randomly selected recordings and scored on attentiveness by two independent researchers. The second observer randomly chose eight dyads, which were used in order to calculate the inter-observer reliability with a Pearson's correlation coefficient. The correlation between the observations of the two observers on the total amount of attentiveness towards MSST was $r = 0.76$. The correlation was slightly lower between the variables measuring the attentiveness directed at the book/stimuli ($r = 0.72$) and attentiveness directed at the storyteller ($r = 0.73$). After calculating the Pearson's correlation coefficient, it was examined whether there are notable differences in the amount of attention in the observations of both researchers. When looking at the discrepancy in scores between the two observers, it was striking that the inter-observer reliability of two dyads is far apart. For the first dyad, the listener was busy manipulating the stimuli throughout the reading session but showed no visual attentiveness, which lead to a discrepancy between the two observers. For the second dyad, the quality of the video was low, because these participants showed very subtle signs of attentiveness making his or her behaviour difficult to interpret. From both of these dyads, three recordings were included in the calculation of the inter-observer reliability. When these six recordings were omitted, the correlation raises for the total attentiveness ($r = 0.86$), the attentiveness towards the book/stimuli ($r = 0.76$) and the attentiveness towards the storyteller ($r = 0.79$) (ten Brug *et al.* 2015).

Analysis

The average duration of a storytelling session (in seconds) was calculated for each storytelling dyad by adding up the duration of the storytelling sessions and dividing this by the number of sessions. An independent sample *t*-test was used to compare the average duration of the MSST stories to the average duration of the regular stories.

The proportion of attention paid to the book/stimuli and to the storyteller was calculated for each reading session. The total attention directed to the storytelling as a whole was calculated by adding up the amount of attention directed to the storyteller and to the book and/or stimuli. Descriptive statistics were used to report attentiveness to the book and/or stimuli, to the storyteller and to the storytelling as a whole.

As it is not possible to deal with missing data in a repeated measures analysis, we chose to perform a missing data analysis. Little's missing completely at random (MCAR) test was not significant (chi2 (12) = 10.33, $p = 0.57$), meaning that the missing data were probably completely random. A missing data analysis in the form of multiple interpolations replaced the missing recordings. Five imputations were generated for the six variables describing listener attention (for each measurement attention to the book/stimuli and attention to the storyteller). The minimum and maximum values found in the dataset were maintained, and the condition (MSST or general reading) was included as a predictive variable.

Repeated measures were performed to analyse whether the amount of attention directed to the storyteller and book/stimuli changed over time. The storytelling condition (regular book vs. MSST book) was included as a between-subject factor. The three measurements (the 1st, 5th and 10th storytelling sessions) were included as the factor. The percentage of attention directed to the book and/or the stimuli was used as the dependent variable in the first repeated-measure analysis, and attention paid to the storyteller in the second analysis.

This was followed by an analysis of whether the storytelling condition influenced the effect of repetition. The percentage of attention directed to storytelling as a whole (attention to the book and/or stimuli and to the storyteller) was used as a dependent variable, taking into account linear and quadratic

effects. In addition to looking at a solely linear relationship, we also explored a quadratic relationship.

Results

The average duration of an MSST story was 321.05 s [(5.35 min), SD = 228.66 s (3.81)], the average duration of a regular story was shorter [mean = 280.28 s (4.67), SD = 125.40 s (2.09)], but this difference was not statistically significant ($t(74) = 1.755$, $p = 0.189$). When the duration of the storytelling was reviewed, it revealed that two dyads in the MSST condition read relatively long stories: these had an average duration of 1163 (19.38) and 1226 (20.43) s, while the third longest duration was 599 s (9.98). If these two dyads were excluded, the average duration of the MSST stories was 280.43 s (4.67) (SD = 129.27). These two dyads were omitted from the further analysis, because to our opinion, these dyads changed the character of the storytelling activity.

Table 1 shows the attentiveness towards the storyteller and the book and/or stimulus in the two groups: MSST books and regular books. The average amount of attention directed at the MSST as a whole was 64.42%, 72.92% and 71.60% for the 1st, 5th and 10th reading sessions, respectively. For regular storytelling, the percentages of attention directed at the activity were 42.94%, 41.79% and 43.78%.

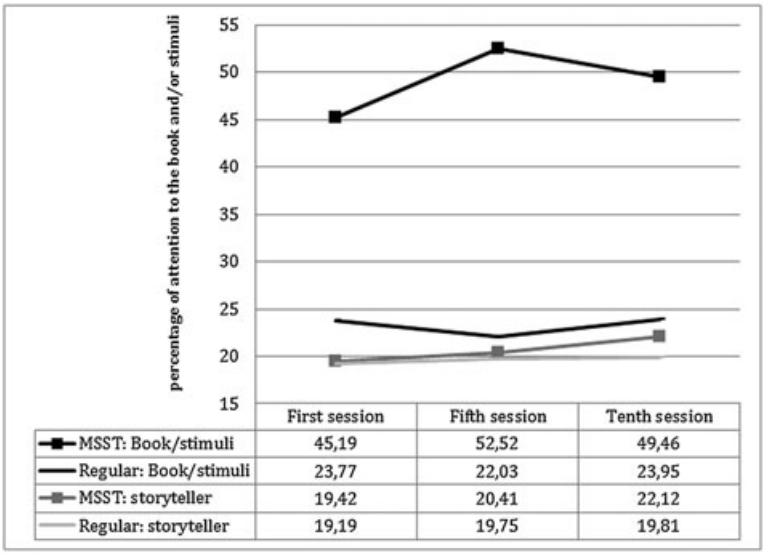
The three measurements of attention paid to the storytelling were included as a factor in the repeated-measures model and whether an MSST or regular book was used was added as a between-subject factor. Figure 2 shows the amount of attention paid to the MSST and regular storytelling.

The amount of attention paid to the book/stimuli was measured, and a repeated-measure analysis was performed. A significant main effect was found for the attention paid to the book/stimuli on the MSST and the regular stories. This showed that the listeners' attention was more directed to the book/stimuli when being read MSST books than when being read regular books ($F_{1,72} = 33.628$, $p < 0.001$). There was no evidence for either group that the attention directed to the book/stimuli changed as the book was read more often ($F_{2,144} = 2.151$, $p = 0.12$). There was, however, a significant interaction effect: as the books were read more often, the attention differed between regular books and MSST books ($F_{2,144} = 5.093$, $p < 0.01$). The changes in attention between the first two recordings and between the last two recordings differed for the two reading conditions ($F_{1,72} = 10.617$, $p < 0.01$). The attention directed at a regular book over the three storytelling sessions seemed to be constant, with a small decrease in attention at the fifth reading session. The attention aimed at the stimuli of MSST books first raised and then decreased slightly (Fig. 2). There was no evidence of the attention being

Table 1 Attentiveness to the storyteller, the book/stimuli and the storytelling as a whole for the storytellers using MSST and the storytellers reading regular books

			Attentiveness					
			MSST ($n = 43$)			Regular storytelling ($n = 31$)		
			Mean (%)	SD (%)	Range (%)	Mean (%)	SD (%)	Range (%)
Sessions	First	Storyteller	19.26	13.54	0–50	19.19	12.95	1–54
		Book/stimuli	45.19	19.42	9–80	23.77	21.87	0–97
		Whole activity	64.42	16.51	25–96	42.94	24.54	3–97
	Fifth	Storyteller	20.41	10.42	1–43	19.75	14.59	1–51
		Book/stimuli	52.52	18.53	17–83	22.03	21.40	0–86
		Whole activity	72.92	14.51	41–100	41.79	26.35	3–88
	Tenth	Storyteller	22.12	12.22	2–53	19.81	14.69	0–65
		Book/stimuli	49.46	17.22	15–82	23.95	23.62	0–93
		Whole activity	71.60	16.88	31–96	43.78	26.73	4–97

SD, standard deviation; MSST, multi-sensory storytelling.



	First session	Fifth session	Tenth session
MSST: Book/stimuli	45,19	52,52	49,46
Regular: Book/stimuli	23,77	22,03	23,95
MSST: storyteller	19,42	20,41	22,12
Regular: storyteller	19,19	19,75	19,81

Figure 2 Attentiveness to the book and/or stimuli and the storyteller during the three reading sessions of regular and multi-sensory storytelling (MSST).

linear over the course of the sessions ($F_{1,72} = 1.671$, $p = 0.20$).

The second repeated-measure analysis was performed with attention directed to the storyteller as the dependent variable. No difference was found in attention directed to the storyteller between regular books and MSST books ($F_{1,72} = 0.159$, $p = 0.691$) nor was there proof of an effect of time, meaning that the attention directed to the storyteller did not change significantly over the reading sessions ($F_{2,144} = 0.681$, $p = 0.508$). Finally, no interaction effect was found, meaning that the attention directed to the storyteller over the course of the sessions did not differ between the two reading conditions ($F_{2,144} = 0.303$, $p = 0.739$).

Discussion

The aim of this study was to compare the amount of attention in persons with PIMD between two reading conditions: MSST books and regular books. The attention of the listener was divided into attention paid to the storyteller and attention paid to the book and/or stimuli. The listeners in the MSST condition were significantly more attentive to the book and/or stimuli than those who were read regular stories. Attention directed at the storyteller did not differ significantly between the two conditions. A difference was found between the regular and MSST conditions in the attention paid to the book and/or stimuli over the course of the sessions: the change in attention between the first and fifth, and 5th and 10th reading sessions differed between the MSST condition and the regular books.

The results of the current study supplement our knowledge of the effectiveness of MSST as an intervention for persons with PIMD (ten Brug *et al.* 2013; ten Brug *et al.* 2015; ten Brug *et al.* 2015). The difference in listener attention directed to the book and/or stimuli between the two reading conditions is in favour of MSST stories. These stories have cues to particular events that may be (or may become) familiar to the listeners and also highlight these cues by the use of neutral backgrounds, thus directing attention to what is foregrounded (Grove 2011).

For each individual with and without disabilities, some stimuli will stand out more from their environment [salient stimuli (Mackintosh 1975)] and therefore attract more attention compared with others. The 'salience' of a stimulus depends on how it is perceived by an individual. However, for people with PIMD who frequently suffer from sensory impairments (Evenhuis *et al.* 2001), specific sensory aversions or can either be oversensitive or under sensitive to certain stimuli (Vlaskamp *et al.* 2007), the need to adjust stimuli to their preferences and abilities is evident. Contrary to regular books, MSST stories are fully adjusted to the listeners preferences. This adjustment not only concerns the stimuli used in the story but also the fashion in which the stimuli are presented, and the room where the story is read is

predetermined based on the results of a structured questionnaire. So, every effort has been made to make the stimuli used in the book as salient as possible, and the content and presentation of the story to fit the persons needs and wishes as much as possible.

It is assumed that learning will be quicker with more salient stimuli (Kamin & Schaub, 1963; Mackintosh 1975) and that MSST might therefore give the listener more opportunity to learn about the book and hence apprehend the story.

In accordance to Mackintosh's theory of attention (1975), when stimuli are presented repeatedly in a meaningful context, their relevance increases, too, relevant stimuli gain more attention (Mackintosh 1975). In our study, we find that the attention between the first and fifth reading sessions of the MSST books increased. This can be explained because the stimuli used in an MSST book are part of a story meaningful to the listener and therefore become more relevant when the story is read repeatedly. Young *et al.* (2011) also found that engagement increased towards the sensitive stories as they were repeated more often. No such increase between the first and fifth sessions was found in the regular story condition. Later on, the listener might become more habituated to the book and the book becomes predictable, which could cause a decrease in attention (Pearce & Mackintosh 2010). This matches with the decrease found in the current study between the fifth and tenth sessions of the MSST condition. This decrease was again not observed in the regular storytelling condition.

In a recently conducted study into MSST, we found that the active presentation of stimuli during MSST stories also contributed to the listeners' attention (ten Brug *et al.* 2015). Because the stimuli used in MSST books offer more opportunity for active exploration than the text and pictures of regular stories, this might also explain the higher amount of listeners' attention during the MSST condition. The higher levels of attention during MSST, compared with regular storytelling, are in accordance with the results found in a study by Mitchell & Van Der Gaag (2002). They analysed the levels of engagement in two women with PIMD during a storytelling programme named Odyssey Now (Grove & Park 1996). Mitchell & Van Der Gaag (2002) found higher levels of engagement during these storytelling sessions compared with a routine interaction with staff.

In the current study, if the listener was attentive to the book, it was not taken into account whether this was negative attention (e.g. trying to close the book) or positive attention (looking carefully at a stimulus or a picture). In another study, discontented behaviour was only observed a few times during MSST sessions (ten Brug *et al.* 2015), but it is unknown how often discontented behaviour occurs in regular reading sessions. It would be interesting to include data on listener alertness and well-being in future research. Penne *et al.* (2012) suggested that the relationship between the storytellers' interactive style and the well-being and involvement of the listener should be explored. This could be supplemented by other data, for example, on the role of repetition in the level of well-being and involvement.

This study has some limitations. In our study, two groups of people with PIMD were compared: one group reading an MSST book and the other group reading a 'regular' book. To avoid differences between the persons in the two conditions, an A-B design could have been an option. However, we deliberately have chosen not to use such a design because the listeners and storytellers could then become accustomed to reading together, and the first sessions would thus affect the listeners' attentiveness in later sessions. Also, the fact that we used a convenience sample, with the first responders being classified in the MSST group, might lead to concerns that this group is more motivated. We have avoided this by recruiting both groups separately in time.

A general concern is the reliability of the behavioural observations, as persons with PIMD have minimal communication skills and their behaviour is often idiosyncratic, which makes it difficult to interpret (Grove *et al.* 1999; Petry & Maes 2006; Hostyn & Maes 2009). However, to increase reliability, we used individual profiles of the behaviour of the person with PIMD provided by their storyteller to optimise the interpretation of the observable behaviour. An earlier study showed that observations of attention in which these individual profiles are used are moderately reliable (ten Brug *et al.* 2015).

Conclusion

Compared with regular books, MSST books increase the listeners' attentiveness to the book and/or stimuli. Further research must focus on which aspect or

aspects of MSST are the decisive factor (or factors) in the effectiveness of MSST: the use of sensory stimuli, the custom made character, the adapted reading condition or a combination of factors. For now, we can conclude that an MSST story, which is adapted to the preferences and abilities of a person with PIMD and includes sensory stimuli handpicked for this listener, will gain more of a listeners' attentiveness towards the book and the stimuli compared with reading a regular book. The results of this study are promising and offer new opportunities for persons with PIMD to include storytelling in their daily life.

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