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ORIGINAL ARTICLE

The content validity of the Behavioural Appraisal Scales in people with profound intellectual and multiple disabilities: A Delphi study

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Abstract

The Behavioural Appraisal Scales (BAS) were developed in The Netherlands to assess functional abilities of people with profound intellectual and multiple disabilities (PIMD). It is recommended that further studies examine the psychometric properties of the BAS. The aim of this study was to evaluate and, if necessary, improve the content validity of the BAS. A two-round Delphi study was used. In Round 1, parents, researchers and practice professionals indicated for each item whether they would retain, adapt or remove it, explaining their answers. The BAS were adapted based on this feedback. In Round 2, participants were given the adapted version and asked to indicate for each item whether they wanted to retain or remove it, again providing an explanation. Feedback was analysed by calculating the percentage of participants who wanted to retain, adapt or remove a certain item. Content analysis was used to analyse participants' explanations. In Round 1, more than 20% of the participants wanted to remove 11 from the 122 items, and wanted to retain or adapt the remaining items. Seven categories of adaptations emerged: (1) feasibility, (2) the construct the item measures, (3) applicability, (4) similarity among items, (5) splitting items, (6) reassignment and (7) the professionals who score the items. In Round 2, for all items >80% of the participants indicated they wanted to retain the item. Experts felt that the content validity of the BAS could be improved. After the adaptations, the content validity was evaluated as good. Further studies are needed to evaluate whether the new or adapted items are not too easy or too difficult, whether information from different informant groups results in being scored differently, and to evaluate possible differential item functioning.

KEYWORDS

assessment in practice, Behavioural Appraisal Scales, content validity, Delphi study, profound intellectual and multiple disabilities

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INTRODUCTION

The Behavioural Appraisal Scales (BAS) were developed in the Netherlands to measure functional abilities of people with profound intellectual and multiple disabilities (PIMD) (Vlaskamp et al., 1999). Functional abilities refer to the ability to perform every-day life skills (Vlaskamp et al., 2005). Functional abilities are particularly important for people with PIMD, who have a profound intellectual disability, a severe to profound motor disability, and often several other impairments and general health problems (Nakken & Vlaskamp, 2007; Van Timmeren et al., 2016), as these skills are directly relevant to the development of their autonomy (Vlaskamp et al., 2015). Because of their disabilities, people with PIMD are dependent on others, and it is only through these relationships they can influence their own lives and develop their abilities to their fullest potential (Van der Putten et al., 2017). People in their environment, such as direct support professionals, therefore need to recognise and understand their communicative behaviours, for which assessment is crucial (Vlaskamp, 2005). The BAS was developed to provide a profile of ability strengths and weaknesses, in order to offer appropriate support. In the BAS, functional abilities are divided into five factors: (1) emotional communicative behaviour, (2) receptive language behaviour, (3) general communicative behaviour, (4) visual behaviour and (5) exploratory behaviour.

The BAS were developed to assess the maximum abilities of people with PIMD. In practice, the BAS are used to formulate goals to stimulate the personal development of persons with PIMD (Vlaskamp et al., 1999). If information is available about the functional abilities of a person with PIMD, it is valuable to take this into account in regard to the support of their developmental needs (Vlaskamp et al., 1999). The BAS have several features that are important when assessing people with PIMD. Firstly, in order to assess maximum abilities, the BAS combine information from different sources, which is considered to be important when assessing this group (Lyons et al., 2016). The BAS combine information from observation, a test situation, and an interview of a support person, thus including the opinion of an expert involved in providing support to the person with PIMD. Secondly, the test procedure is flexible; it focuses on maximum possibilities and on the support needed. For example, there is no time limit imposed on responding, and the test may be taken at several test moments. Objects preferred by the person with PIMD can be used (Vlaskamp et al., 1999), as these can facilitate task engagement (Tullis et al., 2011; Virués-Ortega et al., 2014). Thirdly, the items were developed to take impairments in people with PIMD into account, for

example, by not relying on motor or sensory abilities. Items are broadly formulated to render them applicable to people with severe sensory or motor disabilities, so that they can demonstrate their maximum abilities. Lastly, there are no stopping rules, since the entire instrument is to be completed. This is particularly important for people with PIMD, as stopping rules are based on a linear development model, whereby it is assumed that if a person does not endorse several items in a row, they will not endorse the subsequent, more difficult items. However, according to several studies, development in people with disabilities may follow a different pattern (Van Braeckel et al., 2010; Visser et al., 2017), and the same may apply to people with PIMD.

Although the BAS have several advantages for assessing people with PIMD, studies on its psychometric properties are limited. A study by Vlaskamp et al. (2002) showed good inter-item and inter-rater reliability. Construct validity was assessed using a principal component analysis, which resulted in the five factors of the BAS. Vlaskamp et al. (2002) found that further studies of convergent validity were needed. Another study (Wessels et al., 2020) examined the factor structure, by comparing it and the order of difficulty of items in two subgroups of people with PIMD (adults with a more severe visual impairment and young children with less severe visual impairments). In general, acceptable construct validity and convergent validity were found, but results indicated that additional changes may enhance the validity of the BAS. For instance, some items correlated more strongly with scales other than the subscale they were assigned to, which suggests that they could possibly be reassigned. In addition, the results showed that some items may measure a different construct in different subgroups of people with PIMD; for example, because items relied on visual abilities. The authors therefore concluded that some items may be removed or reformulated (Wessels et al., 2020).

Until now, studies have mainly focussed on the construct validity and several aspects of reliability of the BAS in people with PIMD, so further studies evaluating content validity are needed. Content validity refers to the extent to which an assessment instrument is representative of all aspects of the construct it aims to measure (Evers et al., 2010). It concerns the comprehensibility, relevance and comprehensiveness of an instrument (Terwee et al., 2018). These are aspects that can be evaluated by experts who have knowledge and experience in the field. Asking experts to evaluate the content validity of an assessment instrument is therefore commonly used practice (Beck, 2020). For the BAS, different aspects could be evaluated by experts to improve content validity. The difference in length among the different subscales suggests an imbalance among them, as the shortest subscale

(emotional communicative behaviour) consists of three items and the longest (exploratory behaviour) consists of 37 items. Anecdotally, healthcare psychologists often report in practice that some parts of the BAS do not seem to be applicable for some people with PIMD, even though the BAS were specifically developed for this group, taking into account their disabilities. For example, the BAS include a visual behaviour scale, which is barely applicable, if at all, to people with severe visual impairments, even though the majority of people with PIMD have a visual impairment (Van Splunder et al., 2006). In addition, it is not clear to what extent the BAS take into account the heterogeneity of the group of people with PIMD. The disabilities within this group are severe and complex and intertwined, resulting in a unique pattern of abilities and disabilities for each individual (Van der Putten et al., 2017).

In order to adapt the support to the unique needs of this group, it is important to focus on the whole range of abilities a person with PIMD might have in order to stimulate the maximum potential for development. For example, an individual may not be able to use their hands, but may be able to hold an object with their elbows or feet. In addition, some individuals may rely more on domains other than those measured by the BAS, such as tactile or auditory skills. The response to sensory stimuli may be very different for different individuals with PIMD (Vlaskamp & Cuppen-Fontaine, 2007).

In sum, these research findings and observations made by healthcare psychologists indicate that the content validity of the BAS could be improved. The BAS are one of the few instruments specifically developed to assess functional abilities in people with PIMD (Carnaby, 2007). Information about functional abilities is highly valuable, as these abilities can be developed with adequate support. Thus, the present study has two central aims: (1) to analyse the content validity of the BAS, by investigating whether items or subscales should be added to the BAS regarding the measurement of functional abilities in people with PIMD, and whether any of the items should be adapted or removed; and (2) to enhance the content validity by adapting the instrument.

METHODS

This study employed the Delphi technique, which is widely used to establish consensus among experts in several feedback rounds (Ahmed et al., 2016; Hart et al., 2010; Petry et al., 2007). Participant anonymity is ensured, to guarantee that opinions can be expressed freely (Ahmed et al., 2016). Between survey rounds, participants are given an anonymous summary of how the other participants rated the items and the adaptations

that were made. This is followed by another survey round in which the items are rerated (Skulmoski et al., 2007).

Participants

To gain insight into a variety of perspectives, a heterogeneous group of participants was used (Keeney et al., 2011; Parratt et al., 2016). This group included:

- Professionals supporting people with PIMD.
- Researchers actively involved in research focussed on people with PIMD.
- Parents of people with PIMD.

The inclusion criterion for support professionals and researchers was a minimum of one year's experience in supporting people with PIMD. A further inclusion criterion for all participants was 'adequate verbal and writing skills in Dutch'. All participants were from The Netherlands or Belgium, except one who lived in Germany.

Purposive sampling was used to recruit participants. Participants were recruited in different ways. Firstly, they were recruited by contacting researchers, parents and healthcare professionals via the professional networks of the first and last author. They were asked to further distribute the invitation to participate in the study. Secondly, they were recruited by contacting organisations that provide support to people with PIMD. Thirdly, an invitation was posted on the Twitter page Research Centre Ernstig Meervoudig Bepert (Severe Multiple Disabilities), and on the EMG Platform (Severe Multiple Disabilities Platform) website. If experts were interested in participating in the study after reading the invitation, they could leave an email address. A total of 93 prospective participants filled in their email address and were sent a direct email invitation with a link to the online questionnaire, where they could also provide informed consent. Of these 93 prospective participants, 41 participants completed the questionnaire, while the remaining 52 did not respond. A sample size of 41 is in line with sample sizes used in previous Delphi studies (Ahmed et al., 2016; Hart et al., 2010; Kelly et al., 2008). Information about the participants is shown in Table 1. Six participants did not participate in Round 2, of whom five were practice support professionals, and one was a parent.

The Behavioural Appraisal Scales

The BAS were based on the Behavioural Assessment Battery (Kiernan & Jones, 1982) and specifically adapted for people with PIMD to measure functional abilities. It

TABLE 1 Participant characteristics

	Support professionals	Researchers	Parents	Total
Number	28	6 ^a	7 ^a	41
Age (range)	39.3 (22–61) ^b	37.0 (29–57)	51.1 (46–63)	41.0 (22–63) ^b
Years of experience with people with PIMD (range)	12.2 (1–31)	11.3 (2–32)	15.8 (8–26) ^c	12.6 (1–32)
Gender: female (%)	27 (96.4)	6 (100.0)	7 (100.0)	40 (97.6)
Experience with the BAS assessment procedure (%)	14 (50.0)	3 (50.0)	^d	17 (41.5)

Abbreviations: BAS, Behavioural Appraisal Scales; PIMD, profound intellectual and multiple disabilities.

^aThree researchers and two parents were also working in practice as professionals.

^bOne practice support professional did not give his or her age.

^cMean age of children with profound intellectual and multiple disabilities; one parent did not give the age of their child.

^dIt was unknown whether the parents had experience with the BAS assessment procedure.

consists of 100 dichotomous items in five subscales, which were defined as follows based on principal component analysis (Vlaskamp et al., 2002): (1) emotional communicative behaviour, (2) receptive language behaviour, (3) general communicative behaviour, (4) visual behaviour, (5) exploratory behaviour. In addition, there are 22 additional items, which, based on the results of a principal component analysis, are not part of the subscales but are often included in the assessment procedure by practice support professionals, as they could yield valuable additional information about functional abilities (Vlaskamp et al., 2002). These items have a different scoring scale than the other dichotomous items, namely ‘always’, ‘sometimes’ or ‘never’. The items are scored in various ways: some are assessed in a test situation, some are observed while the assessment is taking place, and some are scored by interviewing someone who knows the person with PIMD well (Vlaskamp et al., 1999). The BAS is a Dutch instrument that we aim to translate into English; which means that there is currently no English version available. According to Vlaskamp et al. (2002), inter-item reliability (Cronbach’s alpha 0.96–0.98) and inter-rater reliability were good ($r = 0.47$ – 0.93), based on the BAS scores of 96 adults with PIMD. Wessels et al. (2020) found support for construct validity in two groups of people with PIMD: adults with severe visual impairments ($n = 25$) and young children ($n = 52$), but construct validity may be enhanced by removing, adapting or reassigning items, as 16%–18% of the items correlated more strongly with a different subscale than the one they were originally assigned to. It was also suggested that some items may measure different constructs in different subgroups of people with PIMD, as differences were found in order of difficulty (for 20 items) and in factor structure in the two subgroups, as shown by the oblique multiple group (OMG) method.

Instrument

The Delphi surveys were designed by the authors of the present study, using the online software Qualtrics, Version 2019. The observations of the Delphi panel participants relate to the Dutch language version of the BAS. In the first round, the 122 items of the BAS were presented for each subscale and participants were asked for each item to indicate whether they wanted to retain it, adapt it, or remove it. There was space provided after each question which the participants could use to explain their answers, unless they wanted to retain an item without adaptation. In addition, general questions were asked about the BAS (see Table 2). In the second round, participants were given an anonymous summary of the feedback and adaptations of the BAS made based on the feedback from the first round. They were then given the items in the new version of the BAS and asked to indicate which items they did not want to retain (see Table 2). In addition, for each subscale space was provided where respondents could comment on the items or subscales.

Procedure

Participants were sent an information letter by email, which included information about the background of the study, and a confidentiality pledge statement guaranteeing the anonymity of the survey data records. The first page of the online questionnaire contained information about the study, the participant’s time investment, the anonymous processing and reporting of the results. Moreover, participants were informed that they could terminate their participation at any moment. Participants could only proceed to the survey if they ticked the box that indicated they had read the information and had given consent to participate in the study. All participants who responded to the invitation to participate in the



TABLE 2 Questionnaire for both Delphi rounds

Round 1		
Questions per item (122 items)	Questions per subscale	General questions
Would you like to: <ul style="list-style-type: none"> • Retain the item? • Adapt the item? Why? How would you adapt the item? • Remove the item? Why? 	Would you like to add any items? <ul style="list-style-type: none"> • No • Yes. Which items? 	Would you like to adapt the scoring options of the BAS? Are there subscales missing that could be relevant for measuring functional abilities in people with PIMD? Do you have other recommendations that could help improve the BAS?
Round 2		
Adapted items (presented per subscale)	New subscales, additional question:	
Could you please select which of the following items you would <i>not</i> like to retain as part of the BAS? Do you have any remarks considering the items or subscale?	Are there items missing that should be part of this subscale?	

Abbreviation: BAS, Behavioural Appraisal Scales.

study were asked to take part in the two-round Delphi study. In each round, participants were sent an email with the online link to the questionnaire and a reminder 2 weeks after the initial invitation. Participants were able to enter their responses over several sessions. Participants received an automatic notification in the first round if a question was not answered, which reduced the occurrence of missing data.

Analysis

After the first round, calculations were made for each item to determine the percentage of participants who suggested that the item should be retained without adaptation, the percentage wanting to adapt it, and the percentage wanting to remove it. If less than 80% of participants indicated that an item should not be altered, their open feedback was further analysed. Decisions were made about the removal or adaptation of items based on the analysis of open feedback. The answers to the open-ended questions were analysed using open coding

(Glaser, 2016). The feedback was labelled by the first author to define the central themes of the answers that were provided. Then, the labels were compared and if possible combined within an overarching label by the first author. Finally, the feedback and labels were discussed per item within the research team consisting of the three authors. It was discussed, based on the feedback, if items had to be merged, removed or adapted. Based on this discussion, items were adapted or removed and the adaptations were discussed again by the research team until consensus was reached. If adaptations had implications for the content and coherence of the items that more than 80% of participants wished to retain, these items were also adapted. In addition, new items were developed based on participants' suggestions. For answers to the general questions, the same data analysis approach was used as for analysing the open-ended feedback. The feedback was summarised in categories and discussed within the research team. Based on the feedback, subscales were added, and eventually, the manual was adapted and the lay out was changed for the final version of the BAS.

After the second round, new items, adapted items and new subscales were removed if less than 80% of the participants felt that the item should be retained (Ahmed et al., 2016; Petry et al., 2007). Again, feedback given on the open questions was labelled using open coding and was discussed within the research team. Items that more than 80% of the participants wanted to retain, could nevertheless be adapted or removed based on the feedback on the open questions.

RESULTS

Round 1: Feedback on the items

The percentage of participants who indicated that they wanted to remove an item ranged from 0 to a maximum of 35.9%. For 11 of the 122 items, more than 20% of the participants indicated they wanted them to be removed, but participants wished to retain or adapt the remaining items (see Appendix). For all items, suggestions were made for improvements. Seven categories of suggestions were identified: (1) feasibility of testing and scoring the items, (2) the construct measured by the item, (3) applicability to people with PIMD, (4) similarity among items, (5) splitting items, (6) reassignment of items and (7) the professionals who should score the items. These categories are described below, ranked in order from most to least often mentioned, followed by a description of the adaptations that were made based on the suggestions. The comments made about missing items and subscales,

scoring options, and general suggestions for improving the BAS are also described.

Feasibility of scoring or testing the items

For 84 of 122 items, participants indicated that the formulation was unclear. For 40 items, they suggested that the instructions should be adapted, because they were difficult to understand or carry out. For 55 items, participants indicated that the behaviour measured by the item was difficult to interpret in people with PIMD. For example, they found the item ‘the person makes laughing or crying sounds’ difficult to score, because these sounds are difficult to recognise and do not always indicate emotions in this group. For seven items, participants suggested that an example would make the instructions clearer. One parent stated that she did not like the formulation of the item ‘the person can imitate simple movements’, as the examples provided were movements that are not easily performed by people with PIMD.

The adaptations based on this feedback focussed mainly on the instructions. Items were improved by adding examples and clearer descriptions of how the item should be tested and what behaviours could be scored positively. The word ‘simple’ was removed.

Suggestions about the construct measured by the items

For 75 of 122 items, at least one participant indicated that the item did not measure functional behaviour, or that the functionality was not clear. An example is the item ‘A person hits a surface with one or two hands’. For 40 items, participants mentioned specifically that it was not clear to them what the item measured. For 18 items participants suggested, in addition to suggestions regarding functionality, that they would like the item to yield more information than it did; for example, by adding an open question (such as ‘How does a person indicate yes or no?’ or ‘What words does a person understand?’). Comments were also made about communication, as the items did not fully cover the communicative repertoire of people with PIMD. Participants mentioned that three items focussed on the use of gestures, these items might not be endorsed by people who use verbal language even though they may have a high level of communication skills. Participants suggested splitting the general communicative behaviour subscale into a subscale for verbal communication (sounds, language) and one for non-verbal communication (gestures).

Based on the feedback, the following adaptations were made: the items which participants felt did not measure functional behaviour were either removed or merged with other items (see Table 3, Example 4) or adapted (see Table 3, Example 5). A follow-up open question was added for several items, as this could provide relevant information for the support of people with PIMD and therefore increase functionality (see Table 3, Examples 1 and 2). The follow-up questions are not taken into account when calculating the scores on the subscales, but provide descriptive information that can be useful for support. General communicative behaviour was divided into two subscales: non-verbal and verbal communicative behaviour.

Applicability to people with PIMD

For 75 of 122 items participants indicated that they were not applicable to all or some people with PIMD, because they required skills that were either too complex, or relied on abilities that were not measured by the subscales. Examples are visual skills (e.g., items in the general communicative behaviour subscale); auditory skills (e.g., items in the visual behaviour subscale) or motor skills (e.g., items in the general communicative behaviour subscale). Participants suggested that 44 items should be formulated more broadly to allow for the idiosyncratic and unconventional behaviour of this group. For example, seven participants commented about item Em2 (‘The person makes laughing or crying sounds’) that laughing does not necessarily indicate happiness, as it could also be an expression of stress or seizures. For eight items, participants stated that the item could be intrusive in some situations for people with PIMD (e.g., items about holding the person’s hand).

Some items relied on abilities that were measured by another BAS subscale; these items were moved to that subscale (see Table 3, Example 3). In addition, items were also formulated in such a way that they identify maximum abilities, while taking into account unconventional or idiosyncratic behaviour (see Table 3, Example 3), or were removed (see Table 3, Example 7). Items that were considered intrusive were removed.

High degree of similarity across items

For 69 of the 122 items, participants indicated that there was a high degree of similarity with other items. These items were merged with others or removed (see Table 3, Example 6). As a result of the suggestions about

TABLE 3 Example of items of the original version of the BAS, codes based on feedback and changes to the items based on the feedback

Example item (subscale)	Most mentioned feedback in codes (number of participants)	Changes made based on feedback
1. The person makes sounds to indicate they are happy or sad (emotional communicative behaviour)	Item should be formulated more broadly (5) Split item into two items (3) Ask for more information (2) Difficult to interpret the behaviour of the item (6) Add other emotions (3)	The person can indicate that they are happy. How does the person indicate this? The person can indicate that they are sad. How does the person indicate this? <i>In addition, items about emotions “fear” and “anger” were added</i>
2. The person can indicate “no” (receptive language behaviour)	Item should be formulated more broadly (8) Ask for more information (5)	<i>Moved to general communicative behaviour</i> The person can indicate that they disagree with something. If so, how does the person indicate this?
3. The person can squeeze a squeaky toy (general communicative behaviour)	Unclear what the item measures (8) Item not applicable to people with PIMD (4) Item should be moved to a different subscale (6)	<i>Moved to motor exploratory behaviour.</i> The person can squeeze something
4. The person makes faces to their reflection in the mirror (general communicative behaviour)	Not functional or functionality unclear (3) Not applicable to people with PIMD (3) Difficult to interpret the behaviour of the item (2)	<i>Item removed</i>
5. The person hits a flat surface with one or two hands (exploratory behaviour)	Not functional or functionality is unclear (9)	The person can hit something, such as an object, button or wheelchair tray
6. The eyes and the head follow a moving object in the largest part of a vertical movement (visual behaviour)	Similarity to other items (5) Not functional or functionality is unclear (2) Item formulated too vaguely (1) Other professionals should score this item (3)	<i>Item merged with other items:</i> The person can follow a moving object with their eyes. What movements? (e.g., horizontal, vertical, circular, irregular).
7. The person moves their head to see more (additional information)	Similarity to other items (6) Item should be reassigned to another subscale (2)	<i>Item removed</i>

Abbreviations: BAS, Behavioural Appraisal Scales; PIMD, profound intellectual and multiple disabilities.

similarity, the two subscales with the most items—visual behaviour and exploratory behaviour—were shortened from 36 and 37 items, respectively, to 23 items. In total, the BAS were reduced from 100 items and 22 additional questions to 87 items and five general questions that yield information for the testing procedure.

Splitting items

For 26 of 122 items, participants indicated that they should be split into two items (e.g., Table 3, Example 1). These items were either split into two items, or removed based on the other categories of feedback.

Reassignment of items

For 24 of 122 items, participants mentioned at least once that an item should be reassigned to a different subscale. Based on the feedback regarding reassignment and the feedback regarding the items, items were either removed (see Table 3, Example 7) or reassigned to a different subscale (see Table 3, Example 3).

Professionals who complete the BAS

For 16 of 122 items on the visual behaviour scale and three items in the additional information, participants

suggested that the items should be filled in by an orthoptist. For two items on the receptive language behaviour scale and one item on the visual behaviour subscale, participants indicated that the scoring was dependent on the informant, as it depended on the extent to which an informant was familiar with the communicative signs made by the person with PIMD. As the scoring procedure for the BAS is flexible and maximum abilities are scored, the BAS may be completed based on information from several informants and informants who know the person very well (e.g., a parent or direct support person). Thus, no adaptations to the items were deemed necessary based on these comments.

Round 1: General remarks

Scoring options for the BAS

Thirteen respondents did not answer the question about changing scoring options, and nine indicated they did not want to change these options. Three participants wanted to dichotomise the additional information items that were scored as 'never', 'sometimes' or 'always' in the original BAS. In addition, eight participants said that they wanted to add a scoring category, such as 'often', 'partly' or 'sometimes'; and three participants wanted to add open questions, such as 'how' a person demonstrates certain abilities. Six participants suggested taking into account the context, such as differences in responses of the person with PIMD at different times or for different support people. One participant suggested changing the order of the scoring options in the additional information questions. As the majority of participants did not want to adapt the dichotomous scores and wanted to facilitate a clear interpretation of the scores, the scoring options were retained; but an open follow-up question was added for specific items as this was often suggested in the feedback. These open questions were added to provide relevant information for support, but they are not taken into account when calculating the scores for the strengths-weaknesses profile.

Missing items

Participants mentioned that certain emotions were missing from the emotional communicative behaviour subscale, such as anger and fear. Participants indicated that they would like to add several ways of communicating and expressing emotions, besides making sounds. Respondents also wanted to add items about attracting

someone's attention, joint attention, responding to a question, initiating turn-taking, and items that call for a yes-or-no answer. One respondent suggested adding an item about the ability to move around in a room independently. These items were all added to the new version of the BAS.

Missing subscales

In total, 25 of the 41 participants did not suggest missing subscales. Two respondents had left this question unanswered. The most frequently cited missing subscale was auditory behaviour (three times). Other subscales were: skills a person performs independently (twice), social functioning/interaction (twice), recognising patterns (once), pain (once), unintentional communication (once), tactile and vestibular responses (once), vocal sounds/language (once) and locomotion (once).

A subscale about auditory behaviour was added. Other suggestions were either already part of the BAS (e.g., tactile responses), or measure a construct not measured by the BAS (e.g., pain).

Other remarks

When asked whether they had any other remarks, participants mostly commented on feasibility. Participants suggested that general questions on disabilities, alertness, preferences and sensory integration should be added as these could be relevant for scoring and interpreting the BAS (three times). Participants also mentioned that the BAS were lengthy (five times), the lay out should be changed (twice), the items should be ordered differently (four times), a training should be developed for the BAS (once) and a testing kit should be made available (three times). One participant wanted to see a clearer description of the target group. All comments concerned the lay out or the manual, which was adapted in the final version of the BAS.

Summary of round 1

After the adaptations, the BAS consisted of the following subscales: emotional communicative behaviour (six items); receptive language behaviour (nine items); general communicative behaviour: verbal (nine items); general communicative behaviour: non-verbal (nine items); visual (exploratory) behaviour (23 items); motor exploratory behaviour (23 items); and auditory behaviour (eight items) (see Figure 1).

Round 2: Feedback on the items

The percentage of participants who wanted to retain the item ranged from 82.9% to 100%. Therefore, based on these percentages none of the items were removed. However, several items were removed (see Figure 1) or adapted, based on participants' comments in the second round.

Clarification

In the second round, in total 35 participants suggested on 44 occasions that an item, the scoring procedure or instructions could be clarified. To clarify the items and instructions, examples of the behaviour were added, or a specific instruction about when an item could be scored positively. For example, 'responding with happiness if a parent or support person approaches' was added as an example of the item 'the person responds with emotions when another person approaches'.

High degree of similarity among items

In total, participants mentioned 28 times that there was a high degree of similarity among items. These suggestions related mainly to the visual (exploratory) behaviour subscale and motor exploratory subscale. Participants suggested merging items in these subscales to reduce the length of the BAS. Six items could be merged or removed in the visual exploratory behaviour subscale and one item

could be removed from the motor exploratory behaviour subscale (see Figure 1).

Applicability

Participants suggested on 24 occasions that an item was difficult to interpret or was not applicable to people with PIMD. The majority of the comments mentioned the word 'understanding', indicating that it is difficult to determine whether or not someone with PIMD understands something. The word 'recognise' was added to items that focussed on understanding.

The construct measured by the item

Six comments from participants stated that an item or example in the instructions possibly focussed on a different construct than the subscale was designed to measure or that the functionality was not clear. Items or examples that were not clearly described or that possibly measured a different construct were adapted or removed.

Round 2: General remarks

Adding items or categories

Participants made 24 suggestions about adding a category, open question or item. These items or categories

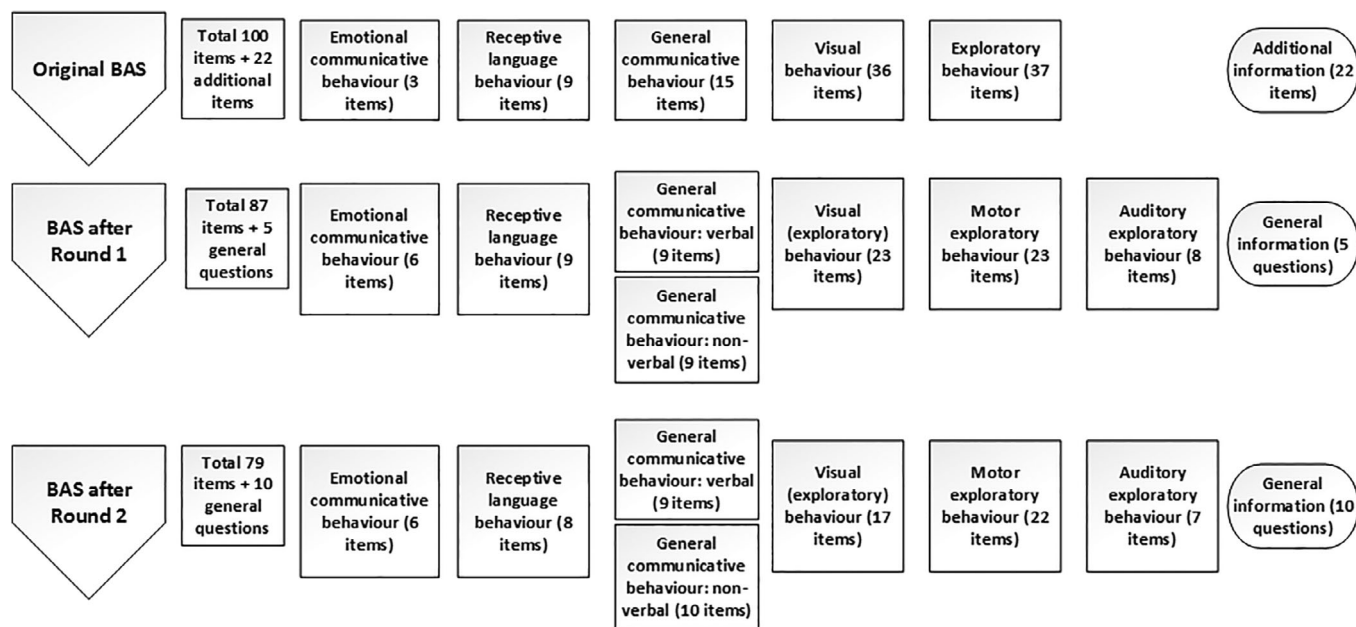


FIGURE 1 Visual representation of the subscales of the Behavioural Appraisal Scales (BAS) per round of the Delphi study

were added if they were judged relevant for the BAS scoring procedure and the construct measured by the BAS. For example, to the general questions section of the BAS we added a question about motor disabilities that could influence scoring.

General remarks

There were two suggestions that involved adapting the lay out in the final scale of the BAS, such as adding space for answers. Seven comments were made about professionals who filled in the BAS, such as the importance of stating who were involved in completing the BAS, and asking several professionals to complete the instrument in order to increase the amount of information provided. One respondent suggested adding information about the outcome of the BAS to enhance support. More information about how to use the outcome of the BAS in order to improve the support of people with PIMD was added to the manual. For the general questions, the following addition was made to the instructions: the person filling in the BAS should write down the source of the information (such as case file information or a specific professional).

DISCUSSION

The BAS were specifically developed for people with PIMD taking into account their disabilities (Vlaskamp et al., 1999; Vlaskamp et al., 2002). However, several aspects of the BAS required further study, as both experience in practice and research studies suggest that some items may not be applicable to specific subgroups of people with PIMD or may measure a different construct in different subgroups of this group (Wessels et al., 2020). Content validity was analysed using a Delphi study consisting of two rounds. Experts (researchers, parents and practice professionals) provided feedback on the BAS. They stated that the content validity of the BAS could be improved, and made several suggestions about adapting the BAS. These adaptations were incorporated in the BAS-R.

The suggestions for improving the BAS could be summarised in several categories. Firstly, respondents indicated that several items were not applicable to people with PIMD as they relied on abilities other than what the subscales seek to measure. When adapting the BAS, we formulated items in such a way that they covered a wide range of disabilities, thus taking into account the heterogeneity of the group of people with PIMD. Secondly, participants wanted a clearer description of how the

behaviour measured by the item could be functional in daily life. The link with item functionality was strengthened to make the BAS-R more useful in supporting people with PIMD. Based on the strengths/weaknesses profile of the BAS-R, support goals could be formulated to stimulate the development of people with PIMD. Thirdly, several aspects that limit the feasibility of the BAS were mentioned, such as the instrument's length, the lay out, and difficulties regarding the interpretation of the items. Since interpreting the communicative behaviours of people with PIMD is complex, because of their individual and idiosyncratic communication, it is important for people with PIMD that their proxies can correctly do so in order for people with PIMD to be able to influence their surroundings (Chadwick et al., 2018). The length of the BAS is an important aspect, as the workload of support professionals assisting people with intellectual disabilities is generally high (Mutkins et al., 2011).

The feasibility of the items was enhanced, for example by adding examples of behaviours to make the items easier to interpret and to score. In addition, support professionals may feel that the time invested in an assessment procedure would be experienced as less of a burden, if they can see the benefits (Vlaskamp & Van der Putten, 2009). In other words, if the items have a clearer functionality, and the outcome of the BAS provides a starting point for support, the time invested in completing the BAS may be experienced as less burdensome.

Methodological reflection

This study involved three groups of experts: parents, researchers and practice professionals. This meant that a wide base of unique experience and knowledge from different perspectives could be included, resulting in higher-quality solutions (Lyons et al., 2016; Powell, 2003). Although the different groups would ideally be of equal size, this was not feasible in this study. The parent and researcher groups were small and the expert groups were not completely independent; for example, because some parents also worked as practice professionals. It was therefore not possible to analyse differences in inter-group percentages for retaining, removing or adapting items. In addition, we would ideally have included siblings. Unfortunately, no siblings registered to take part in the study, meaning that their perspective could not be included. Siblings are the peers who know the person with PIMD best; their relationship seems to be positive and supportive throughout life (Nijs et al., 2016); and they have their own perspective on the person's needs (Luijckx et al., 2016). It is therefore important to include



their perspective in the assessment of the needs and abilities of people with PIMD in practice. However, the family perspective was included by way of the parental perspective, and we believe the perspective of siblings would not have resulted in large differences in outcomes for the content validity of the BAS-R. Nevertheless, it could be worthwhile for future studies to investigate whether the inclusion of a sibling perspective would produce different outcomes. In general, based on the open feedback, we did not expect large differences among the groups and we therefore believe that we covered the most important suggestions and adaptations to increase content validity.

Finally, a possible limitation is the non-response of parents and professionals. It is possible that only a selective group responded to the online invitation to participate. Of the 93 people who responded to the invitation, only 41 filled in the survey in the first round. Several participants mentioned that the survey was time-consuming, which could mean that a selective group took part, such as people holding a more positive view towards the BAS procedure. However, the participants who completed the survey were a diverse group, ranging in age, work experience, experience with the BAS, and type of involvement with people with PIMD, and they provided extensive feedback on the instrument. We therefore assume that this study covered a wide range of possible suggestions to increase the content validity of the BAS.

Implications for practice

Several aspects of the BAS are important when assessing people with PIMD, such as a flexible testing procedure, combining information from different sources, and taking into account the impairments of this group (Chadwick et al., 2018; Lyons et al., 2016). As both research (Wessels et al., 2020) and experience in practice suggested that some items might not be applicable to some people with PIMD, it was important to examine content validity further. The result of our study, the BAS-R, is important for supporting people with PIMD in practice, as it is one of the few instruments that is adapted to the characteristics of this group and whose content validity has been examined.

By presenting an individual profile of strengths and weaknesses, the BAS-R focuses on all the possible abilities the individual possesses, in order to provide starting points for stimulating maximum possibilities for development. This is in accordance with recent developments regarding the assessment and support of people with an intellectual disability, where assessment is no longer seen as a stand-alone process but is linked to support and development (Buntinx & Schalock, 2010). The BAS

procedure is in line with the dynamic assessment approach, whereby the examiner uses methods that are proximal to the person, and provides assistance focussed on that person's maximum learning potential (Poehner, 2008). To assess maximum possibilities, an examiner can encourage an individual to demonstrate the behaviour being assessed and provide assistance to that individual (Kulesza, 2015). In addition, preference material can be used in the BAS-R. This can support the identification of a person's reinforcers (Tullis et al., 2011), which can stimulate learning and ability development.

Implications for research

Several aspects require further study. Firstly, studies could evaluate whether the items indicated by participants as showing a high degree of similarity after Round 2, measure unique aspects of the construct of functional abilities, or are highly correlated. Secondly, based on proportion correct scores, studies could examine whether any of the new or adapted items in the BAS-R are too easy or too difficult. Thirdly, participants mentioned that items should be scored by several professionals. Further studies could explore whether information from different informant groups are scored differently, and what impact an informant's familiarity with the person with PIMD has on the BAS-R score. Fourthly, major changes were made to the BAS, which resulted in the adapted version BAS-R, so it is crucial that different aspects of validity and reliability be critically re-evaluated in future studies.

Further studies could focus on whether the new version of the BAS, the BAS-R, is indeed applicable to the entire group of people with PIMD, which was one of the objectives of the adaptations. This could be analysed by evaluating possible differential item functioning. Further studies are also needed on the BAS-R's sensitivity to detecting changes in abilities. If the BAS-R are sensitive in this regard, it will be possible to evaluate how the functional abilities of people with PIMD develop and can be stimulated and trained. The BAS-R could be used in research to gain knowledge about the functional abilities of people with PIMD, and about how different domains of functional abilities interrelate and develop in this group.

Although the BAS-R is very promising when it comes to assessing the abilities of people with PIMD, the context of support is continually changing, which may have implications for the assessment of this group in the future. The constantly changing context of assessment can be taken into account by regularly re-evaluating the different aspects of psychometric properties, using a variety of methods. For example, the use of technology is

increasing rapidly and can enhance the abilities of people with PIMD (Nijs & Maes, 2019). Without taking these changes into account, there is a risk that items no longer cover the complete behavioural repertoire of people with PIMD, or are no longer applicable.

Currently, the BAS-R are only available in Dutch. Therefore, the usage of the BAS-R is limited to Dutch speaking countries, until it is translated. The BAS are, to our knowledge, the only instrument assessing functional abilities in people with PIMD whose psychometric properties have been estimated. It is important that the BAS-R are translated into other languages, and that the psychometric properties of the translated versions also be analysed. Our research team is planning to translate the BAS into English, so that future international studies are able to evaluate the psychometric properties of the English version of the BAS, as well.

In conclusion, the BAS were developed for people with PIMD to assess functional abilities and provide a profile of strengths and weaknesses that can be used for their support. The content validity of the BAS-R was increased compared to the BAS, and the adapted items of the BAS-R were rated as being applicable to people with PIMD, adapted to their disabilities and needs, and relevant for their support. As major adjustments were made to the BAS, relevant aspects of validity and reliability should be re-evaluated for the BAS-R. Notwithstanding, the results of the current study on content validity of the BAS-R hold great promise to assess functional abilities and improve adequate support for people with PIMD. The Dutch version of the BAS-R is available on request, and the research team plans to translate the BAS-R into English.

CONFLICT OF INTEREST

There are no conflicts of interest.

ETHICS STATEMENT

The authors declare that the study conforms to the standards of the Declaration of Helsinki. The study was approved by the Ethics Committee for Pedagogical and Educational Sciences, University of Groningen.

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APPENDIX A: NUMBER AND PERCENTAGE OF PARTICIPANTS ($n = 41$) WHO WANTED TO RETAIN, ADAPT OR REMOVE AN ITEM AFTER ROUND 1

Item	Retain, n (%)	Adapt, n (%)	Remove, n (%)
Emotional communicative behaviour			
1	24 (58.5)	16 (39.0)	1 (2.4)
2	21 (51.2)	12 (29.3)	8 (19.5)
3	24 (58.5)	15 (36.6)	2 (4.9)
Receptive language behaviour			
1	19 (46.3)	22 (53.7)	0 (0.0)
2	29 (70.7)	11 (26.8)	1 (2.4)
3	24 (58.5)	14 (34.1)	3 (7.3)
4	29 (70.7)	11 (26.8)	1 (2.4)
5	23 (56.1)	13 (31.7)	5 (12.2)
6	24 (58.5)	11 (26.8)	6 (14.6)
7	22 (53.7)	16 (39.0)	3 (7.3)
8	23 (56.1)	16 (39.0)	2 (4.9)
9	26 (63.4)	12 (29.3)	3 (7.3)
General communicative behaviour			
1	16 (39.0)	18 (43.9)	7 (17.1)
2	21 (51.2)	20 (48.8)	0 (0.0)
3	33 (80.5)	8 (19.5)	0 (0.0)
4	29 (70.7)	10 (24.4)	2 (4.9)
5	35 (85.4)	4 (9.8)	2 (4.9)
6	17 (41.5)	23 (56.0)	1 (2.4)
7	29 (70.7)	8 (19.5)	4 (9.8)
8	33 (80.5)	8 (19.5)	0 (0.0)
9	33 (80.5)	7 (17.1)	1 (2.4)
10	29 (70.7)	11 (26.8)	1 (2.4)
11	31 (75.6)	9 (22.0)	1 (2.4)
12	33 (80.5)	7 (17.1)	1 (2.4)
13	32 (78.0)	8 (19.5)	1 (2.4)
14	29 (70.7)	12 (29.3)	0 (0.0)
15	29 (70.7)	9 (22.0)	3 (7.3)
Visual behaviour			
1	26 (65.0)	12 (30.0)	2 (5.0)
2	24 (60.0)	11 (27.5)	5 (12.5)
3	27 (67.5)	12 (30.0)	1 (2.5)
4	26 (65.0)	11 (27.5)	3 (7.5)
5	27 (67.5)	11 (27.5)	2 (5.0)
6	31 (77.5)	7 (17.5)	2 (5.0)
7	25 (62.5)	10 (25.0)	5 (12.5)
8	29 (72.5)	7 (17.5)	4 (10.0)
9	25 (62.5)	12 (30.0)	3 (7.5)
10	29 (72.5)	7 (17.5)	4 (10.0)

(Continues)

Item	Retain, <i>n</i> (%)	Adapt, <i>n</i> (%)	Remove, <i>n</i> (%)
11	29 (72.5)	6 (15.0)	5 (12.5)
12	26 (65.0)	8 (20.0)	6 (15.0)
13	31 (77.5)	4 (10.0)	5 (12.5)
14	29 (72.5)	5 (12.5)	6 (15.0)
15	25 (62.5)	9 (22.5)	6 (15.0)
16	31 (77.5)	5 (12.5)	4 (10.0)
17	27 (67.5)	8 (20.0)	5 (12.5)
18	27 (67.5)	7 (17.5)	6 (15.0)
19	25 (62.5)	8 (20.0)	7 (17.5)
20	28 (70.0)	7 (17.5)	5 (12.5)
21	33 (82.5)	4 (10.0)	3 (7.5)
22	31 (77.5)	6 (15.0)	3 (7.5)
23	36 (90.0)	1 (2.5)	3 (7.5)
24	34 (85.0)	3 (7.5)	3 (7.5)
25	27 (67.5)	5 (12.5)	8 (20.0)
26	27 (67.5)	5 (12.5)	8 (20.0)
27	30 (75.0)	3 (7.5)	7 (17.5)
28	31 (77.5)	2 (5.0)	7 (17.5)
29	25 (62.5)	11 (27.5)	4 (10.0)
30	26 (65.0)	10 (25.0)	4 (10.0)
31	23 (57.5)	13 (32.5)	4 (10.0)
32	26 (65.0)	12 (30.0)	2 (5.0)
33	28 (70.0)	8 (20.0)	4 (10.0)
34	27 (67.5)	13 (32.5)	0 (0.0)
35	31 (77.5)	8 (20.0)	1 (2.5)
36	32 (80.0)	6 (15.0)	2 (5.0)
Exploratory behaviour			
1	27 (69.2)	12 (30.8)	0 (0.0)
2	28 (71.8)	9 (23.1)	2 (5.1)
3	32 (82.1)	3 (7.7)	4 (10.3)
4	30 (76.9)	8 (20.5)	1 (2.6)
5	32 (82.1)	5 (12.8)	2 (5.1)
6	31 (79.5)	5 (12.8)	3 (7.7)
7	26 (66.7)	8 (20.5)	5 (12.8)
8	31 (79.5)	6 (15.4)	2 (5.1)
9	30 (76.9)	8 (20.5)	1 (2.6)
10	26 (66.7)	5 (12.8)	8 (20.5)
11	29 (74.4)	4 (10.3)	6 (15.4)
12	24 (61.5)	10 (25.6)	5 (12.8)
13	27 (69.2)	7 (17.9)	5 (12.8)
14	24 (61.5)	7 (17.9)	8 (20.5)
15	30 (76.9)	5 (12.8)	4 (10.3)
16	26 (66.7)	10 (25.6)	3 (7.7)
17	29 (74.4)	5 (12.8)	5 (12.8)

Item	Retain, <i>n</i> (%)	Adapt, <i>n</i> (%)	Remove, <i>n</i> (%)
18	31 (79.5)	3 (7.7)	5 (12.8)
19	33 (84.6)	4 (10.3)	1 (2.6)
20	32 (82.1)	5 (12.8)	2 (5.1)
21	31 (79.5)	5 (12.8)	3 (7.7)
22	31 (79.5)	3 (7.7)	5 (12.8)
23	29 (74.4)	4 (10.3)	6 (15.4)
24	35 (89.7)	3 (7.7)	1 (2.6)
25	31 (79.5)	6 (15.4)	2 (5.1)
26	30 (76.9)	5 (12.8)	4 (10.3)
27	31 (79.5)	4 (10.3)	4 (10.3)
28	28 (71.8)	7 (17.9)	4 (10.3)
29	21 (53.8)	13 (33.3)	5 (12.8)
30	34 (87.2)	3 (7.7)	2 (5.1)
31	29 (74.4)	7 (17.9)	3 (7.7)
32	29 (74.4)	5 (12.8)	5 (12.8)
33	28 (71.8)	7 (17.9)	4 (10.3)
34	17 (43.6)	8 (20.5)	14 (35.9)
35	31 (79.5)	4 (10.3)	4 (10.3)
36	31 (79.5)	5 (12.8)	3 (7.7)
37	33 (84.6)	3 (7.7)	3 (7.7)
Additional information			
1	29 (74.4)	4 (10.3)	6 (15.4)
2	30 (76.9)	5 (12.8)	4 (10.3)
3	26 (66.7)	6 (15.4)	7 (17.9)
4	26 (66.7)	5 (12.8)	8 (20.5)
5	23 (59.0)	6 (15.4)	10 (25.6)
6	29 (74.4)	2 (5.1)	8 (20.5)
7	28 (71.8)	3 (7.7)	8 (20.5)
8	26 (66.7)	3 (7.7)	10 (25.6)
9	22 (56.4)	7 (17.9)	10 (25.6)
10	26 (66.7)	8 (20.5)	5 (12.8)
11	33 (84.6)	2 (5.1)	4 (10.3)
12	28 (71.8)	6 (15.4)	5 (12.8)
13	14 (35.9)	13 (33.3)	12 (30.8)
14	29 (74.4)	2 (5.1)	8 (20.5)
15	27 (69.2)	5 (12.8)	7 (17.9)
16	22 (56.4)	10 (25.6)	7 (17.9)
17	29 (74.4)	8 (20.5)	2 (5.1)
18	30 (76.9)	6 (15.4)	3 (7.7)
19	33 (84.6)	3 (7.7)	3 (7.7)
20	33 (84.6)	3 (7.7)	3 (7.7)
21	24 (61.5)	9 (23.1)	6 (15.4)
22	31 (79.5)	5 (12.8)	3 (7.7)

Note: For the subscale visual behaviour, one respondent provided no information, and for the subscales exploratory behaviour and additional information, two respondents provided no information.