



Enhancing pediatric MRI research protocols: Utilizing developmentally appropriate principles and incorporating certified child life specialists

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ABSTRACT

Children participating in MRI research often encounter emotionally and physically demanding protocols, yet research environments often do not incorporate the same emotional safeguards commonly found in clinical settings. In the past quarter-century, functional magnetic resonance imaging (fMRI) emerged as a foundational tool for examining brain structure and function across the lifespan. Working with a Certified Child Life Specialist (CCLS) and adopting the child life principles of assessment, preparation, education, rapport building, play, family-centered care, environmental planning, and community engagement into research protocols can significantly enhance pediatric research protocols and study outcomes. Practical guidance is offered for implementing emotionally safe practices across various phases of research, from recruitment to post-visit debriefing for each developmental age group.

1. Introduction

The concept of *emotional safety*, defined by the Association of Child Life Professionals (ACLP) as “an intentional, interdisciplinary practice to promote resiliency, healing, and trust for pediatric patients and their families during medical experiences” (Gordon, 2024, p. 7), has long been central to pediatric healthcare. However, its application to pediatric research has lagged behind, despite growing recognition that many research procedures, such as magnetic resonance imaging (MRI), closely resemble medical interventions in both form and impact. Children participating in MRI research often encounter emotionally and physically demanding protocols, yet research environments often do not incorporate the same emotional safeguards commonly found in clinical settings.

This gap is particularly relevant for the field of developmental cognitive neuroscience. In the past quarter century, functional magnetic resonance imaging (fMRI) emerged as a foundational tool for examining brain structure and function across the lifespan (e.g. (Luna et al., 2010; Sripada et al., 2020; Uddin et al., 2024) Large-scale, publicly available datasets, such as the Adolescent Brain and Cognitive Development

(ABCD) Study, coupled with rapid progression in data analytics, have further expanded the accessibility and impact of neuroimaging, resulting in breakthrough discoveries related to typical and atypical development (e.g., Bacon et al., 2024; Casey et al., 2018; Dick et al., 2021; Poldrack et al., 2017; Karcher and Barch, 2021; Kievit et al., 2022; Volkow et al., 2018). Many points of this paper are relevant to all MRI based studies, but the focus of this paper surrounds the use of fMRI scans.

As with any research tool, however, the benefits of fMRI come with costs. Technical challenges associated with imaging have been well-documented, most notably issues related to head movement and physiological noise (e.g., Birn, 2012; Satterthwaite et al., 2019). Logistical and financial constraints also exist, such as the availability and high cost of MRI systems and the need for specialized personnel to operate systems. Moreover, participation in MRI research can place significant physical and emotional demands on participants, including the need to remain motionless in a loud, enclosed space for extended periods. These demands can be particularly burdensome for some populations, including children, contributing to higher attrition rates and poor data quality and study outcomes (Seyffert and Castellanos, 2005; Telzer et al.,

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2018).

To address issues such as motion, researchers have developed multiple solutions embedded in sophisticated preprocessing protocols. However, fewer formalized strategies exist to reduce emotional distress, promote procedural cooperation, or accommodate individual differences in children's developmental and psychosocial needs. Clinical and research environments have responded to these challenges by adopting a variety of child-friendly tools and protocols. For example, clinical settings have incorporated and explored the use of child life services, at home learning materials, and mock scanner sessions (De Bie et al., 2010, Fletcher et al., 2023, Rudder et al., 2019, & Tyson et al., 2014). These strategies have been shown to improve procedural success, reduce anxiety, and lower the need for sedation in clinical pediatric imaging contexts (e.g., Barnea-Goraly et al., 2014; Batuman et al., 2015; Khan et al., 2007). More specifically, the inclusion of a child life evaluation before the use of general anesthesia for an MRI significantly reduced the use of general anesthesia, particularly for children aged 5–10 (Durand et al., 2015). Research settings have also incorporated similar tools to improve participant experiences and data collection (Byars et al., 2002 and Theys et al., 2014). In this article, we argue that adopting developmentally appropriate and emotionally supportive practices, particularly those grounded in child life principles, can significantly enhance pediatric research protocols and study outcomes. We begin by outlining the training and role of Certified Child Life Specialists (CCLSs) and describing how their integration into research teams can improve participant experience and data quality. We then offer practical guidance for implementing emotionally safe practices across various phases of research, from recruitment to post-visit debriefing. Our goal is to provide a roadmap for ethically sound and emotionally attuned research with children that enhances both scientific and human outcomes.

2. The role of a certified child life specialist

CCLSs are trained professionals who support children and their families in coping with stressful or unfamiliar experiences, particularly in healthcare settings (American Academy of Pediatrics, 2021). Their work is grounded in principles of child development, psychosocial assessment, and trauma-informed care. The Association of Child Life Professionals (2025) explains, “They (CCLSs) provide preparation, education, distraction, play, and coping tools, among many other benefits, to children and their families.” Through developmentally appropriate education, psychological preparation, and a family-centered lens, CCLSs help reduce fear and anxiety in children, enabling greater tolerance for challenging procedures in both clinical and research settings (Daniels and Brasher, 2023).

Traditionally, many CCLSs have worked in pediatric hospital environments. However, their professional scope has expanded to include a broader range of community-based contexts, including palliative and hospice care facilities, schools, prisons, pediatric research, child advocacy centers, disaster relief programs, and adoption agencies (Lowry et al., 2022). The impact of child life services has been demonstrated across procedures, settings, and age groups with diverse neurodevelopmental profiles. For example, Wright et al. (2023) found that the inclusion of a CCLS during clinical trials involving children ages 5–11 that included nasal swabs, blood draws, and injections led to a lower-than-expected dropout rate (3.5 % vs. projected 10 %). In another example, Fraatz and Durand (2021) described how CCLSs worked within a multidisciplinary team to support children with Autism Spectrum Disorder (ASD). CCLS involvement enhanced care through family partnership, individualized planning, advocacy for psychosocial support, and consistent communication across providers (Fraatz and Durand, 2021).

2.1. Child life certification process

In addition to completing specific academic coursework, candidates

for child life certification must undergo a 600-hour clinical internship under the direct supervision of a CCLS (Association of Child Life Professionals, 2022). Most internship sites also require applicants to demonstrate several hundred hours of experience working with children across a variety of developmental stages and settings before they are eligible to apply. This rigorous training pipeline means that CCLSs bring substantial, hands-on experience with children and families in clinical contexts. As a result, they offer a level of expertise that early-stage research assistants and graduate students, who often directly interact with participants during MRI sessions, may not yet possess.

Beyond their clinical training, child life specialists are uniquely skilled in the assessment and individualization of psychosocial interventions—a vital component when working with children and families under stress. These assessment skills can be applied in real-time during study visits or proactively in preparation for future sessions (Daniels and Brasher, 2023). Moreover, CCLSs operate within a collaborative, team-based model and emphasize the importance of staff education to create a consistent and supportive experience across research personnel. They can offer ongoing support through staff training sessions, consultations, and by providing materials that enable teams to communicate and interact with families in developmentally informed ways (Daniels and Brasher, 2023).

3. Current settings utilizing CCLSs

Although CCLSs have traditionally been employed in hospital settings, their skills are beginning to be integrated into research contexts where children and families may need additional support to navigate unfamiliar procedures. Pediatric neuroimaging studies represent an especially appropriate setting for CCLSs, given the emotional and sensory challenges such procedures often present. Below, we highlight two research institutions that have successfully embedded child life professionals into their study teams.

At the Georgia Center for Developmental Science (G-CDS) at the University of Georgia, a CCLS supports an NIH-funded longitudinal study examining risk and resilience among rural children ages 6.5–9. The study involves home visits, MRI scanning, and caregiver surveys aimed at identifying protective and risk factors in early development. The CCLS collaborates with principal investigators, students, and staff to co-design family-centered protocols, reduce participant stress, and prepare the research team to interact effectively with young children across all study phases. Through developmentally appropriate play opportunities such as virtual reality (VR) and an MRI Lego set, families are met with an approachable protocol and well-trained staff.

Similarly, the Masonic Institute for the Developing Brain (MIDB) at the University of Minnesota, partners with M Health Fairview Masonic Children's Hospital to embed child life expertise throughout pediatric research processes. At MIDB, active research protocols include MRI scanning, EEG, neuromodulation, blood draws, and neurodevelopmental evaluations across various pediatric clinical populations. The CCLS works closely with principal investigators and staff to assess developmental needs, design child-friendly spaces and preparatory materials, and create psychosocial screening tools to identify CCLS direct involvement. When participants are referred, the CCLS provides direct support to children and families, tailoring interventions to reduce distress and promote successful completion of study procedures.

4. Research with vulnerable populations

CCLSs contribute meaningfully at every phase of pediatric research, from study design to data collection, by ensuring that protocols are developmentally appropriate and emotionally responsive. Pediatric studies often require assent procedures that support understanding, strategies for minimizing distress, and careful family engagement. These needs are amplified when working with vulnerable populations, where maintaining emotional safety is essential for ethical conduct, data

Table 1

Guide for improving research procedures based on principles of family-centered care and developmentally appropriate practices. In each element an * denotes a recommendation to be completed by individuals with expertise and clinical skills related to child development and/or education. The “how” section represents possible options for implementing the outline standard based upon the child’s assessed developmental stage not chronological age. This is not an exhaustive list of resources.

Standard	Why	When	How (assessed developmental stage)
<i>Assessment*</i>	Allows researchers to tailor discussion and tools to the individual child. “Establishing a trusting relationship with the patient, the foundation of child life work, begins with initial information gathering and assessment”. Continued assessment will improve the success of the patient-family-researcher relationship. (Thompson, 2018)	Prior to the family coming to the facility, if possible, or in the first few minutes of meeting the family, continuously throughout the visits as new tasks are introduced.	Infant/ Toddler Fill out an assessment form in conversation with caregivers so that members of the MRI team are prepared to meet the individual needs of the child and caregivers. Any potential challenges or stressors can be noted. The visit lead meets the family in the parking area, the walk into the building is where an initial assessment can be made regarding general anxiety level and rapport building begins. Preschool- School Age Fill out an assessment form in conversation with the child and caregivers so that members of the MRI team are prepared to meet the individual needs of the child and caregivers. Any potential challenges or stressors can be noted. Create an An All About Me sheet to learn more about kids likes/dislikes and interests. Providing a safe and fun space for a child to share what is important to them builds trust and rapport and shares important information with the research staff. Teens Fill out an assessment form in conversation directed towards the teen with caregivers providing additional information as needed so that members of the MRI team are prepared to meet the individual needs of the teen and caregivers. Any potential challenges or stressors can be noted.
<i>Preparation and Education*</i>	Preparation provides a sense of control and predictability while allowing children to be actively involved in the process Providing children with a sense of mastery can help to decrease distress and anxiety (Thompson, 2018)	Preparation can be beneficial before, during and even after an experience. After an experience, preparation tools can be used to help children process and explain their understanding and feelings.	Infant/ Toddler Create visual storyboards that can be shared with caregivers to provide information about what their child will experience and how the caregiver can be involved throughout the process. Preschool- School Age Create a sticker chart, storyboard or other visual that allows children to see each step of the process and celebrates their accomplishments along the way. Provide dolls or stuffed animals along with real materials so that children can view and manipulate medical items such as a blood pressure cuff or tourniquet. A guided session/s in the mock scanner is helpful in educating and providing space to practice new skills in a low-stakes environment. Teens The use of a VR headset is helpful to educate youth in a relatable and easy to use way.
<i>Rapport Building, Play and Normalization</i>	Play is critical to supporting the development of a child’s social, emotional, and cognitive well-being (American Academy of Pediatrics, 2021). Additionally, physiological responses such as sweating palms, increased heart rate, and increased body movement can be lessened by integrating therapeutic play opportunities (American Academic of Pediatrics, 2021 & Kohler, 2020).	From recruitment of the participant to follow-up calls and invitations for subsequent aspects of the study Play should be incorporated into all aspects of the research participation experience. Play is how children learn about the world around them, learn, and process their environment.	Infant/ Toddler Create a warm and welcoming environment in which the caregiver can engage in playful interactions with their child and advocate for their child’s needs. Provide space and time for the child to adjust to the new space and people. Interact with the caregiver through conversation before interacting with the child. The caregivers’ interaction with you communicates to the child that you are a safe person. Remind caregivers to bring comfort items along to the visit and verbally share when comfort items can be utilized. Preschool- School Age Create ice breaker activities that the team can use when entering the home such as an “All About Me” activity or a simple home scavenger hunt. Incorporate the use of sticker charts or games during the process to engage children and celebrate the completion of each step of the process. Participants decorate their own star to hang on our “superstar” board after their MRI. This creates a

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Table 1 (continued)

Standard	Why	When	How (assessed developmental stage)
			way to connect children who have experienced the research process. Provide stuffed animals or allow children to bring their own comfort item with them to the visit. Include facility dog as a modality of CCLS work to further normalize the environment, provide comfort during transitions, and promote playful environment and interactions. Teens Incorporate the use of VR or other technological advances where appropriate to increase excitement and involvement in the research process. Participants decorate their own star to hang on our “superstar” board after their MRI. Provide creative choices that allow expression of identity to further support connection to the research process. Include facility dog as modality of work with CCLS to promote playful environment and interactions, further normalizing the environment and building rapport. Infant/ Toddler Add a team member to the MRI visit to provide additional support and anticipate needs. Share information with caregivers about available resources and accommodations (snacks, meals, infant toys and supplies, lactation/ nursing/ well-being rooms, changing tables, etc.). Preschool- School Age Create “Sibling Boxes” for visits to ensure other children in the home feel included. This can also help mitigate distractions that might hinder the data collection process. Add a team member to the MRI visit when young siblings or multiple siblings will be present. Incorporate a lego MRI scanner for play with siblings too to assess understanding of the experience. Include siblings during mock/practice scan sessions. Teens If present during visit ensure that age appropriate information has been shared to support sibling understanding about the research visit. Offer age appropriate activities such as puzzles, books, games, and arts and crafts. Infant/ Toddler Improve signage and communication surrounding parking to minimize barriers to access. Offer to meet caregivers at the parking location to assist with carrying items and navigating new spaces. Orient caregivers to resources and accommodations such changing tables, bottle fill stations, and lactation/ nursing/ well-beings rooms. Preschool- School Age Create a welcoming bulletin board with space to add the participant’s name. Offer to meet the child and caregiver at the parking location to escort them to the building and orient them to the facilities. Provide opportunities for play/ engagement, such as a scavenger hunt, from the entrance to the building to the scanner (sensory and developmental play choices in lobby area) and in the MRI suite. Teens Improve signage and communication surrounding parking to support multiple drivers and minimize confusion. Provide opportunities to answer and ask questions in privacy (avoiding hallways or other public spaces). Infant/ Toddler Create resources and activities for caregivers related to brain health and other specific research
Family-Centered Care	Tenets of Patient and Family Centered Care include participation, respect, and dignity, information sharing, communication and collaboration https://www.ipfcc.org/about/pfcc.html	Before, during, and after the research visit, ensuring the entire family system feels supported: - Meet basic needs - Inclusion of siblings or other caregivers	
Environmental Planning	Create a space that is physically welcoming to families by providing opportunities for play and communicating that the staff understands the needs of children visiting the space (Gordon, J., 2024)	Throughout the visit area and prior to the visit	
Community Engagement and Recruitment	Trust in scientific institutions within the US has declined (Ishmael-Perkins et al., 2023). CCLSs have the skills to help create	Community engagement starts before participant recruitment begins. Creating engaging, educational resources is vital to	

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Table 1 (continued)

Standard	Why	When	How (assessed developmental stage)
	developmentally appropriate, engaging materials for outreach and can help explain complex research terminology in a way the participant can understand (Daniels et al., 2023).	connecting with the community. These relationships transcend the duration of the study to assist with recruitment and retention.	related studies. Facilitate caregiver engagement in advocacy groups to learn more about caregiver perspectives and barriers to participation in research related activities with young children. Preschool- School Age Create activities related to brain health, utilizing developmentally appropriate books and a hands-on activity using Play-Doh to share simple and accurate information. Create and facilitate activities to learn about children and caregivers misconceptions or barriers to engagement in research. Teens Create activities related to sharing information about specific research studies and facilitate questions and answers about barriers to engagement in research. Utilize a VR headset with an MRI simulator to familiarize teens and caregivers in the community with the imaging experience.

integrity, and participant retention (Kraus and Horowitz-Kraus, 2022).

Collaborating with an interdisciplinary team that includes child life professionals is especially important when working with children who have neurodevelopmental differences or cognitive delays. The ACLP outlines four key pillars of emotional safety: screening and assessment, intervention, environment, and staff communication, education, and training (Gordon, 2021). When integrated into research protocols, these pillars can reduce stress and promote emotional well-being throughout participation.

As noted earlier, excessive movement during fMRI scans is a well-documented barrier to data quality, particularly in studies with young children. While motion correction methods are available during post-processing, preventative strategies can be equally, if not more, effective and participant-friendly. Practice sessions and mock MRI training have been shown to reduce motion and increase scan success rates (e.g., Barnea-Goraly et al., 2014; Epstein et al., 2007; Theys et al., 2014). However, these approaches do not fully address the anxiety and emotional distress that children may experience during an fMRI experience.

Children may experience anxiety about MRI procedures due to uncertainty, misconceptions, or a lack of developmentally appropriate preparation. CCLSs are uniquely equipped to address these factors through psychological preparation and personalized support (Boles, 2016). Their interventions help children understand what to expect and offer tailored coping strategies appropriate for the child's developmental stage. These strategies may include verbal and visual explanations, interactive play, and structured rehearsal of MRI-related tasks. To illustrate how these techniques can be applied in research, the next section and accompanying Table 1 outline best practices for incorporating child life strategies into pediatric imaging studies.

5. Application of child life elements

5.1. Overview

While the inclusion of a CCLS is recommended in any setting where children and families may benefit from additional support, some specific tools and strategies can be applied broadly across pediatric research contexts. The elements described below offer a framework for evaluating current research protocols, integrating developmentally appropriate practices, and identifying areas where additional staff training or specialized support may be needed. Each standard is defined,

contextualized, and illustrated with examples of its application in active research environments. These practices are summarized in Table 1 as a guide for implementation within the assessed developmental stage.

5.2. Assessment

Many variables contribute to how a child may view and react to a potentially stressful experience. Learning more about communication, the child's history of medical experiences, temperament, ability to cope, anxiety levels, and parent stress provides high-quality information that can be used to tailor interventions and protocols to meet the unique needs of the child (Staab, Klayman, and Lin, 2014). Additionally, Staab et al. (2024) recently found that CCLS assessment of child's age, estimated length and difficulty of scan, and parent's responses to screening questions allowed the CCLS to predict which children could successfully complete an unsedated MRI. Of significance, Staab et al. (2024) share the two questions on the parent screening questions that were most predictive of a successful "awake" scan were related to how well the child typically copes in the medical environment and if they have a hard time adjusting to change. While receiving information before a visit is ideal, assessment techniques can happen continuously throughout the visit as the research team interacts with the child and family. Whether it is basic well-child visits or more intense previous hospital experience, most families come in with a preconception of past medical experience (Weiss et al., 2023).

5.2.1. Assessment forms

In one study, researchers meet the family in their home for a data collection session, after the visit in the home, one member of the research team completes an assessment of the child with information such as their ability to tolerate new stimuli, their ability to engage socially with new people, and their ability to stay on task (Fraser et al., 2019; Staab et al., 2024). This helps provide the imaging team with knowledge that allows them to prepare and adapt to meet the needs of the family. For example, after one particularly challenging home visit experience, the CCLS was alerted via the online assessment form that the child had a challenging time transitioning from one task to the next and displayed some violent behavior. The imaging team was able to debrief and discuss ways to help manage the emotions of the child while also supporting the child through the imaging visit.

5.2.2. Ongoing assessment

Communication between team members during a visit, along with continued flexibility, is essential to meeting the ongoing needs of a child during the data collection process. Ongoing assessment during a visit ensures that the current needs of the child and family are continuing to be met. An example of ongoing assessment includes the ongoing awareness of basic need changes (hunger, bathroom break, check-in with caregiver) along with close observations of questions, misunderstandings, or concerns that may arise during a visit.

5.2.3. Post-visit assessments

Following procedures, CCLSs typically document their involvement during a procedure or intervention. This is especially important in longitudinal studies. The CCLS in one study documents overall anxiety, ability to engage, overall cooperation, distractibility, who was with the child, and if they chose to have their caregiver present in the scan room. All of these factors will help support the child when they return for the second wave of the study and help the team to be prepared when working with each child.

5.3. Preparation and education

One pillar of the child life profession, and the theoretical foundations of child development, is the idea that children cope better when they know what to expect and are prepared for new or unfamiliar experiences (Boles, 2016). Not only do children need to be prepared, but they also need to be prepared appropriately, in terms and ways they can understand. There are three evidence-based elements at the core of preparation including (1) developmentally appropriate information, (2) encouraging questions and emotional expression, and (3) forming trusting relationships with the staff (American Academy of Pediatrics, 2021). When children are provided with the appropriate tools to understand what is coming next, they are more likely to be successful (Boles et al., 2020). Additionally, participants aged 5–11 years old demonstrated significantly less anxiety when prepared for an outpatient surgical procedure as compared with children who did not receive a child life intervention prior to their procedure (Brewer et al., 2006). Active participation in pediatric research can encourage participants to feel empowered to ask questions, continue to participate in research, and ensure that children understand to what they are assenting. Utilizing these methods, children have multiple opportunities to ask questions and become an active part of the research experience, rather than passive participants.

5.3.1. Use of a mock scanner

Several studies utilize a mock scanner during their preparatory phase of data collection. This process can be individualized to the child's needs. Some children may find the MRI experience exciting and easy to complete; however, others may be hesitant and need to take more time to explore how it feels to be inside an MRI bore. These spaces are very adaptable to each age group, and researchers can add MRI sounds or other stimuli to replicate the sensory experience of being placed in an MRI machine.

5.3.2. Social story

Several studies use a version of a social story to provide preparation information to child participants before MRI scans (Fletcher et al., 2023; Train, 2006). The social story can be a series of photographs that accurately outline the MRI process, preferably from the standpoint of the child. Social stories can be adapted to meet the developmental or individual needs of the population you are working with. For example, a presentation with photos and a short description, a checklist with words/ visuals/ or pictures, a roadmap with bulleted information, or a First-Then visual to communicate in the moment what to expect could be created based on the individual experience of the participant and family.

5.3.3. Lego MRI scanner

A Lego MRI scanner is used by both CCLSs to provide approachable psychological preparation. Using the Lego MRI scanner, the CCLS can assess, through play, misunderstandings, past experiences, and questions the child may have, while providing honest and accurate information. The small pieces and ability to take apart and rebuild parts of the Lego MRI scanner allows for opportunities of autonomy, mastery, and exploration with an item that is familiar to many children.

5.3.4. Medical play opportunities

Similarly, opportunities for engagement with equipment that the child will encounter during a visit can help a child become more familiar and comfortable (Burns-Nader and Hernandez-Reif, 2015). For example, in one study, a CCLS has medical play bags with lab draw items (i.e. a tourniquet, alcohol wipes, or band-aids) for a study that collects blood for young children. If the CCLS assesses that the child is unfamiliar with the lab draw items or has had a past negative experience, they may engage in medical play with the items to promote exploration, sharing of concerns and misunderstandings, and designing a coping plan to best support the child during the actual lab draw. It is recommended that medical play occur with a CCLS as they have completed extensive training demonstrating competency in assessment, along with the ability to gauge and meet the physical and emotional needs of the child during medical play.

5.3.5. Pre-visit Zoom calls with CCLS

The CCLS in one study invites every family to participate in a pre-visit Zoom call, an "MRI Play and Learn Session". This is a brief, 15-minute video call that provides a foundation for the visit and allows the child to ask questions, look at pictures, and build rapport with the research staff. This provides an additional assessment opportunity for the CCLS to determine specific concerns the family may have regarding the upcoming MRI that can be addressed during the call or when the family arrives for the visit.

5.4. Play, rapport building, and normalization

Play is how children explore, connect, and learn about the world. Yogman et al. (2018) remind us that "Play is not frivolous" (pg. 5) and explain how play supports the development of safe relationships and enhances the development of executive functioning skills. Play is an integral component of child life interactions with children and families. It helps build relationships and connections with children and families, while ensuring that the child's developmental needs are seen and efforts to support these needs are provided. Normalizing the research space, through play experiences, provides children with a space for them to more easily connect with the research team. Engagement in play and efforts to normalize the environment can lead to opportunities for building trust and safety in a new environment. The AAP (2021) policy statement about child life services highlights that play-based child life interventions aid in reducing children's emotional distress and increase their ability to cope with new, potentially stressful experiences. Options for play throughout the research environment communicate safety and connection to a child. CCLSs work closely with research staff to incorporate play activities into each visit. Playrooms and lobbies with an array of developmentally appropriate activity options and accessibility offer options for play and engagement.

5.4.1. Ice breaker activities

Set up quick, easy games that allow children to engage with the research team quickly. A short game of iSpy, Would You Rather, or completing an "All About Me" activity sheet together can set the stage for a fun and playful interaction that immediately sets the tone for the interaction between researcher and participant.

5.4.2. *Developmentally appropriate play opportunities*

The playroom at one location is fully stocked with options for play for children ages infancy- adolescence. These options for play are aimed at providing opportunities for open-ended, child-directed play and can be applied to multiple age groups as well as be easily cleaned. Specific examples include balls, rattles, shape sorters, building blocks, baby dolls, doll houses, dinosaurs, action figures, puzzles, books, card and board games, and options for coloring and seasonal arts and craft activities. The playspace and toys are maintained by volunteers along with student learners.

5.4.3. *Use of sticker charts*

Sticker charts are an easy way to engage children in the process. For example, in a study requiring the collection of multiple vials of saliva during the visit, a sticker chart can be used that allows the child to visualize the steps and celebrate each accomplishment by allowing them to actively check the box or add a sticker when one step is complete.

5.4.4. *Utilization of virtual reality*

One study specifically utilizes a virtual reality headset with an MRI movement game created by GetWell Pals ([Eden Immersive \(PTY\) Ltd., 2025](#)). This game introduces the child to an MRI machine and simulates a game where the child must hold a circle on a target, trying to earn stars for holding still. The child has 3 attempts to hold still and earn a star. It also plays the MRI sounds during the game to acclimate the child to some of the sounds they may hear during imaging.

5.4.5. *Creating connection amongst participants*

One study implemented an “Our Superstars” wall, allowing each child to decorate their own star to hang on the wall. This allows children to see that other children have participated in the study and elicits pride and ownership of the experience as they attach their own creation to the wall. The study also plans to utilize the stars as a form of retention, encouraging children to find their previous star and create an additional piece of artwork for the wall.

5.4.6. *Use of comfort items*

One MRI study includes the option to choose a stuffed animal that can be used throughout the visit and taken home with the family. The stuffed animals also allow research team members to show various data collection methods using a stuffed animal if the child appears apprehensive to engage. For example, children can act as the data collectors and check the stuffed animal’s blood pressure before having the blood pressure cuff placed on their arm.

5.4.7. *Use of a facility dog*

An emerging intervention that CCLSs are currently utilizing are the services of a facility dog, a trained assistance dog, as a modality of their work with children. The CCLS first assesses the child’s needs and tasks at hand for the day, and then, if appropriate, incorporates the facility dog into the intervention to support the child and family. For example, if a parent shares that the child is feeling shy and nervous in the new environment, the CCLS may ask the child and family if they like dogs. Interacting with the facility dog can promote play interactions and normalize the environment. Playing ball, helping the facility dog change into their MRI pajamas, and learning about the MRI with the CCLS and facility dog make a playful and comfortable environment in which learning and attempting a new task is now fun and engaging.

5.5. *Family-centered care*

The Institute for Patient and Family Centered Care ([Institute For Patient and Family-Centered Care, 2025](#)) identifies respect and dignity, information sharing, participation, and collaboration as the core concepts for implementing patient and family-centered care. Additionally, the IPFCC explains that when working with children, “family” should be

defined by the child as the people they decide to include and interact with regularly. The goal of CCLSs is to ensure that whoever the child deems as their family is included in visits, while recognizing the importance of participation and collaboration. Accommodating multiple family members, especially siblings, during visits can be challenging; however, when family is included, the needs of the entire family are validated, rapport can be established, and participation with the research team and understanding of the process is more likely ([Hefferan and Sullivan, 2023](#)).

5.5.1. *Ethical and cultural considerations*

The unique clinical experience of CCLSs allows these professionals to gain knowledge when it comes to collaborating with families from a variety of cultural backgrounds. In the realm of healthcare, disease and injury do not discriminate; therefore, CCLSs work with children and families who speak different languages, have different religious beliefs, and engage in a variety of cultural practices. For example, hair texture is a consideration for families who may need to provide a hair sample or place other data collection equipment on their head. Recognizing these differences in hair textures is crucial to maintaining a culturally sensitive protocol. According to the ACLP code of ethics, child life specialists “have an obligation to maintain an environment that respects every variation of race, identity, ability, and community” ([ACLP, 2023](#), p. 2).

5.5.2. *Sibling boxes*

To ensure siblings are appropriately included in the protocol without disrupting data collection, one study utilizes sibling boxes. This box includes similar materials that are used with the primary child and allows the sibling to participate alongside the research team. For example, the research team uses a Jenga game for data collection, and an extra Jenga game is included in the box for siblings to build and play alongside the team.

5.5.3. *Appropriate staffing*

When the team is knowledgeable regarding whether siblings or other children will be present can allow the team to prepare materials as well as provide correct staffing for the visit. In one study, if a family is bringing a young child, an additional team member is brought along to assist with the visit. This person is dedicated to ensuring that the sibling is engaged in play, which allows the parent to focus on their data collection tasks. Some locations utilize trained volunteers and research students to provide sibling support during visits. It is important that the additional team member knows basic developmental needs, the importance of engagement in play interactions, and caregiver/ child attachment and communication. Clear communication about the location of the caregiver, along with information sharing about the sibling’s specific developmental, psychosocial, and emotional needs, will be crucial for the additional staff member to provide high-quality family-centered care that allows all members to be comfortable and engaged.

5.5.4. *Family needs with access to accommodations*

Awareness of each family’s individual needs supports interactions based on dignity and respect. Asking questions and carefully listening to the family’s individual needs provides information about what accommodations can be offered to best support their visit. Examples could include, a mother whose breastfeeding and needs to pump or feed the baby around 10:30 am, perhaps a family prays at a certain time of day, is currently fasting, or needs to leave by a certain time to participate in an important event, or a child or family member with mobility needs who would benefit from additional seating options during the visit. The individual needs of families are abundant; awareness and access to accommodations will extend dignity and respect to all.

5.6. *Environmental planning*

A welcoming space, equipped with the staff and supplies to meet the

varied needs of research participants, communicates to children and families that their emotional and physical safety is important during the visit. The environment should be conducive to the physical and emotional needs of the child and their family, such as considering access to restrooms, the developmental ability of a child, child-friendly decor, and sensory-friendly spaces. CCLSs utilize their knowledge and training related to child development, therapeutic play, cultural considerations, and patient and family-centered care principles to offer valuable feedback on design, decor, and other developmental items to research study staff (Gordon, 2024).

5.6.1. Consider wayfinding and signage

The research team identified that the parking arrangement was unclear for visitors to the imaging center. The CCLS set up a meeting with the parking services department, and an evaluation was conducted of the parking garage by university parking staff. Following the parking garage evaluation, additional signage was placed around the parking deck to assist with wayfinding. Clear signage and staff communication with visitors help to ensure that adults and children feel welcomed to a new space.

5.6.2. Individualized welcome for participants

Upon entry into the imaging center, participants are greeted with a welcome sign where each child's name is written on the bulletin board. Not only does this personalize the visit, but it also makes parents feel more comfortable with the team. Anecdotally, many parents have stopped with their child for a photo in front of the board.

5.6.3. Gantry wrap

The CCLS in one study helped to bring in a company to wrap the MRI scanner and room with a soothing nature scene (Siemens Medical Solutions, 2025). This scene appeals to children as well as other participants who may be arriving for an MRI experience. For the children, the animals around the room act as a built-in iSpy game and an opportunity for distraction as they transition to the MRI table, while helping the space to feel less clinical.

5.6.4. Play opportunities implemented throughout the environment

Pediatric-themed opportunities for play and engagement in the environment throughout the visit help children and families feel more comfortable. One location has nature-themed murals on the walls leading into the research space, in which staff can engage children in an I Spy game. Additionally, participants completing an MRI scan can choose between character-themed scrubs, including Sci-Fi and Disney-themed characters, or traditional blue scrubs. A playground is available for families to use before and after visits, along with access to indoor spaces equipped to support play and other basic needs.

5.6.5. Meeting the needs of families

The CCLS met frequently with the imaging core staff to offer insights about changes that could be made to the MRI suite area to create a more welcoming space designed to meet the needs of children and their families across the lifespan. Improvements included a refreshment area for caregivers and patients, comfortable seating, a small table and chairs, along with a stock of play options that could be offered, and the addition of seating for caregivers in the control room as an option when appropriate.

5.6.6. Parental presence

Redesigning the MRI space to allow for parent presence, along with easier accessibility for children of all ages and abilities, can make a significant difference in the comfort level of children and their families during data collection (Rollins et al., 2005). Examples of redesigning the MRI space include the addition of an MRI safe rocking chair, MRI safe headset for the parent to wear when present in the room, along with parental screening questions and waivers to promote parental safety and

inclusion in the MRI space.

5.7. Community engagement & recruitment

One key aspect of large studies that involve young children is the role of community engagement and recruitment and the development of trust (Guillemin et al., 2018; Reck et al., 2025). CCLSs have the skills to create developmentally appropriate, engaging materials for outreach and can help explain complex research terminology in a way that children or other people who are not familiar with research terminology can understand (Daniels et al., 2023). The inclusion of a CCLS on a Research Community Advisory Board is one way that multiple research studies could benefit from child life expertise related to community engagement and recruitment. Additionally, in individual studies a CCLS may use hands-on activities, books, and storyboards, to engage families with the research team to promote understanding and confidence about participating in the study or referring other participants to participate in research.

5.7.1. Developmentally appropriate education

Once recruitment for one study began, there was a lot of hesitancy in the community regarding the MRI experience. Some people would mention radiation, the use of contrast, or feeling nervous about the loud sounds. The child life specialist and community engagement team collaborated to create a variety of activities that allowed children and families to learn more about brain health while also interacting with the research team members. Specifically, one activity allowed children to use Play-Doh to create their own brain, identifying the different parts of the brain and what they are used for. Paired with a variety of book options, this activity was used in libraries and other community events to engage children and their parents in conversations surrounding brain health, science, and how researchers learn about the brain, including the safe usage of MRIs.

5.7.2. Utilize virtual reality in the community

The community engagement team, with the help of the CCLS, in one study, is able to utilize a VR headset at events and field trips to help educate children and their parents on the use of an MRI scanner. This MRI simulator allows the user to explore the MRI space and to practice lying down and hearing the MRI sounds while holding still (KindVR). This has been extremely helpful when engaging with homeschool or other community groups where there is an opportunity for 1:1 education and interaction.

6. Evaluation

Part of a CCLS's role is to assess the impact of interventions and adjust approaches based on ongoing observations. Whether this is documented in narrative notes or structured forms, evaluation is a core component of emotionally responsive care. There are not currently any metric-based evaluations for programs as each setting requires unique integration of child life services. Suggestions include incorporating a program evaluation component to the study by focusing on key goals and determining what information is needed to attain those goals. Some examples of questions for post-visit evaluation may include:

- Did the child and family understand the procedures and expectations?
- Were additional tools or accommodations needed to support success?
- Is there any additional training that could benefit the research team?
- Were there any environmental factors that created distress or barriers to participation?
- Could follow-up surveys from children and caregivers provide actionable insights for future protocol improvements?

Integrating systematic evaluation into the research process enables

teams to reflect on their practices and continuously improve the participant experience.

7. Next steps

Child life services are associated with improved quality of care, reduced costs, and better outcomes in pediatric healthcare (American Academy of Pediatrics, 2021). These same benefits are directly applicable to research with children, particularly in studies funded by competitive federal grants or philanthropic sources. By helping participants feel informed, prepared, and respected, child life services can increase recruitment success, reduce attrition, and boost participant satisfaction.

As a next step, research teams should evaluate existing protocols involving children and families and consider the following:

- Are there opportunities for rapport-building and play integrated throughout the research process?
- Do team members feel confident and well-prepared to work with pediatric and neurodiverse populations? If not, which aspects require additional training or experience?
- Are family members meaningfully included, and is the space welcoming and adaptable to their needs?
- Is the preparatory information age-appropriate, accessible, and easy to understand?
- Has the data collection environment been optimized to support emotional safety?

Many of these improvements can be implemented at low cost but yield high impact. For teams interested in hiring a CCLS, resources are available through the Association of Child Life Professionals at www.childlife.org, including a career center (<https://aclp.nationalhealthcareers.com/>). There are many active CCLS profiles on LinkedIn and it is another way to find and connect with CCLSs around the country. Academic departments within universities such as Human Development and Family Science, Child Development, and Psychology often have connections to CCLSs or aspiring child life students seeking volunteer or other hands-on experience opportunities.

8. Conclusion

All researchers are ethically obligated to protect human subjects (Office for Human Research Protections (OHRP), 2022, 2024). The Belmont Report articulates the principle that researchers must not only protect participants from harm but also maximize potential benefits and minimize risks (Department of Health, Education, and Welfare, & National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 2014). This ethical responsibility is particularly critical when working with children and other vulnerable populations. In pediatric MRI research, where procedures can be stressful or confusing, protocols must be designed to support both physical and emotional safety.

The education and training that CCLSs receive is unique and their skill set integrates seamlessly into pediatric research study protocols. CCLSs are well-equipped to help research teams implement the “best” possible experience, not just an adequate one. By drawing on trauma-informed, developmentally grounded practices, CCLSs enhance the research environment and promote trust, engagement, and retention. As stated, the inclusion of a CCLS is impactful, and we recognize that for some small research teams the inclusion of a CCLS might be a barrier, however all research teams possess the ability to assess protocols and intentionally incorporate developmentally appropriate principles. Striving to ensure that all participants and families are adequately informed, supported, and respected is not only a matter of procedural ethics—it is a cornerstone of scientific integrity and public trust.

Every participant interaction is an opportunity to foster curiosity,

connection, and confidence in children while also improving data quality and scientific outcomes. Emotionally supportive protocols can lead to greater compliance, lower attrition, and better return on research investment (Kraus and Horowitz-Kraus, 2022). Just as importantly, they can transform research into a positive and empowering experience for children and their families.

Ultimately, emotionally safe practices are not optional enhancements—they are foundational to ethical, inclusive, and effective research. As Gordon (2024) reminds us, “Emotional harm is often invisible; therefore, it is easily overlooked and dismissed. Emotional safety is as fundamentally important as physical safety” (p. 40). By integrating child life services and developmentally appropriate principles into research design, protocols can be created that respect children’s developmental needs, empower their voices, and improve both the science and the experience of research participation. At the core of research is inquiry, which in turn fosters innovation. Continued innovation is a catalyst, expanding and promoting understanding and evidence-based discovery. As summarized in Table 1 and throughout this writing, the evidence-based and innovative inclusion of family-centered care principles and collaboration with a CCLS enhances both scientific and human outcomes during pediatric research.

CRediT authorship contribution statement

Cala Hefferan: Writing – review & editing, Writing – original draft, Conceptualization. **Diane Bales:** Writing – review & editing. **Assaf Oshri:** Writing – review & editing. **Charles Geier:** Writing – review & editing, Writing – original draft, Conceptualization. **Lauren Holley:** Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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