What matters to children with CFS/ME? A conceptual model as the first stage in developing a PROM

Roxanne Parslow, Aarti Patel, Lucy Beasant, Kirstie Haywood, Debbie Johnson, Esther Crawley

ABSTRACT
Background Paediatric chronic fatigue syndrome (CFS)/myalgic encephalomyelitis (ME) is relatively common and disabling. Research is hampered because current patient-reported outcome measures (PROMs) do not capture outcomes that are important to children with CFS/ME.
Aim The aim of this study was to explore the aspects of life and health outcomes that matter to children with CFS/ME.
Methods Twenty-five children with CFS/ME were interviewed (11 males, 14 females; mean age 12.9 years (SD 2.2), range 8–17). Twelve were trial participants interviewed during the trial and 13 were recruited as part of a follow-up qualitative study. Parents were present in 19 interviews with their children. Three mothers participated in a focus group. All the interviews and the focus group were audio-recorded and transcribed. Data were analysed thematically using techniques of constant comparison. NVivo was used to structure and categorise data in a systematic way.
Results Children identified four key themes (health outcome domains): ‘symptoms’ that fluctuated, which caused an unpredictable reduction in both ‘physical activity’ and ‘social participation’ all of which impacted on ‘emotional well-being’. These domains were influenced by both ‘management’ and ‘contextual factors’, which could be positive and negative. The relationship between healthcare and school was considered pivotal.
Conclusions Children’s descriptions helped to inform a conceptual model that is necessary to develop a new paediatric CFS/ME PROM. Doctors need to be aware of how children conceptualise CFS/ME; the relationship between healthcare and school is fundamental to ameliorate the impact of CFS/ME.
Trial registration number ISRCTN81456207.

INTRODUCTION
Chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME) is characterised by severe disabling fatigue1 with additional symptoms including musculoskeletal pain, sleep disturbance, cognitive dysfunction, headaches, dizziness and sweats.2 Paediatric CFS/ME is relatively common with a prevalence of between 0.4% and 2.4%3–6 in population studies and between 0.06% and 0.1%7–9 in studies based in hospital settings. It is disabling8–11 with a negative impact on quality of life.12–16 Despite this, research is hampered by the lack of high-quality patient-reported outcome measures (PROMs) for adults17 and children.18
Well-developed PROMs enable clinicians and researchers to collect patient-centred evidence on outcome.19, 20

What this study adds
Children with CFS/ME report a range of often extreme impacts on their health and ability to participate in school and society.
A new patient-reported outcome measure for paediatric CFS/ME should measure symptoms, their impact on physical activities, participation in school and social activities, and mood.
Supportive schools, family and friends and strategies to manage activity can help ameliorate symptoms.

What is already known on this topic
Chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME) is an important disabling illness in childhood.
Children with CFS/ME attend less school and can have mood problems.
There is currently a lack of qualitative evidence describing important outcomes to children with CFS/ME.
June to August 2012 in assessment and follow-up clinics. If eligible, they were informed about the relevant study by their specialist clinician and given patient information sheets. Consent was obtained from the family to be contacted by a researcher to arrange an interview.

**SMILE trial**
Children (aged 12–18 years) and their parents were interviewed as part of the SMILE trial about whether PROMs used were suitable to assess the impact of CFS/ME and measure important outcomes.\(^{24} \) Children and their mothers were interviewed at three possible time points using a checklist of topics\(^{24} \) usually at the participants’ homes. Purposive sampling ensured interviews included a range of informants, in terms of age, sex and families from both intervention arms (maximum variation sampling).\(^{24} \)\(^{25} \)

**PROMs study**
We then extended this work in a further qualitative study recruiting participants from a wider age range (aged 8–18 years) to explore the key health outcomes important in paediatric CFS/ME (PROMs study). Semistructured interviews in participants’ homes were used to explore how children with CFS/ME describe the impact of CFS/ME. A topic guide (see online supplementary appendix 1) informed by previous reviews\(^{17} \)\(^{26} \) was sent in advance to children and their parents before the interview. We conducted one focus group for parents (without their child) to discuss aspects of quality of life that they felt were important.

**Data collection and analysis**

**Qualitative data**
For both studies, interviews were recorded and transcribed verbatim. Data analysis was an ongoing and iterative process. Interviews were stopped when we reached data saturation. We compared data collected from both studies for systematic differences in content before combining the data. Data were analysed thematically using techniques of constant comparison.\(^{27} \) Data items were systematically assigned codes using NVivo.\(^{28} \) Similar codes were cross-referenced and emerging themes were discussed with members of the research team to improve reliability. Two members of the research team independently analysed approximately 10% of the data to compare coding and enhance reliability. Descriptive accounts were produced, and theoretical explanations for behaviours, opinions and decisions developed.

**Quantitative data**
The service currently collects information routinely at assessment about fatigue, physical functioning, pain, anxiety and depression from the following inventories: Chalder Fatigue Scale,\(^{29} \)\(^{30} \) 36-item short form (SF-36) physical function subscale,\(^{30} \) EQ-5D,\(^{31} \) visual analogue pain rating scale, Hospital Anxiety and Depression Scale\(^{32} \) and the Spence Children’s Anxiety Scale.\(^{33} \)

**RESULTS**

**Participants**
Twenty-five children with CFS/ME were interviewed (11 males, 14 females; mean age 12.9 years (SD 2.2), range 8–17). Twelve (of the 13 approached) were interviewed during the SMILE trial and 13 (of the 17 approached) were recruited as part of the PROMs study. Parents were present with their child during 19/25 interviews. Twenty-five mothers were interviewed.

Table 1 compares those interviewed with those assessed in the specialist CFS/ME service in the same time period. Participants in the PROMs study were slightly younger. Participants were also less anxious and less likely to be female because we prospectively recruited male patients (38.5% compared with 72.6%, p=0.01). Initial clinical assessment data were available for 5/7 of the children who declined to participate. Analysis of these data shows that children who declined were broadly similar to those who participated in terms of the characteristics shown in table 1: mean (SD) age 14.4 (1.5) years; 80% (4/5) female; median (IQR) time to assessment 6 (6–10) months; median (IQR) Chalder Fatigue score 23 (22–25); median (IQR) SF-36 physical function 65 (60–80).

**Living with CFS/ME—‘feeling ill’**
We propose a conceptual model (figure 1) of being unwell with CFS/ME that suggests interactions between four key themes (health outcome domains) that contribute to how children understand their illness and ‘feeling ill’: ‘symptoms’, ‘physical activity’, ‘social participation’ and ‘emotional well-being’. These were influenced by two additional themes: ‘management’ and ‘contextual factors’. Children described a linear relationship between symptoms, impact on activity, participation and emotional well-being. When symptoms were worse, children felt this had a direct impact on their activity, “When I am worse it is mostly just resting”, and mood, “As I feel crash down I become a little bit less positive”. Children also described mood effects as a result of a lack of participation, “I could have been doing better and it is very frustrating”.

**Symptoms**
Most children described a range of symptoms: aches and pain, sleep disturbances, a lack of energy, tiredness and memory and concentration problems. Although the individual experience of symptoms differed, some described a collection of symptoms, “everything hurts”.

My legs felt like jelly, which was the cause of the … and um I got a sore throat, … um I got ear pain, headache, tummy ache, everything. (Female)

Several children described the cognitive impact; a reduced capacity to remember things, concentrate and a ‘brain fog’. This was often described as a ‘loss’ in ability to participate in academic activities:

I was just good at memorising stuff and now it’s completely gone. (Female)

**Fluctuation in symptoms**
Many children described the unpredictable fluctuation in symptoms and an associated lack of control, often describing a boom and bust cycle. This was particularly linked to their perceived levels of energy “ever changing energy level” and impacted their mood and confidence in returning to usual activities:

I’d like to do some certain sports again, but I am just worried about the energy levels…. (Male)

**Physical activity**
All participants described a reduction in physical activity and children often reflected on sport or hobbies that they had to give up, “used to be very sporty and active” (male). In some cases, symptoms stopped children doing activities at the time, in others, restricting activity led to a negative cycle of more and more limitation:
I just dropped things and dropped things...so it is kind of a bit of a negative cycle and was going down, and down until I was literally doing nothing. (Female)

A few children acknowledged the consequences of not limiting activity resulting in ‘paying the price’:

I organised a massive water fight the other day and I think I overdid it a bit so yesterday I was inside all day, I just felt wiped out. (Male)

Social participation

Impact on school

Reduced school attendance and reduced timetables “I only do little amounts of school” was one of the most commonly reported consequences. Time off school varied from “two hours a day” to “a year off school”. Children were worried about exams, falling behind and losing out on social interaction:

it’s not just the lessons I’m missing out on, it’s the other stuff that’s kind of there. (Female)

Returning to school was found to be quite challenging by children, “It was actually quite hard to get back to school”. Children and their parents (box 1) reported anxiety caused by not keeping up with schoolwork. In some cases, children dropped subjects to reduce stress. In many cases, children were frustrated at not meeting their full potential:

I get really frustrated because then I think if I was there full time I could have been in more lessons and I could have been doing better. (Female)

Impact on friendships

Despite parental encouragement, being unwell with CFS/ME affected children’s ability and motivation to spend time with friends, often limited due to symptoms and reduced activities:

It was hard because like my friends were going out and leaving me at home because I just couldn’t do it. (Female)

Impact on home life and family

A few children reported that CFS/ME affected their ability to spend time with their relatives or siblings, going on family outings or on holiday. Parents emphasised the impact it had on

Table 1  Comparison of characteristics of children at initial clinical assessment who were interviewed as part of the SMILE trial and PROMs study compared with children who were assessed and treated by the specialist service during the same period (2010–2012)

<table>
<thead>
<tr>
<th></th>
<th>SMILE trial</th>
<th>CFS cohort (n=511)</th>
<th>PROMs study</th>
<th>CFS cohort (n=530)</th>
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<tbody>
<tr>
<td></td>
<td>(n=13*)</td>
<td>unless otherwise shown</td>
<td>p Value†</td>
<td>unless otherwise shown</td>
</tr>
<tr>
<td>Age (years)#</td>
<td>14.5 (1.5)</td>
<td>14.0 (1.6)</td>
<td>0.21</td>
<td>11.3 (2.7)</td>
</tr>
<tr>
<td></td>
<td>Median (Q1–Q3)</td>
<td>Median (Q1–Q3)</td>
<td>Median (Q1–Q3)</td>
<td>Median (Q1–Q3)</td>
</tr>
<tr>
<td></td>
<td>n=13</td>
<td>n=541</td>
<td>n=13</td>
<td>n=559</td>
</tr>
<tr>
<td>Time to assessment</td>
<td>12 (6–17)</td>
<td>12 (8–24)</td>
<td>0.40</td>
<td>9 (6–12)</td>
</tr>
<tr>
<td></td>
<td>Median (Q1–Q3)</td>
<td>Median (Q1–Q3)</td>
<td>Median (Q1–Q3)</td>
<td>Median (Q1–Q3)</td>
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<td></td>
<td>421</td>
<td>438</td>
<td>0.07</td>
<td>438</td>
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<tr>
<td>Chalder Fatigue score (0–33)</td>
<td>13</td>
<td>26 (23–28)</td>
<td>13</td>
<td>24 (17–25)</td>
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<tr>
<td>SF-36 physical function (0–100)</td>
<td>13</td>
<td>50 (45–55)</td>
<td>11</td>
<td>50 (30–75)</td>
</tr>
<tr>
<td>Anxiety (SCAS) (0–90)</td>
<td>12</td>
<td>45 (21–58)</td>
<td>10</td>
<td>16 (8–26)</td>
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<tr>
<td>No. of symptoms (0–14)</td>
<td>13</td>
<td>9 (7–10)</td>
<td>13</td>
<td>8 (7–10)</td>
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<td>Anxiety (HADS) (0–21)</td>
<td>13</td>
<td>12 (8–15)</td>
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<td>7 (4–9)</td>
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<td>Visual analogue pain (0–100)</td>
<td>12</td>
<td>42 (29–57)</td>
<td>12</td>
<td>61 (48–81)</td>
</tr>
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<td>School attendance past week</td>
<td>n=13</td>
<td>n=541</td>
<td>n=13</td>
<td>n=559</td>
</tr>
<tr>
<td>None</td>
<td>0 (0.0%)</td>
<td>101 (21.2%)</td>
<td>0.24</td>
<td>4 (30.8%)</td>
</tr>
<tr>
<td>10%</td>
<td>2 (15.4%)</td>
<td>49 (10.3%)</td>
<td>0.00</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>20%</td>
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<td>29 (6.1%)</td>
<td>1.77</td>
<td>1 (7.7%)</td>
</tr>
<tr>
<td>40%</td>
<td>1 (7.7%)</td>
<td>88 (18.5%)</td>
<td>0.00</td>
<td>88 (17.7%)</td>
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<tr>
<td>60%</td>
<td>3 (23.1%)</td>
<td>100 (21.0%)</td>
<td>3 (23.1%)</td>
<td>95 (19.2%)</td>
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<tr>
<td>80%</td>
<td>3 (23.1%)</td>
<td>84 (17.6%)</td>
<td>4 (30.7%)</td>
<td>89 (17.9%)</td>
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<td>100%</td>
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<td>21 (4.4%)</td>
<td>1 (7.7%)</td>
<td>26 (5.4%)</td>
</tr>
<tr>
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<td>5 (1.1%)</td>
<td>0 (0.0%)</td>
<td>4 (0.8%)</td>
</tr>
</tbody>
</table>

*Characteristics included for one child whose mother was interviewed (the child was not interviewed).
†Age for the SMILE study and the CFS cohort is age at first assessment. Age for the PROMs study is age at interview. This is because children were recruited from follow-up visits not at clinical assessment.
‡Comparison of characteristics of children at initial clinical assessment who were interviewed as part of the SMILE trial and PROMs study compared with children who were assessed and treated by the specialist service during the same period (2010–2012).
family life with the family having to work around the fluctuating symptoms:

There aren’t a lot of family days out... I really miss them. (Female)

Emotional well-being
Children and their parents described a fear and anxiety associated with having the illness. This was often related with the fluctuation and uncertainty about the duration of periods of feeling ill:

... I was so scared of it lasting a long time again. (Female)

Activity restrictions often led directly to feelings of low mood and frustration. Parents noted that the loss of social interaction affected their child’s morale.

aaah, it’s a bit annoying and stressful, um I’m not always able to do what I want to do. (Male)

Management (self and therapeutic)
Children and their parents described a variety of management strategies for their CFS/ME. Some of these were described as strategies they had learnt ‘naturally’ or on their own through experience (self):

I actually kind of naturally did quite a good balance between doing enough but not doing too much. (Female)

In other cases, children described managing activity using similar descriptions as used in the specialist service (therapeutic):

... I just have to save a bit of energy up for it it’s like money you have to save a bit, spend a bit. (Male)

Parents reinforced that important activities such as having a job were often adapted to minimise the impact of the illness. Where children had managed to continue with some activity, these were sometimes prioritised if they were particularly enjoyable although often limited to prevent an increase in symptoms.

Contextual factors
Contextual factors, such as support and understanding from family, friends, school and healthcare providers, influenced their ability to manage their illness. Friends were often willing to undertake less physical activities indoors, “We just invite them in and watch a movie or whatever”. However, CFS/ME was often perceived as illegitimate and participants talked about the negative attitudes and comments they received.

I am more happy to be in the sanctuary of my own home where my parents understand me than people at school who don’t really have a clue. (Male)

Parents were more concerned about the impact on their child’s emotional well-being than children themselves. Some parents talked about a lack of understanding from extended family members, “Grandparents they don’t understand”. Some children reported significant support from schools enabling them to manage their symptoms:

... they have offered the best help they can get me as well, time off resting, if I am feeling ill I can go straight to the nurses’ office and lie down. (Male)

However, others reported difficulties in having their condition recognised and appropriately supported by educational authorities. Parents and children described the importance of getting a diagnosis and being understood, “Relief really to be understood”. The interaction between healthcare and educational institutions was fundamental to acknowledge the condition and

Figure 1  A child’s experience of living with chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME): a conceptual model.
manage the impact. A mother and daughter described the interaction between a delayed diagnosis, lack of support from schools and impact on the daughter:

Mother: ...I was trying to get her off from school and they wouldn’t let me take her from school

Child: it was really annoying.

Mother: ...she was really struggling and then it wasn’t, until she was diagnosed that they said that you can only do so many hours. (Mother and daughter)

DISCUSSION

CFS/ME was described as an unpredictable and fluctuating illness with a pervasive impact. Children described a linear relationship between four key outcomes: symptoms impacted on physical activity, school and social activities, which affected mood and emotional well-being. These can be ameliorated (or not) by contextual factors such as social support from family, friends, school and healthcare. The relationship between healthcare and school was considered pivotal.

Strengths and weaknesses

This is a large qualitative study (n=25), and participants were representative of those assessed in a specialist service. We are unable to generalise results for patients seen in primary care, those who are severely affected or younger than 8 years old. Most children chose to be interviewed with parents, which may have caused them to conceal problems.34 To ensure the child’s voice remained paramount, quotes from parents have been included where they have enriched their child’s viewpoints, which may mean we have not included areas that are important to parents. Eleven children were recruited from a trial. Trial participants can differ from those that do not take part in a trial.35 In addition, those who took part in the PROM study received the topic guide before the interview, which may have influenced their results; however, these groups and the data they generated were similar to the clinic population and to each other.

Results in context with previous literature

Child-derived measures specific to CFS/ME do not exist.18 The identified themes underpin a conceptual model of the lived experience of paediatric CFS/ME, defining the health outcomes that should be assessed in children, and enhancing the relevance and acceptability of a new CFS/ME-specific PROM. This study supports and extends existing (largely quantitative) evidence of the impact of CFS/ME on children’s schooling,5 36 social activities,11 37–40 and emotional function.15 16 39–42 Missing school was the most pervasive and important reported outcome in this study; the impact was wide-ranging, influencing social relationships and academic work. These effects were exacerbated when children returned to school because of changes in their peer group and anxiety about falling behind in their studies. Where educational authorities and schools were supportive, the impact of the illness was lessened.

We were surprised that most children described a linear unidirectional relationship between symptoms, activity and mood. Children describe anxiety, low mood and stress as a consequence of their symptoms and the reduction in usual activities, socialising and ability to keep up with school. This is consistent with previous studies that identified the social implications of the illness: loneliness, loss of normal adolescent life and worries about school.16 40 45 We assessed the data for multidirectional relationships between the domains; however, in contrast to previous studies,16 children in this study did not describe emotional well-being having an effect on physical activity, school or socialising. This may be because previous studies recruited children with comorbid mood disorders16 who may have received cognitive behavioural therapy and explored the relationship between mood and activities. Unlike other studies,16 children did not describe bullying but did report that a lack of support outside the family negatively influenced their experience of CFS/ME. This may be because previous studies recruited adolescents with CFS/ME who were anxious45 or after recovery.49 Children did not report strained family relationships,11 43–45 although they did report reduced family activities. This may be because parents were present in interviews and the results may have been different if children had been interviewed alone.
Implications
Paediatricians need to be aware that from a child’s perspective CFS/ME is more than just fatigue; it impacts on activity, school attendance, socialising and mood. Contextual factors are important in how children experience symptoms and disability. Doctors need to develop strong relationships with schools. Current PROMs used for CFS/ME measure fatigue, disability and mood. A new PROM needs to collect data on symptoms, activity and socialising. Most of these themes are not currently assessed by PROMs used in paediatric CFS/ME.46 Future research should explore which outcomes are most important to children to include in a new PROM. The conceptual model is informative for clinicians and researchers who often have different views from children on what is important to measure46 in research and healthcare settings.47

Acknowledgements
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Contributors
EC developed the idea for the SMILE study. EC and KLH developed the idea for the PROMs study. AP, LB and DJ conducted the qualitative interviews and focus group. AP, LB and RP conducted the data analysis. KLH contributed to the analyses. All authors contributed to the interpretation of results and to drafting this paper.

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Disclaimer
The views expressed in this publication are those of the authors and not necessarily those of the NHS, the National Institute for Health Research or the Department of Health.

Competing interests
EC is a medical advisor for the Association for Young people with ME (AYME) and the Sussex and Kent ME/CFS society.

Ethics approval
A favourable ethical opinion was given for the SMILE Trial (08/09/2010, ref: 10/H0206/32) by South West 2 Local Research Ethics Committee. An amended agreement was approved (31/05/2011). The NHS Health Research Authority (NRES Committee East of England) approved the PROMs study (ref: 12/EE/0186).

Provenance and peer review
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PROMS Study Topic Guide

The questions listed below are a guide for the researcher to use in the semi-structured interviews. The questions may differ slightly between the younger (aged 8-11 yrs) and older children (aged 12-16 yrs)

Introduction: We are doing a project about the way in which CFS/ME affects children and are very interested to hear about your experiences. We want to hear about the way in which CFS/ME has affected you and continues to affect you now, about what matters to you and how CFS/ME stops you from doing things that you would like to do. We want to ask a few questions about the questionnaires you have used and whether they are relevant. We want to understand your story.

a. Tell me about being unwell with CFS/ME.

b. How does CFS/ME affect your life?

c. What would you like to do that you are unable to do at the moment?

d. How do you know if you are feeling better?

e. How do you know if you are feeling worse?

f. How do you know if strategies are working or not working?

g. What should we measure for recovery?

h. What would you want to improve if you got better?

i. What outcome would be important to you?

   I. Seeing your friends more?

   II. Feeling better?

   III. Doing more exercise?

j. Tell me about the questionnaires you have filled in.

k. Here are some other questionnaires. Do you think they are better or worse?

l. Is there anything else that you would like to tell me about the way in which the CFS/ME affects you?

A range of prompts will be used, including:

Tell me more about that …

How did that make you feel?

How did that affect you?