Managing discomfort and developing participation in non-emergency MRI: Children's coping strategies during their first procedure

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Abstract

Introduction: Building on existing work, this paper aims to develop a detailed analysis of the practical coping strategies developed by children who had not previously experienced an MRI, regarding a non-emergency examination of the brain.

Methods: Semi-structured interviews with 22 children, aged between eight and sixteen years, were conducted immediately post-procedure. Emergent data were thematically analysed in line with the core precepts of Grounded Theory, and triangulated against interview data with their parents where pertinent.

Results: The primary concern among interviewees related to how they had coped with the discomfort of an unfamiliar medical procedure; this was recurrently managed through a process herein termed *Participation Development*. This comprised three phases. The first, *preparative participation*, describes the children's reported attempts to ready themselves for the examination (with parents) ahead of arriving in hospital. The second, *enabling participation*, describes how the children (with input from parents and radiographers) endeavoured to understand what was to come, and select viable distraction techniques.Finally, *sustaining participation* describes the children's reports of actualizing their preparations during the examination itself. Where the overall process of participation development was successful, the children reported a sense of mastery, growth and even joy.

Conclusion: While much work in the domain portrays children as relatively ‘passive’ agents’ during an MRI procedure, the findings herein point to how they can (with varying degrees of success) actively and constructively work with others. This, it is contended, has direct import for the improvement of support, both prior to and within a procedure itself.

Keywords

Children; coping strategies; grounded theory; magnetic resonance imaging; paediatric medicine; qualitative research; thematic analysis

Introduction

Recent advances in computed tomography (CT), magnetic resonance imaging (MRI), nuclear medicine (NM), positron emission tomography (PET) and ultrasound have increased the number of patients exposed to these medical imaging modalities. Perhaps inevitably, most research has focused primarily upon these systems' technical qualities.[1,2] However, patient experience during medical imaging procedures has not been entirely overlooked; many studies have highlighted the anxieties and coping strategies particular to individuals undergoing such investigations.[3-5]

MRI is a non-invasive, painless, non-ionizing procedure, making it attractive when considering appropriate investigations. However, some adults report feelings of generalized threat to self-control during MRIs; being inside the scanner's bore is often associated with "lying as for cremation" and may produce a sense of being "buried alive."[3,4] When patients undergo a first-time non-trauma (non-emergency) MRI and have time to think about it and no previous experience with it, they can experience high anxiety levels.[6] Thus, uncertainty about a prospective diagnosis correlates with greater stress and anxiety prior to the examination.[7] Uncomfortable or stressful medical imaging experiences as a young person can also result in negative responses to such examinations in adulthood.[8]

The vast majority of studies addressing patient experience in medical imaging, and MRI in particular, have focussed upon adult participants.[1] Literature directly investigating how children and younger adults (i.e. under-16s) understand and work through such procedures is scant at best, though a broader body of literature recommends play therapy as helpful in reducing anxiety[5,9] . Thus, it is important to consider unique concerns, which may emerge

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[1] One should remain aware of the fact that this is the case with much social research; ethical approval is simply harder to obtain when researching children rather than adults.

during MRIs conducted with paediatric patients. Research shows that children should not be thought of as just 'small adults'; examining children requires both an understanding of their normal variations in anatomy and paediatric pathologies and an awareness of their cognitions, comprehension and communicative capacities.[10,11] Relevant work shows that children value being taken seriously and also that they are very capable of exhibiting informed levels of satisfaction regarding medical care.[12, 13] It is therefore important for clinicians to develop the ability to understand children's experience during imaging to provide high-quality care and develop meaningful interactions to improve the examination situation for all involved.

This paper aims to build upon Raschle et al.'s[5] observations regarding children's behaviour during cranial scans, with a view to advancing understanding of how children interact more generally to medical imaging. It details methods that a sample of young participants used to handle and adapt to the premises of an unfamiliar healthcare investigation. Using a grounded theory approach,[14] these findings are then squared with analyses of the parallel perspectives of parents (where relevant) to make full contextual sense of the ways specific MRI encounters played out in reality.

Method

This study was conducted at a single diagnostic imaging department in a university hospital in western Norway.[2] Grounded theory is employed as the core investigative approach.[14] This research model has been extensively used in several contemporary healthcare fields to build

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[2] This pediatric imaging department does not have a dedicated pediatric MRI scanner; therefore, all pediatric MRI examinations are performed on a general-purpose scanner within the adult department.

specific, nuanced, inductive models of clinical encounters with direct practical implications for better handling of practitioner–patient relations [15, 16].

Participants

The inclusion criteria for participation were: (a) children under 16 years of age, (b) undergoing a non-emergency MRI brain examination (c) for the first time. An opportunity sample of N=22 children aged between 8 and 16 participated; n=10 were aged 8–10, and n=12 were aged 11–16. The gender split was evenly n=11. Inpatients, children requiring emergency MRI procedures and children with learning disabilities were excluded. The conditions of ethical approval limit further reporting on specific details of the participant sample.

Procedure

All interviews were conducted in person in the participating diagnostic imaging department immediately following the completion of the children's MRI procedures. This helped preserve a sense of direct relevance of recent experiences among the participant group, which typically has a shorter average attention span than that of adults.[17] For similar reasons, the interview duration was kept to a reasonable minimum (m=15 minutes). Interviews were conducted exclusively by the second author, a researcher with extensive experience in conducting qualitative investigation in clinical contexts.

A semi-structured interview was followed in all cases, based on open-ended questions, limiting interviewer bias as far as possible.[18] Also, as recommended by the literature, the fine details of the interviewing approach were adjusted case by case according to the participant's specific needs. Specifically, the language was adapted according to age group and cognitive developmental stage, though it was always kept as informal and conversational as possible to minimize potential confusion or intimidation for the child.[17]

Each interview began with a request for basic demographic information, i.e. age and schooling, to help the child relax. Then the children were asked to recount, in their own words, their thinking and activities up to and including the MRI examination itself. They were prompted (when necessary) on:

- physical and psychological preparation they had used;
- who and what had been involved in these preparations;
- what their expectations had been;
- their understanding of the procedure itself;
- how they felt during the scan;
- their suggestions about improving the experience and
- what they would tell their friends about the examination.

Additional data were collected wherever possible to help contextualize and expand the primary materials, in line Glaser and Holton's approach.[14] Thus, following each child's interview, accompanying parents were asked to describe their own experiences in connection to their child's MRI and preparation and how they viewed the clinical activities before and during the procedure.

Data collection and preliminary analyses were undertaken simultaneously, with themes emerging from early interviews and observational field notes, directing the emphasis in subsequent data collection.[19] Thus, consistent attention to participants' own concerns about the MRI process was ensured.

Analysis

All interviews were recorded, transcribed verbatim and translated into English by the second author at the point of transcription. Provisional (open) codes were developed from the raw data by the first and second authors; these were then reviewed and redeveloped by the third author and were revised by all three until a mutually satisfactory interpretation of all data was achieved. From these codes, a set of local theoretical principles, each descriptive of the issues arising, were outlined.[14] The fourth author, not involved in the original project, then reviewed the interpretation of data over the entire process. Given this input, all four finally revised the total analysis independently and then collectively, ensuring an extended process of triangular consensus validation.[20] Data emergent from the parents' interviews were subject to the same procedures and are integrated into the formal analysis when they illuminate key concerns.

Ethics

All forms of data collection for this project were approved by the Regional Ethical Committee for Medical Research in Norway. The head of the diagnostic imaging department which ultimately participated in this study was initially approached regarding involvement. Following the receipt of permission to participate at the institutional level, prospective participants and their parents were provided with an information letter and a written consent form. The letter outlined the project aims, provided assurance of confidentiality, stressed the voluntary nature of participation and informed participants that they could access the survey results by contacting the first author. All participants and their parents provided written consent to participate.

Findings

The MRI experience was procedurally negotiated by the participating children in an overall process herein termed *Participation Development*. Elaborated below, with reference to illustrative data, are three progressive phases in this process which emerged from the grounded evidence collected. These are:

1. Preparative participation
2. Enabling participation
3. Sustaining participation.

All are discussed below, with reference to empirical data, and are triangulated with illustrative parental concerns.

1. Preparative participation

The children reported involvement in a wide range of preparative activities prior to arrival in the diagnostic imaging department, most conducted with parents. The hospital typically provides an information booklet about the MRI procedure when the appointment is first scheduled (approximately one month prior). The children frequently alluded to how they and/or their parents had used this booklet, along with online resources, to help eliminate uncertainty around what to expect:

> *"[M]y mother told me I was going into a machine and…it'd take pictures."* (Boy aged 10)

In some cases, the child had prior experience of a relatively similar radiological procedure to use as a reference point for personal preparation and interpersonal discussion. Where such experiences were positive, they were used by both children and parents to help allay anxieties. However, when such experience was not available, another common resource drawn upon was reported to be the positive experiences of 'known others' (i.e. family and friends) during radiological examinations in general and MRI in particular. Using such conversational and written materials, older children in particular could allay anxieties through self-rationalizing the facility of the upcoming procedure:

> *"[I]t is for my own good and…for my own sake."* (Girl aged 14)

The youngest, meanwhile, were less inclined to cite practical information as key to their coping; they more commonly referenced external motivations such as material rewards from parents as things that "made it worth it":

> *"I want to come again so I can get more toys!"* (Boy aged 8)

Children also drew attention to other sources that had been helpful in generating familiarity with what was to come, not least the television:

> *"I have occasionally seen the MRI machine on TV...I had imagined how it looked."* (Boy aged 11)

On the other hand, some children acknowledged that they had known relatively little beforehand or that they had simply forgotten in the intervening month:

> *"[W]hen I got the brochure it was quite a long time ago, I thought little of it and I forgot it."* (Girl aged 12)

From a parental position, how *much* discussion was considered necessary also varied. At one end of this spectrum, contribution to the child's preparative participation was relatively discrete. At the other, it was a prolonged, ongoing project:

> *"We've prepared him a little by telling him that there could be loud noises and that he could be in there for long time; he just had to be patient and think of other things."* (Father of a boy aged 11)

> *"[We] talked about it every day for two weeks prior to the examination."* (Mother of a boy aged 8)

Parents also identified the information provided by the hospital as crucial in their contribution to the preparative participation process. There was no appeal made to any general sense of a "necessary" amount or quality of detail, but they mentioned a rather more ambiguous requirement that what was provided should be practical in helping them allay their child's specific anxieties:

> *"[T]here was enough information for me so I could talk to him to get him prepared mentally." (*Mother of a boy aged 8)

As a corollary, parents whose children had more complex healthcare needs were clear that they would have benefitted from a greater amount of forensic information, for example about the Embla plaster and the diet before the MRI as well as specifics about the noise and space inside the scanner itself. It was also argued that if it had been made clear to the child that they would be able to watch a film during the examination (which apparently was not explained), this would have negated some of their worries. It was also proposed that the information booklet could contain pictures of a child or an adult in the MRI scanner, so the machine's size would not be a surprise on the day of the examination.

2. Enabling participation

The second stage of the evidenced process describes ways in which the children, upon arrival in the diagnostic imaging department, reported having collaboratively worked with parents and radiographers to ready themselves for the upcoming examination.

For participating children, the sense of gaining some degree of mastery over their own prospective experience in the MRI (with the resulting anxiety reduction) was, in turn, contingent upon a sense of clarity regarding what was involved and why. In some cases, detailed information from a medical professional, coupled with the simple assurance that there would be an option to "escape" if necessary, was reported as a major confidence boost:

> *"The machine hums while taking pictures, there is a series of approximately 3–5 minutes and sometimes of 6 minutes…[and I knew] I got a button with me that I could press and they would come right away."* (Girl aged 15)

In others, a clear sense of what to expect, generated through active sensory experience (rather than discursive information) was reported to be of exceptional value. Several children mentioned how having been briefly exposed to the noise of the MRI before their procedure had rendered that part of the procedure significantly less intimidating. With respect to the "why", meanwhile, the value of being told — or often, more importantly, shown — how their own activity could affect the procedure itself further provided a sense of *agency*. For example, one child explained how the importance of staying still in the MRI was meaningfully demonstrated for him through a brief experiential learning task:

> *"They took pictures of me before I went in, when I moved. The photo was completely unclear."* (Boy aged 10)

As a result of such techniques used by the radiographers, the children regularly built on their preparative participation experiences to move away from viewing themselves as passive subjects in the MRI procedure and towards viewing themselves as authentically active participants.

In addition to the matters addressed above, the children also frequently reported how the offer of a choice of distraction helped them feel empowered *in situ*. The children could choose between watching a film and listening to music during the scan and between having or not having their family beside them. While they usually elected to have family members alongside, they also often chose the film or music. However, one child chose not to watch a film at all, because *"…all [the] films were boring."* (Girl aged 15)

Thus, a key matter arising across the corpus of data related to how the participants were given active choices in ways which children are rarely allowed in other contexts. In this way, many of their concerns were negated through instrumental education and a promised distraction, but they were perhaps more negated through an appeal to a form of social-psychological capacity they might not otherwise experience. We might propose, therefore, that important conditions to enable the participation phase to be accomplished successfully are (a) clinicians' ability to interact intelligibly with both child and parents and (b) their capacity to tailor a child-relevant collaborative effort with each MRI.

3. Sustaining participation

This stage relates to how the children sustained active participation during the MRI examination itself. Most participants reported that watching films or listening to music were significantly helpful in reducing psychological stress and physical discomfort. Some noted that the machine noise made the audio difficult to hear. Others complained that they needed to remove spectacles within the machine and therefore could not see the film "properly." However, even where claims of full preparation were made, the children still found comfort in an audio or audio-visual distraction:

> *"I just wanted to have something to look at."* (Boy aged 10)

Simple acceptance of the procedure they had prepared for was rarely reported; further discomfort-displacement strategies were nearly always needed in the MRI itself. Sometimes these were seen as outputs of self-suggestion:

> *"I told myself I would not push the button…I would wait until I was finished."* (Boy aged 11)

> *"[I] tried to tell myself that it would not take so long, that I would soon be finished."* (Girl aged 11)

A core aspect of sustaining participation emerged, however, as an act of cooperation with the MRI professional; the children reported as helpful the clinician's suggestions regarding moving between scan sequences, breathing techniques, and handling nausea:

> *"At first I was a little nauseous, so I was taken out again. Then they said it was perfectly normal, and then I went back in and then it was much better. Then they said that I should breathe in with my nose and out with my mouth. It was then really quite good when I completed the procedure."* (Girl aged 16)

In short, even where prior preparation techniques had been considered effective, professional adult feedback was a "deal-breaker" under difficult circumstances.

Sustaining participation was also reported to have been maintained through support from parents and/or family. As one might expect, having parents within "touching range" was a particular issue among younger children. Adolescents, on the other hand, were generally satisfied to know that their parents were "around":

> *"I can see Mum or Dad, or know that they are present in the room."* (Boy aged 12)

The conditions for sustaining participation thus emerged as (a) the children's ability to take control during the situation and (b) their capacity to trust their parents and believe the participating clinicians were "there for them".

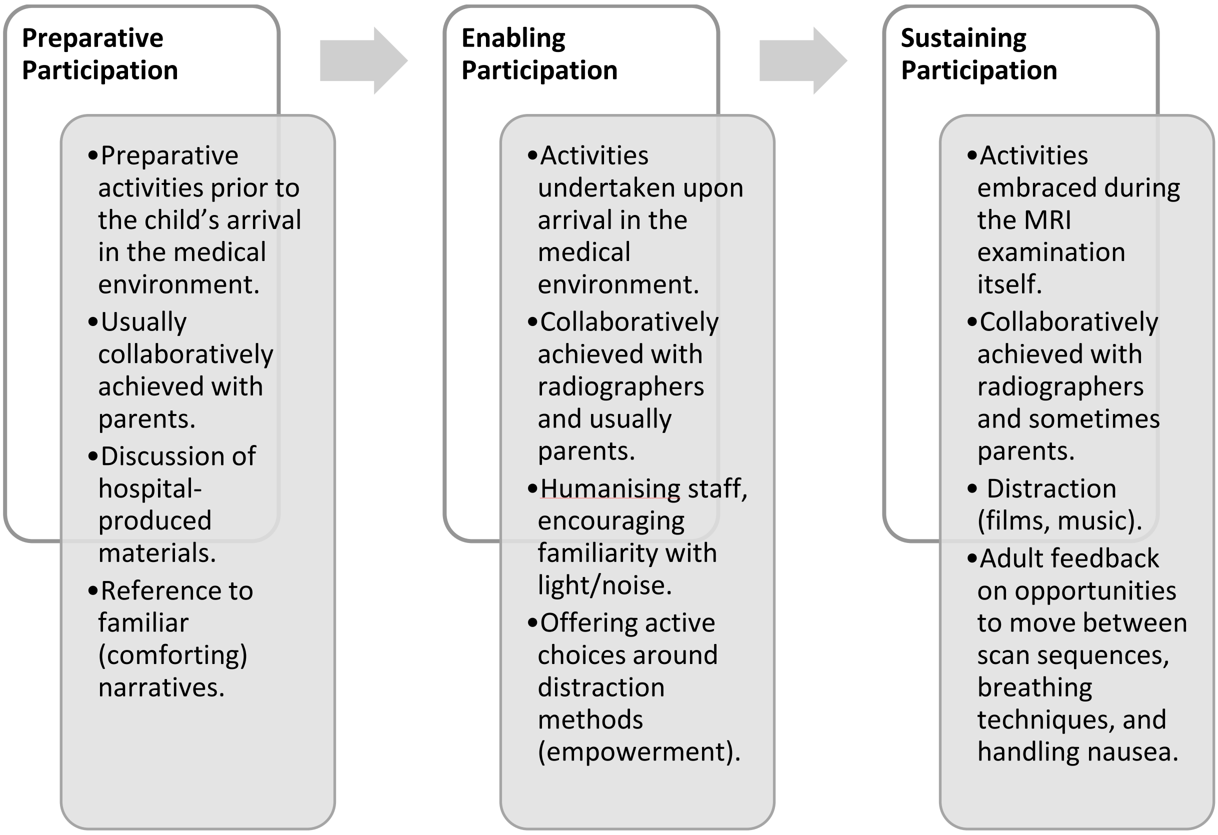
It is important, in a final stage, to reflect upon the quality of distraction techniques and particularly the films shown. While all children interviewed found the films usefully distracting (or rejected them for being "boring"), one mother complained that the movie was violent and would be more likely to stress the child than calm them down. Whether this was actually an issue for the child, the parent's clear discomfort with the choice of movie could, in turn, have negative impacts upon the child's peace of mind during the MRI. Thus, reflection is essential on issues beyond the child's immediate preferences; it is also essential to reflect on what puts supporting adults at ease as well.

In sum, the core issues reported within this theme amount to the final synthesis of interactions between the participating children, the physical apparatus of the MRI and their prior preparatory work in phases 1 and 2 with parents and radiographers.

Participation Development: Summary

The data thus described imply a local "ideal" grounded theory of the Participant Development process. This is schematised in Figure 1.

Figure 1: The Participation Development process



From this, nominally deviant matters emerging from the data at each stage might be better understood in proper context as individual matters emerging from complex social situations. These, along with the core model, are discussed below.

Discussion

Children's primary concerns around their MRI examinations emerged mainly as uncertainty/anxiety about aspects of the examination coming as a surprise on the day. These concerns related particularly to restricted space, noise and strong light in the MRI, the (probably unfamiliar) need to remain perfectly still and, crucially, the children's right to choose. They endeavoured to handle these concerns, in conjunction with parents and the clinicians, in a process herein termed Participation Development, i.e. the practical business of trying to become an active/rational agent in the medical process rather than simply its passive object.[13,21]

The above findings highlight how preparing children to handle prospectively difficult contexts requires carefully tailored, individually sensitive action by Significant Others.[22] At the very least, finding contextually positive distractions is contingent upon understanding what that child finds both positive and distracting. While family/guardians, carers and peers may well have time (and, indeed, responsibility) to develop such detailed knowledge, clinical professionals do not have either the time or essentially longitudinal circumstances. Indeed, interactions in medical imaging departments are more restricted than in other areas of healthcare,[20] occur in highly unfamiliar circumstances for most patients and are likely to be brief and singular.[23] Thus, the findings (particularly in stages 2 and 3 of the posited model) draw attention to how well clinicians themselves did actually read contexts and help patients against all likely (theoretical) odds. This demonstrates a high, often neglected level of social skills in modern medical professionals.[24-26]

It should be further noted that the paediatric patients rarely experienced their maiden MRI scan in the most negative ways reported in parallel adult-related research.[4] Even where the Participant Development process did not appear seamless, strong interpersonal support was still reported as instrumental at specific stages (particularly the last), and no participant experienced active "terror". Rather, passing stress, annoyance and boredom were more common negative reactions. In many respects, this observation reflects as significantly upon the interpersonal circumstances of adult patients around imaging procedures as it does upon children's. The minors in this study frequently reported (a) a range of carefully tailored strategies employed by trusted actors to prepare them for the intricacies of being scanned and (b) equally careful, personalised, empowering on-the-day management of their well-being. This order of support rarely seems to be given to their adult counterparts, whose corollary psychological outcomes are significantly less consistent and more likely to result in a sense of powerlessness.[3,4] This observation implies that adults are certainly no more *inherently* well-prepared to handle an unfamiliar medical imaging context than are children.

It is widely reported in healthcare psychology that while most adults (including many clinicians) traditionally consider children to natively require extensive preparation and care in most medical contexts[13], asking the same order of support for an adult is fraught with cultural implications regarding personal weakness/dependency or even time-wasting[27]. For example, masculinity issues are at stake, an inability to show strength when facing a potentially intimidating medical situation[28]. Thus, the very act of seeking interpersonal help for an outpatient diagnostic procedure such as an MRI might prove very challenging for many adult patients; the contexts for some might be considered disturbing and disempowering, as Törnqvist et al. describe.[4] However, the above findings indicate the broad success of a fluid, ongoing preparatory system within the participant group — borne of consistent interaction between the participants and involved Others — ultimately designed to combat anxiety and develop a strong sense of situational agency in those participants as they approach a first MRI.

Conclusion

This study aimed to illustrate how a child's practical investment in becoming a full, cooperative participant in an MRI is not simply an output of a series of discrete events or something that can be managed through one-size-fits-all reasoning but is, rather, an ongoing interactive process across three interlinked social contexts, involving active cooperation from a range of significant others.

In a local manner, the findings thus confirm some general concerns typical of the broad medical domain. The value of patients of all ages feeling as if they can directly participate in their own healthcare is now borderline axiomatic [29, 30]. More specifically, numerous studies over a long period have outlined the practical (as well as moral) facility of involving children in medical decisions, which affect them. It has been consistently and compellingly demonstrated that paediatric patients who feel empowered during a medical process often have better overall healthcare outcomes than those who consider themselves largely uninvolved, not least due to improved confidence and clarity in interaction with healthcare providers [13, 31, 32]. However, while the essential human right to *be* a participant in medical work is (and has been for some time) a fundamental one for children, the children are rarely informed of this right or regularly involved in meaningful discussions about their care.[13,33,34] In this study, where most of the children felt fully involved from the very beginning and a sense of autonomously appropriate identity was attained, an equally general sense of process mastery was then observed to build.[21]

The notion that all pre-procedure information and professional activity in MRIs can be perfectly tailored to a particular case (of both child and parents) is, of course, somewhat utopian, given time and resource restrictions in any modern healthcare system. However, what has been empirically illustrated for practitioners and researchers alike, at least, is that the child's journey towards being a non-anxious, fully cooperative part of the MRI process does not begin at the moment they enter a hospital nor as a consequence of their being treated at any point as a generic "child".

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