

TITLE PAGE

Full Title	Allied Health Professionals' views on important outcomes of children's elective lower limb orthopaedic surgery: a qualitative interview study to inform a core outcome set
Short Title	Key outcomes for children's lower limb surgery
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Data Availability Statement	Due to the nature of the interviews conducted for this study, transcripts are not available as supplementary data to maintain pseudo-anonymity of participants. All other available data including demographic details are included within the manuscript.

ICJME AUTHORSHIP STATEMENT

Ms Eileen Mairi Morrow – Provided a substantial contribution to the design, analysis and interpretation of the work, drafting the manuscript and approving the final version.

Professor Christopher Morris - Provided a substantial contribution to the design and interpretation of the work, revising the manuscript and approving the final version.

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ABSTRACT

Introduction

A common methodological limitation of research which guides surgical procedure selection for children's elective lower limb orthopaedic surgeries is inconsistent outcome selection. Improving outcome consistency can be achieved through the development of a core outcome set.

The aim of this study is to identify which outcomes are considered important for children's elective lower limb orthopaedic surgeries by allied health professionals (AHPs) and explore why they select these outcomes, to inform a core outcome set development project.

Methods

Online semi-structured interviews were conducted with relevant AHPs. Participants were selected using maximum variation purposive sampling; selection was based on profession and inpatient/outpatient role. The data set was analysed using an inductive and deductive approach to thematic analysis.

Results

Four physiotherapists, three orthotists, three prosthetists and two occupational therapists were interviewed. Most identified outcomes of importance related to 'activities and participation'.

From the data, we conceptualised that AHPs with effective multidisciplinary communication focused on child-centred outcomes, while clinicians with limited multidisciplinary teamworking focused on role-based outcomes.

Conclusion

There is concurrence between outcomes identified as important in this study, and other qualitative studies in similar populations. These important outcomes were seldom measured in previous studies or in routine clinical practice.

KEYWORDS

Paediatrics, children, orthopaedics, surgery, outcomes, interviews.

WORD COUNT

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1 | INTRODUCTION

Elective lower-limb orthopaedic surgery is considered for children who have congenital or developmental musculoskeletal conditions. Surgical interventions are undertaken to treat or prevent pain, deformity, or deterioration in motor function. In a study of the Hospital Admitted Patient Care Activity [1], it is estimated that over 70,000 children's elective lower-limb orthopaedic surgery were performed in England in the financial year 2018/2019, prior to COVID-19 disruption of services.

The range of conditions treated by children's elective lower limb orthopaedic surgeries is broad, incorporating surgeries for cerebral palsy, metabolic bone disease, and congenital deformities [2,3]. As each of these conditions can be the cause of long-term disability and impairment, the selection of surgical procedures by paediatric orthopaedic surgeons is critical. However, previous studies examining the evidence base for paediatric orthopaedic surgery have identified the evidence as very poor quality [4]. A persistent methodological problem with existing paediatric orthopaedic research is inconsistent or inappropriate outcome selection [4,5].

Outcome appropriateness and consistency can be improved through the development of a core outcome set (COS). A COS is a standardised collection of key outcomes which have been agreed as the most important for the patient group, through consensus process between patients, carers and professionals [6]. For children's elective lower limb orthopaedic surgeries, a COS would improve the relevance of the results of research to service users, as well as improving the consistency of outcome use to enable evaluation of evidence through systematic review and meta-analysis [6]. A COS would promote the use of validated outcome measurement tools, and reduce reporting bias by establishing essential outcomes for reporting. A COS with good uptake will significantly reduce three of the four areas of avoidable waste in the production of research proposed by Chalmers and Glasziou for future research in children's elective lower limb orthopaedic surgeries [7].

The research reported in this paper is an early component of a COS development process, seeking to identify outcomes which allied health professionals (AHPs) consider important for this patient group. This project was developed following a James Lind Alliance priority setting exercise in children's elective lower limb orthopaedic surgeries, ensuring the research is important and relevant to

stakeholders [8]. This study will also investigate why AHPs consider these outcomes important, in order to inform the discussions between stakeholders and finalise the COS in the late stages of development.

1.1 | Research Question

The research questions that this study seeks to answer are:

1. Which outcomes do AHPs consider to be important to evaluate for children having elective lower limb orthopaedic surgery?
2. Why do AHPs consider these outcomes important?

2 | METHODS

2.1 | Design

This qualitative interview study investigated the perspectives of AHPs on outcomes for children's elective lower limb orthopaedic surgeries. Semi-structured interviews were conducted with both inpatient and outpatient based AHPs to identify perspectives from both early and late stages of post-surgery rehabilitation. Clinicians from a range of professions were recruited to explore if different outcomes are important to separate professions. Semi-structured interviews were chosen as a method which allows the interviewer to maintain the focus of the interview on the pre-identified themes of the research in a consistent manner using the topic guide, while allowing for flexibility from probing questions as well as order and pace of theme discussion to permit inductive exploration into the participants account [9].

2.2 | Participants, Recruitment and Sampling

Eligible participants were (i) registered with the Health and Care Professions Council as physiotherapists, occupational therapists (OTs), prosthetists, orthotists, and podiatrists, and (ii) currently working with children, or adults who have had children's elective lower limb orthopaedic surgeries whilst under 18 years old.

Participants were selected using purposive sampling [10], selecting by profession and inpatient/outpatient role. Participants were approached through professional bodies: the British Association of Prosthetists and Orthotists, the Association of Paediatric Chartered Physiotherapists, and the Royal College of Podiatry. Adverts

were distributed to members via email by the professional bodies and shared on social media. Sharing the advert was encouraged to allow snowball recruitment and increase diversity of the sample.

OTs proved difficult to recruit to this study as their professional body declined to share the research advert despite initial interest. To recruit OTs, other avenues were pursued including snowball recruitment from participants and approaching members of further professional bodies including the Council of AHPs in Research.

2.3 | Data Collection

Interviews were conducted online using Microsoft Teams. Online interviews were selected to reduce the risk of transmitting COVID-19 and to enable interviewing a wide geographical spread of AHPs efficiently within the available time and resources. Given the widespread adoption of online appointments and meetings in the health sector during the COVID-19 pandemic, it was reasonably expected that AHPs would be familiar with the technology and comfortable to be interviewed online [11].

A topic guide was created (see table 1), informed by a critical literature review and relevant clinical experience, and piloted with three participants to allow refinement. The topic guide originally included the word 'outcome'; however, when participants were asked about 'outcomes', they often responded with outcome measures rather than outcome domains. Therefore, it was adjusted to replace 'outcomes' with 'goals' or 'aims' and the interviewer retained this language in probing questions [12]. As these were considered minor changes, the transcripts from the pilot interviews were included in the dataset.

All interviews were conducted by the lead author (EM). Prior to the beginning of the recording, a short discussion was had with the participants. This included a general discussion of the study, informing the participants of the interviewer's professional background and role, as well as building rapport to develop trust and encourage openness in responses [13]. The interviewer kept field notes which were made both during and after each interview, which included interview context, researcher reflection and consideration of bias [14]. This allowed the interviewer to maintain and review the richer context of the interview when analysing the transcript.

Throughout data collection, recruitment and iterative data analysis were continually checked (EM) to ensure further participants were selected for maximum variation. Data saturation as a marker of sampling adequacy in qualitative research is a contentious concept [15], and there is much debate that argues that data saturation does not itself confer rigour [16]. Therefore, considering the limited timeline of the project, recruitment was ceased when the project team considered the data to be sufficiently and pragmatically varied by profession and area of work (inpatient/outpatient) to allow exploration of the research question [17].

2.4 | Data Analysis

The interviews were recorded by video, as audio recording only is not possible via Microsoft Teams, then converted to an audio file immediately following the interview. The audio file was then transcribed verbatim within two days of recording (EM) [10]. Transcriptions were stored as pseudonymised documents. NVivo software was used to manage the transcripts and facilitate analysis. An iterative approach to data analysis was used, meaning analysis was conducted throughout data gathering, to allow probing questions to be built on the sense making of previous interviews [9,18].

Reflexive thematic analysis, as described by Braun and Clark [19], was used to analyse the data set. A deductive approach [20] to test existing theory was taken to answer question one: which outcomes do AHPs consider to be important to evaluate for children's elective lower limb orthopaedic surgeries? Each outcome proposed by a participant was coded within the transcript and linked to the relevant text within NVivo software by one coder (EM). From this, a list of outcomes was produced and compared to the domains of the World Health Organisation's International Classification of Functioning, Disability and Health (ICF) [21] informally without ICF linking rules by two researchers (EM,JF) to the first level of ICF codes only. The codes which did not match a domain of the ICF were further examined and progressively refined to develop themes supplementary to the ICF by two researchers (EM,JF).

An inductive approach, to build on existing knowledge of the ICF application [21], was used to answer question two: why do AHPs consider these outcomes important? One researcher coded the data set (EM), using reflexive coding categories, linked to relevant excerpts of the transcriptions using NVivo software.

Two researchers (EM, JF) then discussed the coding scope and relevance to the research question, developing and progressively refining themes through continued familiarisation with the data set and collaborative discussion [19]. Summary sheets of each interview were then created to allow easy comparison of themes as discussed by each participant to analyse which aspects, if any, of the participants background influenced their views. Once multi-disciplinary team communication was conceptualised as important to outcome selection through iterative analysis, the participants' relationship with the paediatric orthopaedic multi-disciplinary team was added to the summary sheets.

2.5 | Ethics Approval

Ethics approval for the study was conferred by the University of Exeter College of Medicine and Health Ethics Committee (reference UEMS REC 489173). Participants consented online using Microsoft Forms, with submission of the form indicating consent.

3 | RESULTS

A total of 12 AHPs were interviewed, the demographic details are included in table 2. A total of 35 AHPs were approached for interview; the primary reason given for declining was increased workload while recovering from the clinical impact of COVID-19. Four physiotherapists, three orthotists, three prosthetists and two OTs were interviewed. Most participants were outpatient clinicians; one inpatient physiotherapist and OT were interviewed. Orthotists noted that while they were predominantly outpatient clinicians, they also worked with inpatients at least once a week. Clinicians worked with children as varying proportions of their role; five worked exclusively in paediatrics, while one prosthetist worked with adults only. The interviews lasted between 20-40 minutes. All names included in this report are pseudonyms.

Two podiatrists who saw the original research advert responded to say that they did not associate themselves as being involved with 'lower limb' surgery as their focus was the foot. To address this, an ethics amendment was granted for podiatrist-

specific adverts. Unfortunately, due to timeline constraints, no podiatrists were recruited to this study.

3.1 | Which outcomes do AHPs consider to be important to evaluate for children receiving elective lower limb orthopaedic surgery?

Table 3 reports the outcome domains which were identified as matching a domain of the ICF framework.²¹ Thirty-five outcome domains were identified and mapped to the ICF, representing each of the four categories of the ICF, with most outcomes being within the 'activities and participation' category. All AHP groups identified at least one outcome from each category as important.

Within the ICF category 'body structures', structures related to movement was identified. Within 'body functions', the domains identified include muscle functions, sleep functions, movement functions, specific mental functions and pain. Within 'activities and participation', the domains included changing and maintaining body position, walking and moving, moving around using transportation, self-care, acquisition of necessities, education and community social and civic life. Finally, within 'environmental factors', both support and relationships and attitudes were identified.

There were four supplementary outcomes conceptualised which did not map to the ICF framework. Two of these, 'comfort of wearable medical devices' and 'clothing choice' were largely associated with changes in prosthetic and orthotic prescription. For example, Gabby describes the results of a surgery to remove the foot of a patient with a congenital femoral deficiency:

“They have a much more cosmetic limb, there’s nothing sticking out at knee level. They can actually fit their limb into a set of trousers. They don't have to wear a skirt all the time.” – Gabby, prosthetist

Dana, and outpatient physiotherapist, described the supplementary outcome of reducing the 'requirement for further interventions':

“I guess that you wouldn't want them to come back in for anything. We would all want for them to have one surgery then need not need so much else. Less physio, less orthotics, and definitely no more surgery if that was possible.” – Dana, physiotherapist

'Gaining independence' was a further supplementary outcome which was identified by each allied health profession as important:

"It's important that the child's abilities in terms of like things like self-care and independence pre-surgery, to then what they can do post-surgery in terms of like a lot of independent skills really, go up so that they have the chance to do what they want when they're older." – Anna, OT

3.2 | Why do AHPs consider these outcomes important?

There was a difference in outcome selection by participants who perceived they had effective communication with the paediatric orthopaedic multi-disciplinary team, including paediatric orthopaedic surgeons, and participants who described communication difficulties. Participants with effective communication reported outcomes as being 'child-centred' and collaboratively identified, while participants with limited communication focused on outcomes which they identified as being part of their role.

3.2.1 | Collaboration and Child Focused Outcomes

Clinicians who perceived having effective communication with the wider multi-disciplinary team did not identify outcomes as important themselves, but instead agreed upon individualised outcomes collaboratively with the multi-disciplinary team and children and their parents or carers:

"That's not really something I would decide for anyone. You know it's about sort of the best interest of that child and so, goals are about shared decision making really isn't it, in the end." – John, physiotherapist

Mike, an orthotist with close links to his local paediatric orthopaedic multi-disciplinary team, agreed that important outcomes are individualised, and that the children should be at the centre of the outcome identification:

"I think taking patient's own ambitions for their own hobbies and... lifestyle into account, is so valuable for seeing what's important. We all do that." – Mike, orthotist

Clinicians worked within multi-disciplinary clinics, noted these as valuable environments for shared decision making:

“We've got a really nice MDT [multi-disciplinary team] orthopaedic clinic that runs in one of our special schools where they have the kind of MDT there: physios, OTs, orthotists, rehab engineering, surgeon and parent and child and they tend to look and kind of make decisions together... And I think that's a really nice model.” – Elaine, physiotherapist

Jane, an inpatient OT who worked with the multi-disciplinary team in huddles, ward rounds and weekly preoperative assessment clinics, described that while day to day goals may differ, when the team was working well together the overall outcome is individualised and child centred:

“The surgeons make sure everything is good, the medical team make sure they're not acutely unwell, the physios will get them moving initially, and we are there to step-in as that next stage to make sure that all these factors result in them being able to go home safely. So I would say my day-to-day goals are different to that of the rest of the team, yeah, but the team works well together for that child and their personal needs and overall goals.” – Jane, OT

3.2.2 | Isolated Roles

In contrast, participants who reported poor communication with the wider multi-disciplinary team did not identify important outcomes as being primarily child-centred, but instead centred around their professional role. Anna, an outpatient OT who had limited communication with the inpatient multi-disciplinary team who work in a different hospital, identified outcomes which were specific to her role as an OT as important:

“But that's not really what we focus on as OTs. OTs look at whether the child can do what they need to do, whether they can complete things like getting out the car and using a standing frame, we're not so worried about whether a knee is straight or not” – Anna, OT

This isolated role focused outcome selection was also evidenced in the clinicians' language, with participants stating 'as an orthotist' or 'from a physiotherapist perspective' while discussing role-based outcomes of importance:

“From an orthotics point of view, it's important if somebody's gained that range and they are more comfortable, and say their splints are more

comfortable and their insoles too, and it enables them to be more pain free...”

– Amy, orthotist

Role-based outcome identification was further observed in clinicians’ interpretation of ‘function’ as an important outcome. Although all participants identified ‘function’ as an important outcome for children’s elective lower limb orthopaedic surgeries, when describing how they interpreted ‘function’, participants with poor perceived multi-disciplinary team integration identified ‘function’ as an outcome which only their profession contributed to:

“Functionality is about being able to provide them with a limb that they can actually function with, you know. Whether it's as a high-end sports athlete or whether it's just a person that's able to walk.” – Suzanne, prosthetist

In contrast, professionals with good multi-disciplinary team communication had an appreciation for the wider team contribution to ‘function’ as an outcome:

“Within function some might want the independence, that might be important, OT’s tend to work on independent tasks and stuff. Some people their standing might be important, which would be something I can help with usually. Some people might [want] to be less reliant on splints, which other departments might take over.” – Mike, orthotist

3.2.3 | Communication Impacting Professionalism

AHPs with a limited communication pathway with the multi-disciplinary team reported frustration around how this impacted their professionalism. Gabby, a prosthetist who felt the surgeons she worked with did not prioritise multi-disciplinary team relationships, was embarrassed by working with limited communication:

“So, the biggest problem that I tend to have when patients go for surgery is a lack of communication from orthopaedics themselves. We very rarely get a letter from them to tell us what's happening, and we don't often hear what the surgery actually is. You're usually relying on the parents for a description of what they've had done to kind of figure out what's happening... it's embarrassing” – Gabby, prosthetist

Similarly, Amy, an orthotist who works in a separate hospital to other members of the multi-disciplinary team, was frustrated at not knowing what outcomes the team had identified, and considered this damaging to her relationships with parents:

“The parents expect us to know as well. They expect us to have every single piece of history on this child or young adult, and to know everything that has happened and know exactly what surgery has been done, and how they were supposed to get better, and we don't get that information. It's hard to know what to say to them.” – Amy, orthotist

Amy went on to describe that the lack of reciprocal communication between the multi-disciplinary team was in some cases a cause of parent and carer dissatisfaction with final outcomes post-surgery:

“The family are like ‘oh we weren't told they'd still need orthotics after the surgery’, but we could have told them they definitely would. That was always going to happen.” – Amy, orthotist

3.2.4 | Outcome Measurement Guilt

Clinicians rarely measure the outcomes that they identify as important for children's elective lower limb orthopaedic surgeries. If they did report measuring outcomes, most opted to measure those which were considered routine as part of an assessment:

“I think we'd mainly use our physio assessment. So that would include things like range of movement, strength, muscle power and sorry, muscle strength, uhm... And then as I said, the functional kind of assessment, so things like walking, running, jumping, hopping, standing on one leg, balance stuff. So, it's all kind of within our assessment rather than being a specific outcome.” – Gina, physiotherapist

This also incorporated physiotherapists who worked in a gait laboratory, who described collecting outcome measurements as routine to their role.

Most clinicians expressed guilt around not measuring important outcomes, or not measuring outcomes at all, as they understood outcome measurement to be either important or mandated by their profession:

“We have sort of talked about trying to do it [taking outcome measures], but we don't really have a long enough, like area where we could do it uninterrupted... I know we should, and I feel a bit guilty because I know it's important, but I don't know how we would.” – Laura, orthotist

The barriers to taking measurements of important outcomes largely differed by profession. Orthotists reported insufficient time and space, OTs noted limited familiarity of available or appropriate outcome measures, and prosthetists noted difficulties with taking outcome measures with children:

“Because it's not something we do as OTs currently. It would need, I think, a lot of research. Just think what's out there because it would be starting from scratch. It's not a ‘oh we've heard of this, let's try it’. It's a ‘what on earth could we use, and what's good, and what could work?’” – Jane, OT

Physiotherapists had most dissensus within profession on perceived barriers, reporting either no problems, a lack of time, or that paediatric orthopaedics made up too small a proportion of their case load to use a dedicated outcome measure.

Both inpatient clinicians discussed guilt, but agreed that measuring outcomes would not be appropriate in their role, as outcomes they identified as important would not be expected to improve during an inpatient stay:

“After the surgery when we're seeing them, they're never a better stage. They always step back and then the better stages come once they're off the precautions and then life goes back to normal and they start their rehab properly. So, it I feel like an outcome measure is always gonna not look great because they're always going backwards.” – Anna, OT

4 | DISCUSSION

4.1 | Summary of Main Findings

We have identified that clinicians consider a range of outcomes important for children's elective lower limb orthopaedic surgeries as detailed in table 3, with all categories and several domains of the ICF framework being addressed by each profession. A further four outcome domains supplementary to the ICF were

conceptualised, including comfort of wearable medical devices, clothing choice, requirement for further intervention and gaining independence.

While communication was not the focus of the research question, we argue that this underpins AHP identification of important outcomes. AHPs who perceive that they work within a well-integrated multi-disciplinary team with effective communication work collaboratively to identify outcomes individualised to the child. In the absence of appropriate communication, AHPs work in siloed roles, focusing on outcomes they perceive as being their professional role. Perceived poor communication impacts on the clinicians' perception of their professionalism and contribution to surgical outcome decisions.

4.2 | Comparison with Existing Literature

COS generally include a more specific population than this proposed COS for children's elective lower limb orthopaedic surgeries. Traditionally COS have been developed for a single condition; for example, COS are currently in development for acute appendicitis [22] and childhood epilepsy [23]. A broader COS was considered appropriate for this patient group however due to the large proportion of rare diagnoses treated by paediatric orthopaedics [24,25], and the homogeneity in symptoms including pain and impaired walking function. A broad COS does not preclude the use of disease specific outcome measurements in individual trials but aims to improve the comparability and relevance of key outcomes across the evidence base [26]. Previous broad COS have been developed in similar areas, including for children's fractures [27] and paediatric critical care [28], which have achieved a good consensus between stakeholders.

The results of this study support the continued development of a broad COS for children's elective lower limb orthopaedic surgeries. There is a high agreement on outcomes within the data set, with several domains described as important by each allied health profession. Furthermore, the number of outcomes identified at this interview stage (n=37) was comparable to COS previously developed for sub-populations for children's elective lower limb orthopaedic surgeries; Almoajil et al identified 31 outcomes during qualitative interviews with healthcare professionals while developing a COS for children and young people with ambulant cerebral palsy [29], and Leo et al identified 38 outcomes prior to the consensus process to develop

a COS for Perthes disease [30]. Almoajil et al also identified most outcomes within the 'activity and participation' area of the ICF, and also conceptualised 'independence' as a supplementary outcome [29]. Furthermore, international qualitative work undertaken with parents and children in the recent development of a patient-reported outcome measure for children with lower limb deformities (LIMB-Q Kids) identified similar outcomes of importance, including appearance, physical function, and clothing [31]. This inter-profession and inter-study agreement of important outcomes supports the concept and potential value of a broad COS for children's elective lower limb orthopaedic surgeries.

The outcomes which were identified as important by the AHPs in this study are not routinely measured in research studies which form the evidence base for children's elective lower limb orthopaedic surgeries. In a recent summary of new evidence for paediatric orthopaedics, Lindsay and Oussama described the key articles published in 2019 and 2020.[32] Of the studies relevant to elective surgeries for the lower limb, almost all exclusively measured changes in pain, gait pathology and joint range of motion. Complex outcomes, which are important to all AHPs, e.g. walking in different locations and acceptance from peers, were not included [31]. This was also evidenced in a recent Cochrane review of interventions in children with clubfoot. From the important outcomes identified in table 3, data was only available to evidence the effect of surgery on three outcomes (pain, range of motion, changed foot posture) [33]. There is clear indication that the evidence base is insufficient to inform surgical decisions on most outcomes important for children's elective lower limb orthopaedic surgeries, and routine measurement of important outcomes is urgently required.

There are available patient-reported outcome measurement tools relevant to children's elective lower limb orthopaedic surgeries which address this need. As an example, the Oxford Ankle Foot Questionnaire for Children (OxAFQ-C) is an outcome measurement tool which measures several important outcomes often neglected in paediatric orthopaedic studies, including engagement with school, bullying, clothing choice, and participation in play [34], which were identified as important to children with foot and ankle symptoms in the qualitative work to develop the tool. Additionally, the qualitative work undertaken to develop LIMB-Q Kids, identified broader domains than traditionally measured in children's lower limb

orthopaedic surgery research, including appearance, school function, social function, and psychological function [35]. The use of patient-reported outcome measurement tools validated for children, such as the OxAFQ-C and Limb-Q Kids, should be considered in children's elective lower limb orthopaedic surgeries studies to increase the relevance and value of results. The qualitative work undertaken to develop the OxAFQ-C identified similar outcomes as important to children, as AHPs as important identified in this study [34]. This indicates the potential for agreement between stakeholders, necessary for developing a broad COS for children's elective lower limb orthopaedic surgeries.

Although 'gaining independence' has also been conceptualised as an important supplementary outcome by Almoajil et al's development of a COS for children and young people with ambulant cerebral palsy [29], and Allard et al's study into outcomes for children with neurodisabilities [36], it poses a larger question of the ability of surgery to provide 'independence'. According to the medical model, 'independence' can be facilitated by surgery, providing physical independence and enabling self-reliance [37]. However, in the biopsychosocial model, 'independence' can be defined as the children's ability to make decisions about their own lives without societal barriers [38], and that a barrier to independence is not a fault of the individual, but a fault of societal controls such as stairs in place of wheelchair accessible ramps [37-38]. 'Gaining independence' as an outcome of children's surgery directly contrasts the biopsychosocial model, as the barriers to independence are removed from the child rather than society. It is therefore controversial to consider independence as a justification for surgery, putting the child at risk due to barriers introduced to their lives through societal choices [39].

Collaborative multidisciplinary working has been shown to improve information sharing in healthcare settings for other complex patient groups [40] and improve patient care outcomes [41-42]. However, this study provides new knowledge about the mechanism of outcome improvement, as multi-disciplinary communication facilitates AHP focus on patient-centred outcomes. As the English National Institute for Health and Care Excellence (NICE) noted in a recent evidence review [43], there is limited research on multi-disciplinary meetings and communication, as the focus of the evidence base is multidisciplinary care [40]. This study shows the apparent influence of the communication within the multi-disciplinary team on the outcome

focus for the patient; further research is now required to investigate the facilitators and settings of this communication to inform service provision. Additionally, this finding can be used facilitate stakeholder meetings seeking consensus, to inform the discussion of differing reasons for outcome selection focus between stakeholders [6,26].

Although AHPs have identified outcomes important for children's elective lower limb orthopaedic surgeries, and report working clinically to improve these, they rarely measure changes in these outcomes in their own practice. As the barriers to measuring outcomes were diverse and profession-specific, improving clinical outcome measurement may require an individualised approach, perhaps addressed by professional bodies. This could be supported through a broad COS, which would be more easily applied by AHPs as it would incorporate a larger proportion of their case load. This finding also reinforces the importance of identifying pragmatic tools to measure the outcomes included within the final COS to reduce barriers to implementation and facilitate use in quality improvement projects, audit and routine clinical use [6,43].

4.3 | Strengths and Limitations

A strength of this study was the identification of why outcomes are selected, as minimal previous research has been done in this area previously, and this is rarely investigated as part of COS development. Identification of why AHPs focus on outcomes increases the understanding of differences between paediatric orthopaedic services and supports service change to promote multi-disciplinary team communication.

A methodological strength is the diversity of AHPs included in the data set, with a spread of both criteria for maximum variation (profession and inpatient/outpatient role) represented in the participant demographic data. A caveat is that no podiatrists were recruited, and who may hold different perspectives. Podiatrists should be included in the COS development process to ensure the final COS is relevant to all stakeholders. A further limitation is that all professionals were recruited through professional bodies and snowballing, meaning that the perspective of more isolated or less professionally engaged AHPs may have been missed. However, the range of included clinicians has permitted an insight into diversity of views and

communication pathways, to be expanded further through a COS development project.

A further limitation of this study is the inclusion of AHPs only. To conclusively identify important outcomes for children's elective lower limb orthopaedic surgery, the views of patients, parents, carers and doctors should be considered. While this study informs a gap in the existing research, further qualitative research including key stakeholders will be necessary to inform the incremental development of a COS.

5 | CONCLUSION

We have identified the outcomes which are important to AHPs for children undergoing elective lower limb orthopaedic surgery. These were mapped to the World Health Organisation's ICF and four outcomes supplementary to the ICF were conceptualised, a key stage in the development of a COS for this patient group. The outcomes identified are close in number and domain to similar qualitative studies. These important outcomes are seldom researched or measured in routine clinical practice, further emphasising the requirement for a COS relevant to this patient group.

We also identified that multi-disciplinary communication is integral to the AHPs' outcome focus; AHPs who perceive that they communicate effectively with the wider multi-disciplinary team collaboratively identify child-centred outcomes, while AHPs who perceive limited communication identify outcomes associated with their profession. While it is well established that collaborative working improves health outcomes, we argue that this finding presents new knowledge on the mechanism of this improvement. We also call for further work to address the barriers faced by AHPs in measuring important outcomes in their clinics; as barriers are profession-specific, they would be appropriately addressed by the relevant professional bodies.

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7 | DECLARATION OF INTEREST STATEMENT

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The authors report there are no further competing interests to declare.

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Table 1: Topic guide

Topic	Sub-Topic	Prompt Questions
Demographic details	Profession	What is your profession?
	Interaction with patient group	What is your experience with this patient group? What proportion do you work in paediatrics? How quickly do you see children post-surgery? How well do you know the surgical team?
Important surgical outcomes	Important outcomes	What are the most important things for surgery to improve in this patient group? Would all professionals agree with these aims for improvement? What about the children or carers?
	Satisfaction with surgery	What would make you satisfied or dissatisfied with surgery results for these patients? Have you ever treated a patient who had very poor results from surgery? What about the surgery was poor? Do you feel able to improve surgery results for your patients?
Identifying important outcomes	Goals for surgical outcomes	What are your goals for children when they undergo children's elective lower limb orthopaedic surgeries? What helps you select or decide these goals? What input do the children have? What input do the family/carers have?
	Changing priorities	Do the results of surgery impact children differently over time? For example, at different ages? Once the child is skeletally mature? When the child starts working, or living independently?
Outcome measures	Opinion of outcome measures	What is your opinion on outcome measures which are commonly used for this patient group? Do you take outcome measures in your own practice? Why did you select those outcome measures?
	Further outcome measures	Are there any outcome measures which you believe should be used more or adopted for this patient group?
Conclusion	Conclusion	Is there anything else you would like to discuss?

Table 2: Demographic details of participants

Participant Pseudonym	Gender	Profession	Paediatrics as % of Role	Outpatient / Inpatient Role
Laura	F	Orthotist	30%	Both
Mike	M	Orthotist	25%	Both
Gabby	F	Prosthetist	15%	Outpatient
Amy	F	Orthotist	30%	Both
Elaine	F	Physiotherapist	100%	Inpatient
Suzanne	F	Prosthetist	60%	Outpatient
John	M	Physiotherapist	90%	Outpatient
Gina	F	Physiotherapist	100%	Outpatient
Rachel	F	Prosthetist	0%	Outpatient
Dana	F	Physiotherapist	100%	Outpatient
Jane	F	Occupational Therapist	100%	Outpatient
Anna	F	Occupational Therapist	100%	Inpatient

Table 3: Outcomes highlighted by participants²⁰

ICF Category	ICF Domain	Example Areas
Body functions	Muscle functions	Muscle tone (OR) Muscle endurance (OR)
	Sleep functions	Amount of sleep (OR, OT) Maintenance of sleep (OR, OT)
	Movement functions	Double support time (OR, PH) Lateral trunk lean (PR, PH) Cadence (PH) Walking balance (OR, PR, PH) Stride length (PH)
	Specific mental functions	Happiness (OR, OT) Body image (PR)
	Pain	General or local discomfort (ALL)
Activities and participation	Changing and maintaining body position	Transfers (OR, OT, PH) Standing (OT)
	Walking and moving	Walking pace (OR, PR, PH) Duration of walking (OR, PR, PH) Moving around in different locations (ALL) Going up and down stairs (PH)
	Moving around using transportation	Using public transportation (PR)
	Self-care	Washing (OT) Dressing (OR, OT) Toileting (OT) Looking after one's health (OT)
	Acquisition of necessities	Acquiring shopping (OT, PH)

	Education	Engagement with school (OR) Time spent at school (OR, OT)
	Community, social and civic life	Participation in play (OR, PH) Participation in sport (OR, PR, PH) Crafts (OT) Engaging with social clubs (OT)
Environmental factors	Support and relationships	Carer requirement (OR, OT, PH)
	Attitudes	Bullying (OR, PR) Acceptance from peers (ALL)
Body structures	Structures related to movement	Changed foot posture (OR, PH) Range of motion (ALL)
Additionally conceptualised domains	Explanatory participant quote	
Clothing choice	“They have a much more cosmetic limb, there’s nothing sticking out at knee level. They can actually fit their limb into a set of trousers. They don't have to wear a skirt all the time.” – Gabby, prosthetist	
Comfort of wearable medical devices	“Once the surgery is done, we would hope that the orthosis, the AFO [ankle foot orthosis] or the insole, would be more comfortable, and less likely to rub.” – Mike, Orthotist	
Gaining independence	“It’s important that the child's abilities in terms of like things like self-care and independence pre-surgery, to then what they can do post-surgery in terms of like a lot of independent skills really, go up so that they have the chance to do what they want when they’re older.” – Anna, OT	

Requirement for future intervention	“I guess that you wouldn’t want them to come back in for anything. We would all want for them to have one surgery then need not need so much else. Less physio, less orthotics, and definitely no more surgery if that was possible.” – Dana, physiotherapist
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Key:

OR – Addressed by at least one orthotist.

PR – Addressed by at least one prosthetist.

PH – Addressed by at least one physiotherapist.

OT – Addressed by at least one OT.

ALL – Addressed by all four professions.