Children's Perceptions of Pictures Intended to Measure Anxiety During Hospitalization

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ABSTRACT

Many children experience anxiety during a hospital stay, which can have an adverse impact on their recovery and response to future hospital care. To facilitate assessment of anxiety in young children and children with communicative disabilities, the short S-STAI (short version of the State scale of the State-Trait Anxiety Inventory), has previously been adapted to a visual format. The aims of the present study were (a) to validate the pictures used to represent emotions and the steps of a quantitative scale ('a lot' – 'some' – 'a little'), including to determine whether any of them should be replaced, and (b) to assess different pictures to be used for a qualitative scale ('good/like' – 'in between/so-so' –'bad/dislike') in the same instrument. A total of 103 children aged 5–8 years were asked to choose verbal labels for pictures of facial expressions intended to represent emotions, match those pictures with the emotional categories used in the short S-STAI (Tense/Nervous, Worried/Afraid, Calm/Relaxed, and Happy/Content) and indicate their preferences for pictures intended to represent the steps of a quantitative scale and a qualitative one. The children understood both scales and the differences between positive and negative emotions in the short S-STAI. The older children (aged 7 and 8) significantly more often chose a picture for each step of the scales that was intended to represent that particular step. The article discusses implications for the choice of pictures representing emotional states in the short S-STAI and presents recommended pictures.

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Introduction

Hospital stays as well as medical and peri-operative procedures such as venipuncture and the induction of anaesthesia result in some degree of anxiety in almost all children (Carlsson & Henningsson, 2018). Children who report high pre-operative anxiety also tend to report more pain post-operatively, as measured using the short form of the State Anxiety Scale for Children (Chieng et al., 2013). Even short hospital stays can cause anxiety (Lynch, 2010).

Health-care professionals' assessments of a child's pain have shown a weak correlation with the child's self-reports whereas parents' assessments have been found to be more reliable (Khin Hla et al., 2014). However, Morrow, Hayen, Quine, Scheinberg, and Craig (2012) found that parents' scoring of their child's pain did not correlate well with the child's self-reports using the Health Utilities Index rating scale. This

suggests a need for a multi-pronged approach to assessment. Children's self-reports, reports by adults representing them and health-care professionals' overall impression should all provide input to decisions on treatment strategies (Zisk-Rony, Lev, & Haviv, 2015). However, whenever possible, health-care professionals should adopt the child's perspective and use self-reports (Nilsson et al., 2015). In a Swedish study, children stated that it was valuable to them when health-care professionals asked about their emotional states before a medical procedure was carried out. The children felt trust when health-care professionals took the emotions they experienced seriously (Vantaa Benjaminsson & Nilsson, 2017).

Under Article 12 of the United Nations Convention on the Rights of the Child, children are entitled to express their views freely in all matters affecting them (United Nations, 1989). Hence it is important to listen actively to the anxiety expressed by children so as to be able to give them the right support and treatment (Wennström, 2011). Where children experience severe anxiety, treatment may be delayed, procedures may take longer to complete and patient satisfaction may be reduced (Lerwick, 2016). Further, children who experienced anxiety in the

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hospital has been later reported as behavioural problems at home (Karling, Stenlund, & Hägglöf, 2007). However, many negative experiences of anxiety associated with a hospital stay and/or surgery can be reduced or eliminated if parents (or other legal guardians) and healthcare professionals prepare and support the children and provide them with information (Costello, 2000; Hilly et al., 2015; Lynch, 2010; Vantaa Benjaminsson, Thunberg, & Nilsson, 2015; Wennström, 2011). Children who are given support and information intended to help them gain control over frightening situations often find this beneficial and helpful (Karlsson, Dalheim Englund, Enskär, Nyström, & Rydström, 2016). However, it is important to strike an appropriate balance between informing and distracting the child (Uman et al., 2013). In fact, information containing negative reinforcing words can increase fear in children (Lang et al., 2005). This means that a broader perspective of communication rather than a narrow perspective of information is needed.

One of the instruments most commonly used to evaluate anxiety in paediatric care is the State scale of the State-Trait Anxiety Inventory (S-STAI), developed by Charles Spielberger and colleagues for general (not specifically paediatric) use, which has sufficient psychometric properties: its median alpha reliability coefficient was found to be 0.92 and the item–remainder correlation coefficient was above 0.90 (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The S-STAI in its original form comprises 20 items, 10 that identify a state of anxiety (e.g., 'I feel tense') and 10 that are in the opposite direction (e.g., 'I feel calm'). Respondents give their answers using a four-point scale, which yields a total score ranging from 20 to 80. The S-STAI has shown good reliability and validity in several subsequent studies and has been translated into various languages and adapted to suit different health-care settings (Marteau & Bekker, 1992).

A shorter six-item version of the S-STAI, consisting of items 3, 6, 17 (anxiety present) and 1, 15, 16 (anxiety absent) of the full version, was first tested by Marteau and Bekker (1992). This has subsequently been recommended as the preferred short version, insofar as English-language versions are concerned (Kruyen, Emons, & Sijtsma, 2013; Tluczek, Henriquest, & Brown, 2009).

As children's cognitive and communicative ability differs from that of adults, it is important to use cognitively appropriate means of communication to help them tell their own story and describe their own perceptions as independently as possible. This means not only that language use as such has to be adapted, but also that researchers and health-care professionals need to use means of communication other than speech. For example, pictures can be used to help children visualise a context in order to make it easier for them to tell their story (Carter & Foster, 2013). Earlier research has reported positive outcomes from the use of pictures and easily understandable text in information provided to prepare children for a medical procedure (Gårdling, Törnqvist, Månsson, & Hallström, 2017; Vantaa Benjaminsson et al., 2015).

In Nilsson, Buchholz, and Thunberg (2012), the Talking Mats™ method (Murphy & Cameron, 2005) was applied to the short version of the S-STAI in order to adapt it better to the cognitive and communicative abilities and styles of young children (three to nine years) as well as to increase the range of options available for communicatively challenged children (i.e. children with cognitive and/or communicative disabilities or language problems) to express their anxiety independently.

The Talking Mats™ method, developed by Joan Murphy in 1998, is a vision-based low-technology tool intended to help people with cognitive and/or communicative difficulties to express their views and emotions (Murphy & Cameron, 2005). Basically, it uses three sets of pictorial communication symbols – topics, options and a visual scale – and a space on which to display them. The main strength of the Talking Mats tool, according to Buchholz, Ferm, and Holmgren (2018), is that it enables structured interviews and that the options are illustrated with pictures. This tool has been used successfully with a variety of clinical populations with communicative disabilities, including intellectual disabilities, aphasia and dementia (Brewster, 2004; Cameron & Murphy, 2002; Ferm, Sahlin, Sundin, & Hartelius, 2010; Hallberg, Mellgren, Hartelius, & Ferm, 2013; Murphy, 2000; Murphy & Boa, 2012; Murphy & Cameron, 2005), as well as with pre-school children without disabilities (Beijbom & Wänerskog, 2013). Nilsson et al. (2012) used a visual adaptation which included a door mat, a three-step picture-based quantitative scale ranging from 1 (not at all) to 3 (very much), and four pictures of facial expressions which each represented one label from the short S-STAI: Tense/Nervous, Worried/Afraid, Calm/Relaxed and Happy/Content (Nilsson et al., 2012).

Studies have shown that when it comes to gauging the strength of emotions, children usually prefer face-based scales to words or visual analogue scales (Miró & Huguet, 2004; Page et al., 2012). Facial expressions are a crucial source of information about people in the vicinity, and it is believed that most children are able to discriminate between facial expressions even as newborns (Walden & Field, 1982). Existing research suggests not only that this ability is congenital (Vicari, Reilly, Pasqualetti, Vizzotto, & Caltagirone, 2000), even though it becomes more sophisticated as we grow older (Camras & Allison, 1985; Odom & Lemond, 1972; Vicari et al., 2000), but also that some emotions precede others developmentally (Vicari et al., 2000). There are indications that happiness is the first emotion to be identified, followed in turn by sadness, anger, surprise and fear (Cheal & Rutherford, 2011; Székely et al., 2011). Not surprisingly, the ability to recognise feelings from facial expressions precedes the ability to label feelings verbally (Camras & Allison, 1985; Vicari et al., 2000). It has been demonstrated that children are already capable of matching emotional labels and pictures of facial expressions to a story when they are two years old (Cheal & Rutherford, 2011) and that they start to use emotional labels when they are between two and three (Herba & Phillips, 2004; Vicari et al., 2000). However, in a study where a pain scale using faces was investigated, no evidence at all of valid and reliable use of this scale was found for three-year-olds and only weak evidence was found for four-year-olds (von Baeyer et al., 2017).

Children's emotional vocabulary also expands with increasing age (Herba & Phillips, 2004): at the age of three, most children use terms corresponding to 'happy', 'sad', 'angry' and 'afraid' regularly (McClure, 2000). However, four-year-olds but not three-year-olds were able to distinguish the presence of pain from the absence of pain by choosing faces with different emotional states on a scale (Emmott et al., 2017). Hence, it seems reasonable to use pictorial tools including pictures of faces to assess feelings, including anxiety, in children as young as four or five. This means that it is important to investigate the child's level of maturity.

The present study had two aims. The first one was to validate, with regard to children aged five to eight, the pictures used to assess anxiety in the short version of the S-STAI used in Nilsson et al. (2012). Within the framework of this validation, the study was also intended to determine whether some of the original pictures should be replaced by other pictures included in the study. The second aim, also linked to the overall purpose of measuring anxiety in children during hospitalization, was to validate pictures used to grade quality on a three-step scale including 'good/like', 'in between/so-so' and 'bad/dislike' to be used in interviews with children in the same age range. Within the context of these two overall aims, potential differences across age groups with regard to the choice of pictures were also investigated, and the results for the younger (5–6 years) and older (7–8 years) children were compared with those found in Nilsson et al. (2012), which supported the use of faces for self-reports in the older age group but not in the younger ones.

Method

Study Design

The study used a quantitative descriptive design and evaluated differences between children in two age categories.

The KomHIT Project

This study was part of KomHIT, a Swedish project relating to communication in health-care settings using communicative support and information technology (www.kom-hit.se) (Thunberg, 2011), the overall purpose of which is to support the communicative rights of children in the context of health and dental care (Articles 12 and 24 of the Convention on the Rights of the Child (United Nations, 1989); Articles 2 and 3 of the Convention on the Rights of Persons with Disabilities (United Nations, 2006)). KomHIT aims to promote generalised use of augmentative strategies, mainly in the form of pictorial support. It offers educational resources and easily available communicative tools and materials, provided for free on the internet (www.kom-hit.se and www.bildstod.se). Earlier studies in the KomHIT project have supported the use of pictorial support for children both with and without communicative disabilities (Nilsson et al., 2012; Thunberg, Buchholz, & Nilsson, 2016; Thunberg, Törnhage, & Nilsson, 2016; Vantaa Benjaminsson et al., 2015).

Participants

The recruitment procedure was designed to obtain a purposive sample of children aged 5–8 years. The age range was chosen based on the assumption that the ability to use self-reporting usually develops between the ages of four and seven (von Baeyer et al., 2017; von Baeyer, Uman, Chambers, & Gouthro, 2011). The participants were recruited from four day nurseries (kindergartens) and three primary schools in south-west Sweden. A total of 103 children participated in the study: 52 boys (50.5%) and 51 girls (49.5%). Of these, 15 (14.6%) were bilingual in Swedish and one of the following languages: Albanian, Arabic, Bosnian, Farsi, Spanish, Thai and Turkish. The children were divided into four groups by age (Table 1). Children with cognitive impairments were excluded from the study, since its aim was to investigate the behaviour of children whose developmental age corresponded to their chronological age. Children who did not have a good command of Swedish (i.e., if the child was considered not to understand or not to be understood) were also excluded owing to the linguistic demands of the procedure to be performed as well as to the lack of interpreters.

Ethical Considerations

The study was approved by the Regional Ethical Review Board of Gothenburg, Sweden, as part of the KomHIT project (Ref. No. 241-10). All parents gave their written consent after having been thoroughly informed about the purpose of the study and about their right to withdraw from participation at any time. The children were also informed about the study; they could withdraw by their own accord, although their parents had given their consent, in line with the rights set out in the United Nations Convention on the Rights of the Child (1989). In no case did a decision relating to study participation affect access to health-care or other services. All identities were kept confidential.

Table 1
Distribution of participants in the study.

	Girls	Boys	Total
	N	*N*	*N*
5-year-olds	12	14	26
6-year-olds	13	11	24
7-year-olds	17	14	31
8-year-olds	9	13	22
Total	51	52	103

Materials

The materials used included (a) twelve colour pictures of faces representing four emotional categories (Tense/Nervous, Worried/Afraid, Calm/Relaxed and Happy/Content), with three pictures in each category (shown in Table 2), (b) a series of seven colour pictures representing a story which was supposed to include the above-mentioned emotional categories (Fig. 1), (c) twelve colour pictures representing four three-step 'quantity' scales intended to range from 'a little' over 'some' to 'a lot' (shown in Fig. 2) and (d) nine colour pictures representing three three-step 'quality' scales intended to range from 'good/like' over 'in between/so-so' to 'bad/dislike' which the children were supposed to use to describe the protagonist's attitude towards situations described in the picture-based story (shown in Fig. 3). The pictures were coded as shown in Table 2 and Figs. 2 and 3. In the study, the pictures were presented to the children on three mats (38 cm × 57 cm): one for the facial pictures and the picture-based story, one for the quantity-scale pictures and one for the quality-scale pictures. Finally, an interview guide was used to ensure that all interviews were sufficiently alike.

Facial Pictures

The twelve facial pictures (5 cm × 5 cm) used, which are shown in Table 2, were intended to represent the four emotional categories – Tense/Nervous, Worried/Afraid, Calm/Relaxed and Happy/Content – that were included in the above-mentioned short S-STAI (Nilsson et al., 2012). Drawings were chosen because earlier research has shown that a drawing of a face can be used instead of a photograph (von Baeyer et al., 2011; von Baeyer et al., 2017) and drawings are commonly used by health-care professionals when assessing emotions such as pain. Each emotional category included three pictures. One picture in each category was the one used in the short S-STAI. All facial pictures were obtained from three symbol bases: Widgit (Widgit Software, 1994-2018), Picture Communication Symbols (Tobii Dynavox, 1981-2018) and SymbolStix (Symprint, 2003-2018).

Picture Story

The story used related to hospital care and was produced specially for the study, based on clinical experience as well as literature describing children's experiences of health care, by an expert panel consisting of a paediatric nurse and three speech-language pathologists. The pictures were drawn by the [fourth] author. It was assumed that this subject would engage the children and make it easier for them to understand and remember the story. Concretely, the pictorial basis for the story consisted of seven pictures (7 cm × 6 cm), Fig. 1. The story was about a girl ('Anna') who had to go to hospital because she had broken her arm. The use of stimulus material can be valuable in interviews with children (Carter & Foster, 2013), and pictures have also been used as stimulus material in the design process of various computer applications (Stålberg, Sandberg, Söderbäck, & Larsson, 2016). It has been found that pictures can improve children's understanding and play an important role in health-communication materials. Further, it is also quite common in health-care contexts to use a story format when explaining to a child what is going to happen (Gårdling et al., 2017).

Quantity and Quality Scales

The pictures to be used to represent values on scales of quantity ('a little' (1) – 'some' (2) – 'a lot' (3)) and quality ('good/like' (1) – 'in between/so-so' (2) – 'bad/dislike' (3)) were chosen in consultation with staff at a regional centre who were specialists in speech-language pathology and experienced in the use of pictorial support and Talking Mats (Murphy, Cameron, & Boa, 2013). One aim was to ensure that the pictures would help the children rank emotions, which is an important concern in the development of a scale.

The choice of three-step scales was based on the cup-task test used by von Baeyer et al. (2011) in 3–7-year-olds, where the children were

Table 2
Children's labels of facial pictures representing emotions in the short version of the State-Trait Anxiety Inventory.

Emotion	Ages	1[a] Answer	N/total	%	2 Answer	N/total	%	3 Answer	N/total	%
Happy/Content										
	5-year-olds	Happy	25/26	96.2	Happy	25/26	96.2	Happy	25/26	96.2
	6-year-olds	Happy	24/24	100	Happy	24/24	100	Happy	24/24	100
	7-year-olds	Happy	31/31	100	Happy	28/31	90.3	Happy	30/31	96.8
	8-year-olds	Happy	22/22	100	Happy	21/22	95.5	Happy	22/22	100
	Total	Happy	102/103	99.0	Happy	98/103	95.1	Happy	101/103	98.1
Calm/Relaxed	4[a]				5			6		
	5-year-olds	Tired	16/26	61.5	Happy	23/26	88.5	Tired	14/26	53.8
		Happy	7/26	26.9				Happy	3/26	11.5
	6-year-olds	Happy	11/24	45.8	Happy	18/24	75.0	Tired	10/24	41.7
		Tired	8/24	33.3				Happy	9/24	37.5
	7-year-olds	Tired	18/31	58.1	Happy	25/31	80.6	Tired	15/31	48.4
		Happy	6/31	19.4	So-so	4/31	12.9	Happy	7/31	22.6
		So-so	5/31	16.1						
	8-year-olds	Happy	11/22	50	Happy	19/22	86.4	Tired	10/22	45.5
		Tired	5/22	22.7				Happy	8/22	36.4
	Total	Tired	47/103	45.6	Happy	85/103	82.5	Tired	49/103	47.6
		Happy	35/103	34.0				Happy	27/103	26.2
Tense/Nervous	7				8[a]			9		
	5-year-olds	Sad	17/26	65.4	Sad	15/26	57.7	Sad	20/26	76.9
		Angry	3/26	11.5	Tired	6/26	23.1	Grumpy	3/26	11.5
	6-year-olds	Sad	11/24	45.8	Sad	16/24	66.7	Sad	18/24	75.0
		Grumpy	4/24	16.7	Grumpy	3/24	12.5			
		Angry	3/24	12.5						
	7-year-olds	Sad	21/31	67.7	Sad	24/31	77.4	Sad	24/31	77.4
	8-year-olds	Sad	11/22	50.0	Sad	16/22	72.7	Sad	16/22	72.7
		Surprised	3/22	13.6	Grumpy	4/22	18.2	Afraid	4/22	18.2
	Total	Sad	60/103	58.3	Sad	71/103	68.9	Sad	78/103	75.7
					Tired	13/103	12.6			
					Grumpy	11/103	10.7			
Afraid/Worried	10[a]				11			12		
	5-year-olds	Sad	10/26	38.5	Angry	10/26	38.5	Sad	20/26	76.9
		Afraid	6/26	23.1	Sad	4/26	15.4	Afraid	3/26	11.5
	6-year-olds	Sad	5/24	20.8	Angry	11/24	45.8	Sad	12/24	50.0
		Afraid	4/24	16.7	Afraid	5/24	20.8	Afraid	5/24	20.8
		Grumpy	4/24	16.7						
		Surprised	3/24	12.5						
	7-year-olds	Sad	11/31	35.5	Angry	15/31	48.4	Sad	19/31	61.3
		Surprised	7/31	22.6	Sad	4/31	12.9			
		Afraid	6/31	19.4						
	8-year-olds	Afraid	8/22	36.4	Angry	10/22	45.5	Sad	12/22	54.5
		Sad	4/22	18.2	Afraid	4/22	18.2	Afraid	3/22	13.6
		Surprised	4/22	18.2	Mad	3/22	13.6	Surprised	3/22	13.6
	Total	Sad	30/103	29.1	Angry	46/103	44.7	Sad	63/103	61.2
		Afraid	24/103	23.3				Afraid	12/103	11.7
		Surprised	15/103	14.6						

Note. Cut-off value: 10%.
[a] Picture used in the short S-STAI.

instructed to pick the middle-sized cup from a group of three inverted cups of different sizes: small, medium and large. Several of the pictures chosen for the study are in common use with Talking Mats (Murphy et al., 2013). This was in fact part of the reason why it was considered important to explore options. All pictures used were 5 cm × 5 cm. The pictures in the four three-step quantity scales (to describe the degree
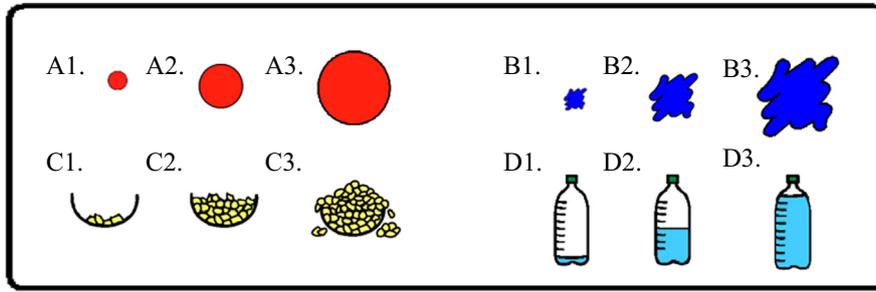

Fig. 1. The picture story.

Fig. 2. Quantity scales (A–D) for 'a little' (1) – 'some' (2) – 'a lot' (3).

of intensity of the emotion) were taken from two symbol bases: Widgit and Picture Communication Symbols (shown in Fig. 2). One of the quantity scales (Scale A) was used in the study by Nilsson et al. (2012), whose results supported the use of the faces selected for self-reports in children aged 7 to 9 years. The pictures in the three three-step 'quality' scales (to evaluate emotions in the picture-based story) were taken from Widgit and Picture Communication Symbols (shown in Fig. 3). Three of the pictures were modified for the purposes of the present study in that the mouth was changed from sad to happy. Quality scales are commonly used with Talking Mats (Murphy et al., 2013). While such scales were not part of the short S-STAI at the time of the study, there were plans to incorporate them in the KomHIT project at a later stage, which is why they were added to the study.

Procedure

The participants were interviewed individually at their day nursery or school. The interviewer (second or third author) sat next to the child and the material was placed in front of the child. An observer (third or second author) sat in a place offering a good view of the child and the material. Hence the observer was able to note the child's body communication, which was important in the interpretation of the child's understanding. This procedure was first tested in two interviews and then evaluated. As those interviews had worked extremely well – the children had even expressed joy at being interviewed – the same procedure was used throughout the study.

The interviews took between 4.30 and 12.22 min (mean: 6.16 min). The child was first given a brief and age-appropriate introduction to the content of the interview and was informed that he or she would be audio recorded. The same information had also been given to the parents. Children could refuse to participate after receiving this information, even if their parents had agreed for them to participate, in which case the interview would have been stopped (but this never happened). Then the interview started, and the instructions were repeated if needed. The interviews were recorded using a digital voice recorder,

and they were all deleted after the analyses were completed. The recording was not played back to the child.

The interviews consisted of four main parts, as described below.

Labelling Emotions

The interview began with the labelling task, intended to collect the children's spontaneous verbal labels. The facial pictures were presented to the child one by one and the child was asked to say how he or she thought the character shown in the picture was feeling. The child's response was noted. When the child had labelled a picture, the interviewer attached it to a mat. The pictures were presented one emotional category at a time in a pre-determined order (according to the short S-STAI), but this was not explained to the child. The child was first presented with three pictures representing Happy/Content and then, in turn, with the three pictures for each of Calm/Relaxed, Tense/Nervous and Worried/Afraid.

Choosing Facial Pictures

At this point in the interview, the story about Anna going to hospital was introduced. The pictures illustrating the steps of the story were placed in correct sequence at the top of the mat containing the facial pictures that the child had just labelled verbally. The aim of this was to examine which facial pictures best represented the emotional categories in a given context. The story pictures representing the different emotional categories were presented verbally as the story progressed. For example, the interviewer said, 'Daddy tells Anna that they're going to see the doctor. Anna feels tense and nervous'. Then the child was asked to choose which one of all the facial pictures he or she thought best represented the verbal expression. The child was then told to attach the picture chosen to the story sequence on the mat. This was repeated once for each emotional category, at appropriate junctures of the story.

Quantity Scales

Next, a new mat was presented, containing twelve pictures (Fig. 2), in a pre-determined scale order, representing four three-step quantity
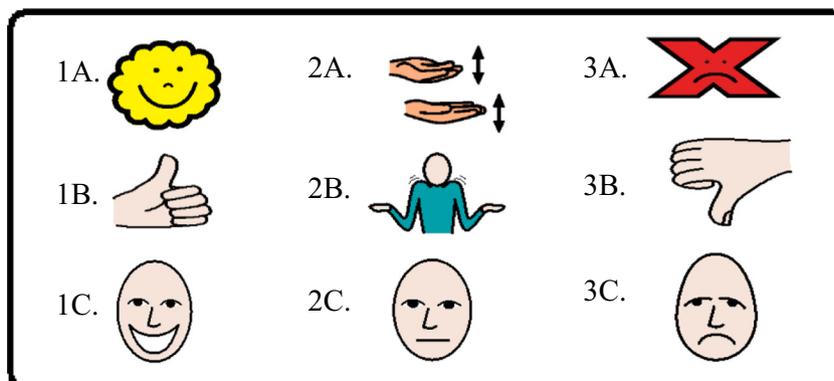

Fig. 3. Quality scales (A–C) for 'good/like' (1) – 'in between/so-so' (2) – 'bad/dislike' (3).

scales intended to range from 'a little' over 'some' to 'a lot'. The child was asked. 'If Anna wants to say that she feels very afraid [while at the hospital], which of these pictures do you think she would choose?' The same question was asked for 'rather afraid' and 'a little afraid'. Hence the child was free to choose pictures from the same scale or several different scales. The result could thus be either a coherent scale (e.g., A1–A2–A3, i.e., all pictures chosen from scale A) or a mixed scale (e.g., A1–B2–C3, i.e. the first picture taken from scale A, the second from scale B and the third from scale C). This was done only for 'afraid'.

Quality Scales

Finally, a third mat was presented, containing nine pictures (Fig. 3), in a pre-determined scale order, representing four three-step quality scales intended to range from 'good/like' over 'in between/so-so' to 'bad/dislike'. The child was asked, "If Anna liked being at the hospital, if she thought it was good to be there, which picture do you think she would choose?" The same question was asked for 'thought it was OK to be at the hospital' and 'didn't like being at the hospital'. Hence, the child was again able to choose pictures freely and could create either a coherent scale or a mixed one.

Data Analysis

For the labelling of emotions, the researchers listened to the audio recordings to identify the words used by the children and then used manifest analysis (Graneheim & Lundman, 2004) to describe the labels. Two researchers (second and third authors) coded and sorted the labels, interpreting and categorising them by consensus. Related words were merged into one category. For example, 'temperature' and 'sore throat' were both included under 'Sick', 'scared' and 'frightened' under 'Afraid', and 'smiling' and 'laughing' under 'Happy'. Modifiers, such as 'very' and 'a little', were excluded. Answers that were difficult to interpret, such as 'his chin is probably shaking, maybe he's staring at something' and 'he's looking at his nose', were placed in the category 'Other'. When a child used two different labels, the first one was chosen as it was deemed to represent the child's first, spontaneous association. The relative frequencies of the four categories of the short S-STAI (Tense/Nervous, Worried/Afraid, Calm/Relaxed and Happy/Content) were calculated. The results are presented as descriptive statistics in Table 2.

IBM SPSS Statistics for Windows, version 20, was used for all statistical analyses pertaining to the picture story and the scales.

Descriptive statistics are used to present frequencies. The most common answers overall and for each age group were calculated. Frequencies for the pictures and labels included in the short S-STAI (Nilsson et al., 2012) were also calculated. Since one purpose of the study was to identify the most appropriate pictures, cut-off values were used in the presentation to ensure that only the most common choices were shown. Any pictures or labels whose frequency was below the cut-off are excluded from the tables. The cut-off level for the labelling of emotions and the picture story was set beforehand to 10% while that for the quality and quantity scales was set beforehand to 15%.

Differences between age groups were first calculated on a pair-wise basis, each group being tested against the age groups immediately above and below it (hence, for example, the six-year-olds were compared with the five-year-olds and the seven-year-olds). Then those groups were merged into an older age group (seven-year-olds and eight-year-olds) and a younger age group (five-year-olds and six-year-olds), which were compared. The χ^2 test was used for all calculations between groups, and the level of significance was set to $p < .05$.

Results

Labelling of Emotions

The results from the labelling of emotions are presented in Table 2.

Happy/Content

The most frequently used labels for Happy/Content (Pictures 1–3) are presented in Table 2. The most common label for Happy/Content was 'happy'. Only one child used the label 'content'.

Calm/Relaxed

The most frequently used labels for Calm/Relaxed (Pictures 4–6) are presented in Table 2. Two of the pictures in the category of Calm/Relaxed (Pictures 4 and 6) were most often labelled as 'tired'. Those pictures were also often labelled as 'happy'. Picture 5 was mainly labelled as 'happy'. In fact, only three children used the intended labels: two children used 'calm' (for Picture 4) and one child used 'relaxed' (also for Picture 4).

Tense/Nervous

The most frequently used labels for Tense/Nervous (Pictures 7–9) are presented in Table 2. Those pictures were often labelled as 'sad', while 'surprised', 'angry', 'grumpy', 'tired' and 'afraid' also occurred. Only three children used the label 'nervous' (two for Picture 7 and one for Picture 9), and no child used the label 'tense'.

Worried/Afraid

The most frequently used labels for Worried/Afraid (Pictures 10–12) are presented in Table 2. The label 'sad' was the most common for Pictures 10 and 12, while Picture 11 was most often labelled as 'angry'. Of the intended labels, 'afraid' occurred for all three pictures while 'worried' was used only by two children and only for Picture 12.

Choosing Facial Pictures

The results from the picture-story task are presented in Table 3.

Happy/Content

Picture 3 was the most frequent choice for the category of Happy/Content. The picture originally used in the adapted instrument, Picture 1, was preferred by 12 children.

Calm/Relaxed

Picture 4 was the most frequent choice for the category of Calm/Relaxed. This was also the picture originally used in the adapted instrument.

Tense/Nervous

The most frequently selected picture in the category of Tense/Nervous was Picture 12. Only two children chose Picture 8, which was originally used in the adapted instrument.

Worried/Afraid

Picture 10, originally used in the adapted instrument, was the most common choice for the category of Worried/Afraid.

Overall, the children tended to choose a picture intended to represent a positive emotion when a positive emotion was presented: for Happy/Content, all 103 children did so, and for Calm/Relaxed, 98 of them did. This was almost as true for negative emotions: for Tense/Nervous, 96 children chose a picture intended to represent a negative emotion, and for Worried/Afraid, 102 of them did so.

Quantity Scale (Intensity Rating)

The results from the quantity-scale task are presented in Table 4. The pictures originally used in the adapted instrument, Pictures A1, A2 and A3, were the most frequent choices. The proportion of children who chose pictures from the intended category (e.g., a picture intended to represent 'a lot' when words such as 'a lot' or 'very' were used) for 'a lot', 'some' and 'a little' increased with age (Table 6). Altogether, 85 out of 103 children chose a picture intended to represent 'a lot' when

Table 3
Pictures chosen by the children to represent the emotional categories of the short version of the State-Trait Anxiety Inventory.

			5 year-olds % (N/26)	6 year-olds % (N/24)	7 year-olds % (N/31)	8 year-olds % (N/22)	Total % (N/103)
Happy/Content	1.[a]		15.4 (4/26)	–	–	–	–
	2.		26.9 (7/26)	25.0 (6/24)	38.7 (12/31)	45.5 (10/22)	34.0 (35/103)
	3.		38.5 (10/26)	58.3 (14/24)	45.2 (14/31)	45.5 (10/22)	46.6 (48/103)
Calm/Relaxed	1.		15.4 (4/26)	–	22.6 (7/31)	–	–
	4.[b]		23.1 (6/26)	58.3 (14/24)	41.9 (13/31)	63.6 (14/22)	45.6 (47/103)
	6.		46.2 (12/26)	16.7 (4/24)	19.4 (6/31)	31.8 (7/22)	28.2 (29/103)
Tense/Nervous	7.		15.4 (4/26)	–	–	31.8 (7/22)	17.5 (18/103)
	10.		19.2 (5/26)	–	–	–	–
	11.		30.8 (8/26)	16.7 (4/24)	22.6 (7/31)	–	21.4 (22/103)
	12.		23.1 (6/26)	33.3 (8/24)	35.5 (11/31)	27.3 (6/22)	30.1 (31/103)
Afraid/Worried	7.		–	16.7 (4/24)	–	–	–
	9.		19.2 (5/26)	–	19.4 (6/31)	18.2 (4/22)	17. 5 (18/103)
	10.[c]		42.3 (11/26)	20.8 (5/24)	38.7 (12/31)	40.9 (9/22)	35.9 (37/103)
	11.		–	16.7 (4/24)	–	–	–
	12.		30.8 (8/26)	33.3 (8/24)	22.6 (7/31)	31.8 (7/22)	29.1 (30/103)

Note. Cut-off value: 10%.
[a] Picture used today in the short S-STAI for Happy/Content.
[b] Picture used today in the short S-STAI for Calm/Relaxed.
[c] Picture used today in the short S-STAI for Afraid/Worried.

appropriate while 94 out of 103 did so for 'some' and 93 out of 103 for 'a little'. Further, a scale where each component represented the intended step (i.e., 1–2–3, regardless of whether the scale was coherent or mixed) was chosen by 81 out of 103 children. The older children statistically significantly more often chose pictures in the intended order ($\chi^2(1, N = 103) = 9.24, p < .05$). A coherent scale (e.g., B1–B2–B3) was chosen by 56 children (54.4%) while the remaining children mixed pictures from different scales. The full scale from the adapted instrument (A1–A2–A3) was chosen by 32 children (31.1%); the older children did this significantly more often ($\chi^2(1, N = 103) = 5.56, p < .05$).

Table 4
The children's choices for a lot – some – a little (quantity scale) in the short version of the State-Trait Anxiety Inventory.

			5-year-olds % (N/26)	6-year-olds % (N/24)	7-year-olds % (N/31)	8-year-old % (N/22)	Total % (N/103)
A lot	A3 [a]		30.8 (8/26)	33.3 (8/24)	41.9 (13/31)	68.2 (15/22)	42.7 (44/103)
	B3		–	–	19.4 (6/31)	–	–
	D3		19.2 (5/26)	20.8 (5/24)	16.1 (5/31)	18.2 (4/22)	18.4 (19/103)
Some	A2 [b]		34.6 (9/26)	29.2 (7/24)	48.4 (15/31)	68.2 (15/22)	44.7 (46/103)
	B2		–	16.7 (4/24)	–	18.2 (4/22)	–
	C2		19.2 (5/26)	20.8 (5/24)	19.4 (6/31)	–	16.5 (17/103)
	D2		19.2 (5/26)	20.8 (5/24)	19.4 (6/31)	–	17.5 (18/103)
A little	A1 [c]		38.5 (10/26)	25.0 (6/24)	41.9 (13/31)	68.2 (15/22)	42.7 (44/103)
	D1		23.1 (6/26)	37.5 (9/24)	32.3 (10/31)	22.7 (5/22)	29.1 (30/103)

Note. Cut-off value: 15%.
[a] Picture used for A lot in the instrument today. [b] Picture used for Some in the instrument today. [c] Picture used for A little in the instrument today.

Table 5
Children's choices for 'good/like' – 'in between/so-so' – 'bad/dislike' (quality scale).

			5-year-olds % (N/26)	6-year-olds % (N/24)	7-year-olds % (N/31)	8-year-old % (N/22)	Total % (N/103)
Good/like	1A		19.2 (5/26)	12.5 (3/24)	–	22.7 (5/22)	14.6 (15/103)
	1B		26.9 (7/26)	–	38.7 (12/31)	31.8 (7/22)	27.2 (28/103)
	1C		46.2 (12/26)	54.2 (13/24)	48.4 (15/31)	40.9 (9/22)	47.6 (49/103)
In between/	2A		–	–	–	–	–
So-so	2B		23.1 (6/26)	33.3 (8/24)	58.1 (18/31)	50.0 (11/22)	41.7 (43/103)
	2C		46.2 (12/26)	54.2 (13/24)	54.8 (17/31)	40.9 (9/22)	49.5 (51/103)
Bad/dislike	3A		23.1 (6/26)	45.8 (11/24)	38.7 (12/31)	31.8 (7/22)	35.0 (36/103)
	3B		–	–	19.4 (6/31)	31.8 (7/22)	17.5 (18/103)
	3C		57.7 (15/26)	41.7 (10/24)	41.9 (13/31)	36.4 (8/22)	44.7 (46/103)

Note. Cut-off value: 15%.

Quality Scale

The results from the quality-scale task are presented in Table 5. The pictures from the facial scale – Pictures 1C, 2C and 3C – were the most frequent choices to characterise the quality of emotions associated with the picture story: 'good/like' (47.6%), 'in between/so-so' (49.5%) and 'bad/dislike' (44.7%). Older children chose pictures intended to represent the middle step of 'in between/so-so' significantly more often than did younger children (χ^2(1, $N = 103$) = 7.62, $p < .05$) (see Table 7). A total of 85 children (82.5%) chose a picture belonging to the intended category for all three scale steps (1–2–3, regardless of whether the scale was coherent or mixed). The older children statistically significantly more often chose all three pictures belonging to the intended categories (χ^2(1, $N = 103$) = 5.90, $p < .05$). A coherent scale (e.g., 1B–2B–3B) was chosen by 41 children (39.8%).

Discussion

The aim of this study was to validate the pictures used to assess anxiety in the short S-STAI described in Nilsson et al. (2012). More specifically, the study focused on investigating how children aged five to eight (a) labelled a variety of facial expressions, (b) matched those labels to specified emotional categories, (c) chose pictures to represent the quantity of emotions ('a little' – 'some' – 'a lot') and (d) chose pictures to represent the quality of emotions ('good/like' – 'in between/so-so' – 'bad/dislike') and, finally, (e) to investigate whether there were any age

differences. Based on this, a further aim was to recommend pictures for further use; those are presented in Figs. 4 and 5.

The results from the labelling task indicate that the children were able to perceive distinguishing features in the negative emotional categories. A large majority (86.9%; see Table 2) chose to label pictures for those categories with negative emotional labels, such as 'grumpy', 'sad' and 'angry'. This suggests that they understood that the facial expressions represented a negative emotion. The same also applied to the positive emotional categories, which the children mostly labelled as 'happy' (76.1%; see Table 2) – except that some of the children used the negative label of 'tired' for two of the pictures for Calm/Relaxed. In summary, the data from this study indicate that the children largely understood the differences between the emotional labels and between positive and negative facial expressions of emotions; the main exception is that hardly any children chose the intended labels for Tense/Nervous.

A previous systematic review showed only weak evidence that children below the age of four years were able to use self-reports for emotions in a valid and reliable way (von Baeyer et al., 2017). This might be because such labels are too complicated for such young children, who may not yet have learned the words (Vicari et al., 2000) or indeed have learned to recognise the emotions concerned (Camras & Allison, 1985; Odom & Lemond, 1972; Vicari et al., 2000). Emotional vocabulary expands throughout childhood (Herba & Phillips, 2004), which may explain why, when asked to choose pictures representing Tense/Nervous, all groups except the oldest chose pictures intended to represent Worried/Afraid. By contrast, the children were very sure about Happy/Content. This is in accordance with earlier research, where happiness is

Table 6
Number of answers belonging to the intended grade ('a lot', 'some' or 'a little') in the short version of the State-Trait Anxiety Inventory.

	A lot N/total	%	Some N/total	%	A little N/total	%
5-year-olds	18/26	69.2	21/26	80.8	21/26	80.8
6-year-olds	19/24	79.2	21/24	87.5	20/24	83.3
7-year-olds	27/31	87.1	30/31	96.8	30/31	96.8
8-year-olds	21/22	95.5	22/22	100	22/22	100
Total	85/103	82.5	94/103	91.3	93/103	90.3

Table 7
Shares of the children's answers representing the intended quality of emotion in the picture story.

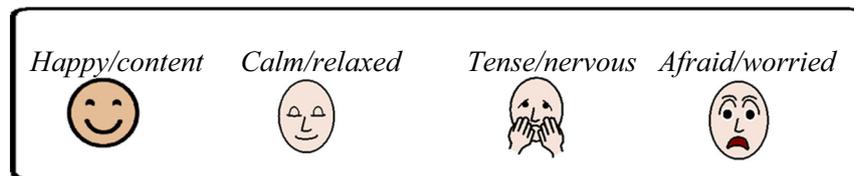| Ages	Good/like N/total	%	In between/so-so N/total	%	Bad/dislike N/total	%
5-year-olds	24/26	92.3	19/26	73.1	25/26	96.2
6-year-olds	18/24	75.0	22/24	91.7	23/24	95.8
7-year-olds	28/31	90.3	31/31	100	31/31	100
8-year-olds	21/22	95.5	21/22	95.5	21/22	95.5
Total	91/103	88.3	93/103	90.3	100/103	97.1

Note. Cut-off value: 10%.

Fig. 4. The recommended picture for each emotional category.

reported as relatively easy to recognise from facial expressions since it involves a uniquely shaped mouth (Vicari et al., 2000). There is also research indicating that children are better at identifying happy expressions (Cheal & Rutherford, 2011). The conclusion from the above is that the pictures shown in Fig. 4 are considered the most suitable for use in the instrument.

When it comes to the quantity and quality scales, the children's overall understanding of both was high (88% for the quantity scale and 92.2% for the quality scale). Hence both scales are considered reliable for all age groups. The results for the quantity scale suggest that the understanding of the size concepts increases with age. Based on the results, the quantity scale originally used in the adapted instrument is recommended for future use (Fig. 5). For quality, the facial scale (Fig. 5) is considered the most appropriate one since it was chosen by the largest proportions of the children. Other research also suggests that facial scales are the most suitable for children (von Baeyer et al., 2011) and that children usually prefer facial scales to other methods when it comes to scoring their emotions (Miró & Huguet, 2004). In addition, children, parents and health-care professionals have reported a preference for facial scales in relation, for example, to the assessment of pain (de Tovar et al., 2010). This information should be considered in studies and practice using Talking Mats, where other pictures – such as hand gestures (thumbs-up, thumbs-down) – are sometimes used instead of faces.

In line with earlier research (Rabiee, Sloper, & Beresford, 2005), this study showed that children's preferences and interpretations may differ from those of adults (as evidenced by the fact that some of the pictures originally chosen for the short S-STAI, on scientific grounds but by adults, were not preferred by the children in the study). Further, it has been reported in other research that young children are better able to distinguish among three steps than among the six or more steps of many established scales (Emmott et al., 2017). This underscores the importance of taking children's thoughts and opinions into account. As mentioned earlier, many pictorial systems designed for children actually tend to reflect the way that adults think about the world. Children's ability to understand the world is dependent on their cognitive and linguistic development as well as on their experience. For this reason, they understand and represent the world differently from adults. If children's own priorities and preferences are taken into account, this may yield communicative tools that are easier for children to learn and use (Light, Page, Curran, & Pitkin, 2007). Important information may be missed if children are not involved in research and their perspective is not explored (Harder, 2011; Nilsson et al., 2015). It is to be hoped that, with the use of the pictures identified by the present study as the most appropriate ones, the short S-STAI will be better able to extract correct first-hand information directly from children. As a result, each

child may receive the right emotional support in health-care situations. However, the validation of the pictures carried out in this article is only a first step and more research is needed. The instrument should be tested in its intended hospital setting, preferably on children both with and without communicative and/or intellectual disabilities.

When it comes to strengths and weaknesses, one strength of this study was the short and engaging visual interview format used, which resulted in a high response rate. The number of children included was also comparatively large, at least for research relating to the use or validation of methods for the use of pictorial support. One weakness of the study concerned the procedure for choosing pictures representing emotions: because the children attached each picture that they chose to the story pictures, they were not able to choose the same picture for two different emotions. This may have affected the results, but no child in the study expressed a wish to use the same picture twice. Another limitation to the study was the absence of a screening procedure to examine the children's understanding of the emotions targeted. Further, only a limited choice of commercially available symbols was included. However, symbol resources that are freely available, for example through the websites www.bildstod.se and www.arasaac.es, are commonly used in health-care contexts in many countries at the present time, so there may at least be some sort of ecological validity to the range of pictures chosen.

Conclusions

This study showed that children between five and eight years of age understood, to a great extent, facial expressions expressing emotions and verbal labels for emotions. The children were able to discriminate between positive and negative emotions, and they demonstrated a good understanding of the quality and quantity scales studied. When it comes to the specific pictures used, it was clear that, in several cases, the children preferred pictures other than those that had previously been chosen by the researchers for an instrument to be used by nurses in clinical practice to assess emotions. For this reason, some of the pictures presently used in that instrument will be replaced by others (the recommended pictures are shown in Figs. 4 and 5). At a general level, this study provides important information about the use of pictorial support to enable children to express and assess anxiety not only within health care but also in other societal contexts.

CRediT Authorship Contribution Statement

Stefan Nilsson: Conceptualization, Methodology, Validation, Resources, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Josefine**
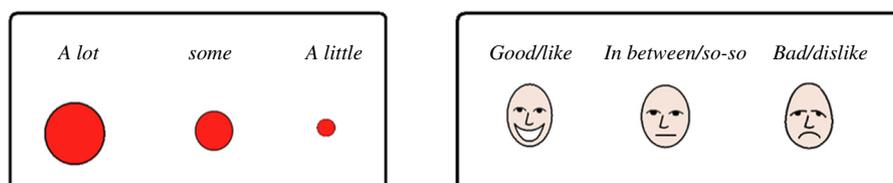

Fig. 5. Recommended pictures for quantity and quality scales.

Holstensson: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization. **Cajsa Johansson:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization. **Gunilla Thunberg:** Conceptualization, Methodology, Validation, Resources, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition.

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