THE USE OF ARTIFICIAL INTELLIGENCE IN PEDIATRIC OCCUPATIONAL THERAPY INTERVENTIONS: PARENT AND CAREGIVER PERSPECTIVES

A Thesis submitted to the faculty at Stanbridge University in partial fulfilment of the requirements for the degree of Master of Science in Occupational Therapy

by

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Certification of Approval

I certify that I have read *The Use of Artificial Intelligence in Pediatric Occupational Therapy Interventions: Parent and Caregiver Perspectives* by Samantha Joy Escobar, Ariana Hans, Megan Lefebvre, and Kimberly Yu, and in my opinion this work meets the criteria for approving a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy at Stanbridge University.

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Abstract

Artificial intelligence (AI) is an area of technology that has continued to develop and advance since its emergence in the 1950s. Recently, AI has significantly impacted society, with new AI-enabled technologies finding ways to better assist healthcare professionals when providing client-centered care. In the field of occupational therapy (OT), the most common or known use of AI in pediatric interventions is through social robots, which are designed to interact with humans to help children with disabilities, such as autism spectrum disorder, develop the skills needed to engage in social participation, play, and self-care tasks within their daily routines. The purpose of this study was to explore the connection between the demographics of parents of children who received OT services and their views, awareness, trust, and considerations associated with AI and its use in pediatric OT. Our team administered an anonymous online survey. The survey combined multiple-choice, open-ended, and five-point Likert-scale questions. Data was collected from nine parents and caregivers of children ages 3-18 who had received OT services. The data collected found that, on average, the level of education influenced knowledge of AI but not trust levels in AI. Although some participants' qualitative answers indicated they were open to the use of AI, the overall trust levels reported in the Likert-scale questions were low. Our survey findings emphasize a continuing need for research focused on family-centered practice that considers clients' social contexts and demographic backgrounds, especially if AI could be involved in pediatric OT services.

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The Use of Artificial Intelligence in Pediatric Occupational Therapy: Parent and Caregiver Perspectives

Occupational therapy practitioners (OTPs) use their expertise and clinical reasoning to formulate goals, teach skills, and improve the quality of life for their patients. Technological advances are helping OTPs meet their clients' individualized goals in new and innovative ways. Within the healthcare field as a whole, there is an influx of professionals, such as doctors, therapists, and administrators, who are integrating artificial intelligence (AI) into clinical care (Aylward et al., 2023). AI is defined as a subclass of computer science concerned with creating systems that can perform tasks usually attributed to intuitive thinking (Aylward et al., 2023). Robotics have been shown to be adaptable tools as they can be programmed to perform various functions or movements (Lindsay & Lam, 2018). AI is often integrated into robotic technology, and this has been shown to enhance self-confidence, collaboration, and social participation in children. The application of AI in the healthcare field allows professionals to make predictions, diagnose diseases, and plan treatments based on computer algorithms (Ghaffar et al., 2023).

In occupational therapy (OT) settings, AI technology that is integrated into technologies such as robotics, exoskeletons, web applications, and treatment programs, can supplement treatment plans and interventions (D'Alfonso et al., 2017; Gonzalez et al., 2021). Robotics and AI technologies can be used as tools in therapeutic settings and integrated into assistive devices for clients to use in their everyday lives. AI and robotic devices can not only improve the physical abilities of patients but can also be used to assist with social development and mental health (Gonzalez et al., 2021). To better

understand AI's capabilities, OTPs should investigate how AI can be integrated into their practice.

There is insufficient research on AI integration in the healthcare field. However, the limited research available has shown that there may be concerns regarding AI use, which include the cost, effectiveness, and ethical considerations of AI (Gafni-Lachter & Ben-Sasson, 2022). Although some research indicates that AI can positively impact patients in psychology, psychiatry, and psychotherapy, there needs to be more research on how AI can be used in OT (Fiske et al., 2019). Further research is needed to determine how effectively AI use is being integrated into specialized areas of care, such as pediatrics and therapeutic services.

In a study regarding attitudes towards AI, parents of children receiving healthcare services using AI tools and technology were asked for their opinions regarding the use of AI (Sisk et al., 2020). The research found that parents and caregivers identified several areas of concern about AI in healthcare. Many caregivers discussed their concerns about how AI would impact human interactions in healthcare because there would be a lack of human contact and empathy. They have also discussed their concerns about understanding the technology itself and related questions about transparency while using AI. Parents also expressed concerns about privacy, the storage of personal and medical data, and the reliability and trustworthiness of these types of interventions. The study's outcomes indicated that these parent concerns should be addressed before implementing AI systems in healthcare. It also indicated that parents should be informed of the potential benefits and risks of AI systems in healthcare and should be given the opportunity to voice their concerns. When parents were comfortable using AI and robotics in pediatric

interventions, it was found that caregivers believed benefits such as cost, quality, convenience, and shared decision-making outweighed the concerns (Sisk et al., 2020). These findings suggest that wider education and understanding of AI could allow a more seamless implementation of AI in healthcare, especially when discussing with parents the use of AI in treating children.

The information gathered from our study contributes to the areas of translational research and health services research outlined in the American Occupational Therapy Association's research agenda (American Occupational Therapy Association [AOTA], 2018). Translational research helps evaluate the effectiveness of OT interventions and examines the implications of developments in science and technology used in the practice of OT (AOTA, 2018). Health services research compares and evaluates the effectiveness of treatment options and approaches used in OT and evaluates performance outcomes for minority groups related to interventions, service sites, clinician training, or team organization (AOTA, 2018). As a result of our study, we gained a greater understanding of parental views and concerns on the use of AI and robotics in their children's intervention process. By understanding concerns and ideas surrounding new technology, such as AI, future clinicians can learn how to better educate various populations on the benefits and capabilities of new trends in technology. The demographic information from our survey can inform future OTPs on how parental background may affect the implementation and acceptance of AI interventions in pediatric OT.

Statement of Problem

There is a lack of information regarding how parent and caregiver backgrounds and demographics may impact opinions about AI and robotics (Kaelin et al., 2021). It is

crucial to understand how differences in areas such as age, race, educational background, and income levels may affect perceptions of AI and robotics, as these differences can influence the effectiveness of interventions implementing these tools. In areas with low socioeconomic status, studies have shown that AI tools can be used to "predict, model, and slow the spread of disease in epidemic situations…" and can allow healthcare professionals to provide services more efficiently in lower socioeconomic areas (Wahl et al., 2018, p. 4). This may suggest that AI can help to bridge gaps in healthcare in areas of low socioeconomic status. However, it is imperative to address misconceptions such as the concerns about breaches of privacy and the loss of human interaction with the use of AI in pediatrics (Wahl et al., 2018).

Research has shown that parent involvement in care plans has significantly improved treatment outcomes for children with disabilities (Kim et al., 2021). Therefore, it is important to understand parental opinions of AI before implementing an intervention plan using AI and robotics. In order to account for these perspectives, we conducted a survey that included multiple-choice and free-response questions to collect both quantitative and qualitative information to provide further insight into the use of AI in pediatric OT. Our target demographic included parents and caregivers of children between the ages of three and eighteen who have participated in pediatric OT. Through this study, we aimed to determine if parental opinions about AI, specifically in the context of pediatric OT care, were influenced by demographic factors. The purpose of this research study was to provide insights into the potential applications of AI robotics in pediatric rehabilitation and the concerns associated with that technology.

Literature Review

AI and robotics can play a pivotal role in enhancing child engagement, independence, and therapeutic support. Robotics that function without AI have been used as therapeutic tools in OT for many years; however, new technology incorporating AI into robotics is relatively new, with most technology created in the last decade (Kaelin et al., 2021). OTPs have used robotics to enhance child engagement and independence by ensuring the child remains interested and active in treatment programs (Lindsay & Lam, 2018). These robotics use visuals and movement to engage the child or to facilitate movements or actions (Lindsay & Lam, 2018; Gonzalez et al., 2021). In childcare settings, AI can also assist an OTP with socialization, entertainment, and consultation (Lee et al., 2022). Additionally, OTPs can use AI to provide virtual companions, personalized recommendations, and automatic feedback. They can also use AI to create immersive virtual experiences for users, allowing them to interact with digital avatars and explore new virtual environments. Including parents in care plans that incorporate AI could improve treatment outcomes for children with disabilities.

Parents' involvement in care plans has significantly improved treatment outcomes for children with disabilities (Kim et al., 2021). AI programs developed for pediatrics have been designed to improve the problems hindering patients from performing daily activities to improve their physical, social, and mental health (Gonzalez et al., 2021). These factors can impact quality of life and the ability to participate in educational and social settings. Kaelin et al. (2021) examined the ways in which AI is currently integrated into pediatric rehabilitation interventions, targeting the participation of children and youth with disabilities or other diagnosed health conditions in valued activities. The most

common integration of AI was using humanoid robots (robots that mimic humans in shape and characteristics) or non-humanoid (robots that do not resemble humans) devices to engage children with disabilities by directing them toward a target or expressing emotions through movement. Additionally, Kaelin et al. found that some interventions delivered remotely use robotics that incorporate machine learning and natural processing language in classrooms to enable the virtual inclusion of home-bound children. Participation is crucial as it enables children to engage in meaningful activities in their daily lives. AI and robotic technologies can enhance participation and communication for children, improve social skills, and provide a safe environment for peer interaction.

In healthcare, there is a widespread adoption of AI-supported technologies that offer numerous opportunities for innovation in the knowledge-intensive healthcare industry (Lee & Yoon, 2021). Some examples of AI-based robots include: the "Aria," which can be used to make emergency calls when an individual using it is unable to use other devices due to accidents, physical disabilities, or exceptional circumstances; IBM's "Watson for Oncology," which supports clinicians by making suitable treatment recommendations; University of Southern California's "Ellie," a human-controlled computer virtual robot designed to act as a therapist to reduce psychological burden; and "WeBot," an AI-enabled psychological counseling program (Lee & Yoon, 2021; Yang et al., 2019). Major hospitals use AI-enabled technologies to support medical personnel in patient diagnostic and treatment activities for various disorders (Lee & Yoon, 2021). Based on these findings, OTPs can use AI to create personalized interventions for children, improving engagement and outcomes.

Common Theme 1: Impact of Technology in Healthcare Interventions

Several studies have addressed the impact of robotic-assisted interventions on children who have received pediatric care services. The most common childhood diagnosis researched among these studies is cerebral palsy (CP), however the literature examines other diagnoses as well. Palsbo and Hood-Szivek (2012) investigated participants who had a variety of disorders, such as autism spectrum disorder and attention-deficit/hyperactivity disorder. Lindsay and Lam (2018) also examined participants with disabilities such as spinal muscular atrophy, brain injury, and Duchenne muscular dystrophy. Elnaggar's (2016) and Palsbo and Hood-Szivek's studies addressed robotic assistive technology to measure whether there would be improvements in hand and upper limb fine motor skills amongst participants. Elnaggar's research aimed at studying the effectiveness of an interactive hand rehabilitation program in treating children with hemiplegic CP. Palsbo and Hood-Szivek aimed to examine the effectiveness of robotic-assisted three-dimensional repetitive motion on hand motor function and control in children with handwriting deficits. The results presented improvements in handwriting fluidity only in children with learning disabilities, not those with CP (Palsbo & Hood-Szivek, 2012). Although most studies focused on children with varying diagnoses, Adams et al. (2017) assessed developing children ages three through eight with no known diagnosis. The study objectives were to ascertain whether free play setups with and without a robot would elicit a developmental sequence of play in typically developing children and aimed to discover whether the robot impacted children's play. The findings show that there was a tendency for younger children to engage in more pretend-play activities while older children engaged in more functional

play activities, and using the robot made pretend-play more challenging to exhibit (Adams et al., 2017).

Ríos-Rincón et al.'s (2016) and Lindsay and Lam's (2018) studies address the use of robot-based intervention with LEGO robots and its effectiveness on a child's level of playfulness with limited gross and manual abilities. Ríos-Rincón et al.'s study implemented LEGO robots and examined if robots could improve a child's playfulness. The results showed that children were more likely to increase their level of play when interacting with a robot. Lindsay and Lam's study examined different types of play using the LEGO robotics program for children with disabilities from ages six through eight. The findings show that although a few children engaged in solitary play, the majority of the children participated in parallel and cooperative play or combined with the use of robotics (Lindsay & Lam, 2018).

Along with these concerns surrounding robotic-assisted interventions, there is an increasing amount of research being conducted on the design and efficacy of AI in OT pediatric care settings. Gonzalez et al. (2021) conducted a systematic literature review that aimed at identifying how robots can help pediatric patients and inspire the development of new devices based on a variety of features. The researchers found that although robotics is used in pediatric settings, there is a lack of well-designed and effective devices available to this population (Gonzalez et al., 2021). However, Lee and Yoon (2021) conducted a literature review that focused on the influence of AI-based technological applications on healthcare to provide strategies that may improve the effectiveness of hospital operations, illness prevention, and patient care. The research found that major hospitals have been using AI-enabled technologies to support medical

personnel in patient diagnostic and treatment activities for a variety of disorders. An example of AI-enabled technology is an application called “Noom,” which helps with managing dieting routines to prevent long-term diseases; the system was able to detect reasons why customers quit using the system and could not attain their goals. Another example of AI-enabled technology mentioned in the study is an AI-enabled eye disease diagnosis system for macular degeneration and diabetic macular edema, which can identify the disease and stage of development in 30 seconds. The accuracy rate was over 95% compared to the collective diagnosis of five expert ophthalmologists, indicating AI-based systems can improve productivity by reducing the error ratio and allow for the exploration of opportunities that may expand care services that were not obtainable before (Lee & Yoon, 2021).

Studies have also focused on the use of AI and how feedback from professionals from various healthcare and health-related fields may or may not influence its use in their scope of practice. D’Alfonso et al. (2017) investigated the use of potentially implementing AI into an online social therapy web application for youth recovering from early psychosis in mental healthcare. The researchers wanted to investigate the efficacy of online therapy, the technology design, and how advanced computational and AI methods can be employed to supplement the support provided by moderators and clinicians. Tanaka et al. (2022) focused on assessing children’s interactions with an AI dog-like robot named “Aibo.” The researchers wanted to investigate how interactions with Aibo could help alleviate pain and anxiety for children undergoing vaccinations in comparison to the control group that was given a stuffed animal instead. Similarly, Moyle et al. (2016) investigated care staff perceptions of a social robot called “Paro” in

comparison to a look-a-like seal plush, with residents who have dementia. They found that staff were willing to incorporate Paro because they saw psychosocial benefits to having it for the residents. Additionally, participants saw Paro as more therapeutic for agitation and improving mood states and engagement as opposed to the plush look-a-like. However, staff reported that not all participants appeared comforted by Paro. The authors suggested that Paro should not be used as a "one size fits all" approach to care since some residents had reacted poorly to the social robot (Moyle et al., 2016). Petersson et al. (2022) and Terry et al. (2022) focused on challenges and potential obstacles to implementing AI in practice through the perspectives of primary healthcare leaders and stakeholders who have shared concerns and opinions. Fiske et al. (2019) assessed the ethical and social implications of translating AI applications into mental healthcare in the field of psychiatry, psychology, and psychotherapy in order to develop preliminary recommendations on how to address these challenges in current and future applications of embodied AI. As AI is being implemented in robotic-assisted interventions, differing opinions on its use remain, and concerns of whether it may benefit or put individuals at risk if exposed to such technological advancements have created controversy.

Common Theme 2: Parental Involvement and Perceptions on Robotics and AI

Several studies addressed the importance of parental involvement in a child's care, highlighting its crucial role in promoting family-centered practice. Some studies focused on how parental involvement can positively affect a child with CP and their overall performance. Ríos-Rincón et al.'s (2016) study discussed the improvement in playfulness in children with CP during free play with their mothers. According to Kim et al.'s (2021) study, family-child-centered care rehabilitation was beneficial in the areas of

physical, cognitive, sensory, and social integration for children with CP. Each study contributes knowledge about the importance of parental involvement in the care of children with CP. Ríos-Rincón et al.'s study discussed the involvement of only the child's mother, while Kim et al.'s study discussed the involvement of both parents in care. In both studies, it was discovered that parental involvement in a child's care increased participation levels.

Parents and guardians are integral to the treatment process. Research has suggested that family involvement in healthcare helps with efficiency in resource use and supports patients' health and well-being (Kuo et al., 2011). It is important to consider the effects parents might have on treatment outcomes. As demonstrated in a study by Rios-Rincón et al. (2016), it was observed that parents took an active role in manipulating toys for their children, with mothers frequently handling and maneuvering toys on behalf of their children. This manipulation within the treatment could impact the effects of the interventions, including how the children interact with the toys in future sessions. A handwriting protocol using robotic assistive technology stated that parent volunteers could deliver treatment with supervision (Palsbo & Hood-Szivek, 2012). The use of robotic assistive technology allows parents to take an active role in the rehabilitation of their children. Similarly, in a rehabilitation program that used social robots, it was indicated that parents could provide physical assistance as needed and were available to the child throughout the treatment process (Butchart et al., 2021). Although family-centered care can lead to improved outcomes (Kim et al., 2021), the extent of that impact when using interventions such as robotics and/or AI is unknown.

Studies by Butchart et al. (2021) and Lee et al. (2022) explored parental views on applying social robotics in their children's care and how it might assist with independence and interaction. Butchart et al.'s study gathered both child and parent perceptions of interacting with a socially assistive rehabilitation robot during a session. The results of the study indicated that the robots have the potential to enhance engagement, promote child independence during rehabilitation exercises, and support the potential of a rehabilitation program when a human therapist is not accessible (Butchart et al., 2021). However, the researchers also suggested that the individual needs and preferences of the child and family should be considered when using socially assistive robots. The study suggests that although the parents felt that robots could assist their child with independence with minimal supervision, parental involvement is still necessary for their rehabilitation process. Lee et al.'s study also focused on parental attitudes toward social robots and involvement in childcare functions based on differing parenting styles and dynamics. The findings suggested that the children's characteristics influenced the parents' preferences for each childcare function, such as socialization, education, and entertainment (Lee et al., 2022). Both these studies emphasized that interventions that include the use of social robotics should focus on family-centered care and the parental needs for specific childcare functions.

In their respective studies, Ramgopal et al. (2023) and Sisk et al. (2020) examined parental perspectives regarding the use of AI technology in children's healthcare, offering valuable insights into parents' level of comfort, concerns, and preferences. Ramgopal et al. surveyed parents about their perceptions of computer-assisted pediatric care in the emergency department. The study surveyed 1,620 parents and the majority reported being

comfortable with AI programs for antibiotics, bloodwork, and radiography interpretation (Ramgopal et al., 2023). The study results of the survey found that younger parents, aged 18-25 years, reported more discomfort with AI than parents over the age of 46 years, and Black non-Hispanic parents indicated more unease with AI than White non-Hispanic parents (Ramgopal et al., 2023). The study by Sisk et al. surveyed parents to comprehend the ethical and practical concerns that affect parental openness to AI-driven technologies and to determine the issues parents felt were crucial when considering using AI-driven healthcare interventions in their child's treatment. Parents reported an average openness of 3.4/5 to AI-driven technologies, with quality, privacy, shared decision-making, convenience, affordability, human element of care, and social justice being the top seven concerns (Sisk et al., 2020). Healthcare providers and AI developers must listen to parental perspectives, engage in open dialogue, and address concerns. Involving parents, sharing accurate information, and incorporating feedback fosters trust and ensures AI aligns with family needs.

Remaining Gaps

Despite the widespread research on various diagnoses and pediatric interventions, multiple avenues of investigation must be explored to serve patients better and improve treatment outcomes. One area that needs to be explored is parent perceptions of AI and its uses in interventions such as robotics in pediatric OT. The opinions of various rehabilitation professionals and clinicians, including but not limited to OTPs, have been investigated following interventions using a social robot with AI features; however, these studies left parental views unassessed (Van Den Heuvel et al., 2017). Over time, AI has grown in popularity in various settings, and the discussion of AI in healthcare has been

shown to reflect overall positive attitudes (Fast & Horvitz, 2017). As the use of AI becomes more widespread, it is important to consider and understand parent and caregiver opinions alongside those of therapists and other clinicians. One study assessed professional opinions of a robot used in pediatric interventions (Huijnen et al., 2018). This study identified roles, strengths, and challenges for the use of robotics; however, the study remained centered on the responses of professionals and not parental views on the use of robotics (Huijnen et al., 2018). Many of these studies fail to provide information from parents that may influence how AI technology is viewed and received in pediatric contexts.

When looking at the research in pediatric OT regarding AI and robotics, small sample sizes, typically less than 30 participants, are commonly found, making it challenging to generalize findings to larger populations. For example, a study on a social robot in rehabilitation involving five children and their parents showed positive results, but a larger sample size is needed to verify the results (Butchart et al., 2021). Similarly, a study using LEGO robots indicated increased playfulness in four children, highlighting the potential of robots in therapy, but further research with a larger sample size is crucial (Ríos-Rincón et al., 2016). Another study observed 21 children engaging with a social robot; however, all of those children were male (Lindsay & Lam, 2018). It is important to observe differences in demographics and assess if studies apply to larger populations. Long-term effects of interventions must also be explored, as follow-up evaluations were often neglected in various studies and not considered. For example, long-term effects were not assessed in a hand rehabilitation program for children with CP using robots (Elnaggar, 2016). Inadequate training time and intervention duration were evident in

many studies, emphasizing the need for more comprehensive and extended protocols in pediatric robotics interventions (Adams et al., 2017; Lindsay & Lam, 2018; Palsbo & Hood-Szivek, 2012). Future research should be conducted to investigate a more long-term protocol for the use of robotics in intervention and treatment plans for children. Furthermore, when considering various treatment plans and methods, clinicians must consider how interventions will impact children over time, not just in the immediate future.

Another area lacking investigation is how background and demographics of parents affect opinions and trust levels of AI and robotics. A Swedish study investigated the challenges identified by clinicians and professionals when attempting to implement AI in healthcare settings (Petersson et al., 2022). One of the challenges this study identified was building trust for AI systems acceptance in clinical practice. It is important for future research to explore parent perceptions of AI and their trust levels as that can impact the implementation of interventions using AI and robotics. Furthermore, understanding how parental background impacts opinions and trust in AI and robotics is crucial. A scoping review that explored how AI has been used in pediatric rehabilitation found that, in most research studies, demographic information of parents, such as socioeconomic status, education, and race, were excluded from the data (Kaelin et al., 2021). It is important to understand parental background as possible correlations can be explored between demographics and perceptions of AI and robotics.

AI is changing treatment modalities for numerous conditions. Recent studies have shown the positive impact AI can have on these conditions, especially in pediatrics. For AI to be used effectively with children, parent involvement is crucial. Studies have

shown that AI can be received well by children and parents (Butchart et al., 2021; Sisk et al., 2020). However, further investigation needs to be made into how parents might contribute to the implementation of AI. Parents and caregivers may still have doubts about the use of AI. However, more research needs to be conducted to conclude if there is a positive correlation between demographics or socioeconomic status and the relation to negative attitudes towards using AI. Although research has suggested that parents may have doubts and concerns regarding the use of AI, the use of AI in pediatric healthcare settings is growing, and parents are becoming more aware of its uses and capabilities (Sisk et al., 2020). As technologies advance, there is a growing need for the field of OT to accept and implement AI. One role AI plays in the field of OT is facilitating engagement in interventions and treatment sessions, but furthermore, it can also contribute to a therapeutic environment where AI is used for consultations, socialization purposes, or entertainment for patients. Further research is needed regarding the various uses of AI in pediatric settings and whether AI technology is best used as a primary intervention strategy or a supplemental tool.

Statement of Purpose, Hypothesis and Research Question

The purpose of this study was to evaluate parent and caregiver opinions on AI by conducting a survey of parents with children who had received pediatric OT in the past or were undergoing pediatric OT at the time of the survey. The central research questions of this study included: how does background and knowledge of AI in parents of children who have received pediatric OT affect opinions of AI used in pediatric interventions? Furthermore, the study asked: what are parents' and caregivers' general perceptions of AI, and what do they believe are potential risks, benefits, and uses for AI robotics in

pediatric OT? The survey included multiple-choice and open-response questions to gain quantitative and qualitative data. We hypothesized that parents would report openness to the use of AI robotics but hesitancy and fluctuating trust levels of AI. We also hypothesized that demographics such as age and educational background would influence trust levels of AI. The data collected from our survey respondents provided further insight into our research questions and provided context for possible implementations of AI in future family-centered OT practice approaches.

Theoretical Framework

We selected the Ecology of Human Performance (EHP) as our theoretical framework for this study. The EHP is the most appropriate framework because it emphasizes the ideology of context and considers how features of an environment influence a person's engagement in task performance (Cole & Tufano, 2020). According to the theoretical base of the EHP, both intrinsic and extrinsic factors play a role in the person-task-context relationship. In the context of our study, if a child relies on the use of AI as part of rehabilitative intervention, it can influence the parents and caregivers to child interaction and the environments in which they interact. For example, if an assistive robot that uses AI is implemented during treatment sessions via in-person or via telehealth, an OT can assess the reciprocal nature among the client factors and environmental variables.

The EHP framework's fundamentals focus on ecology, how it affects human behavior and performance, and how one's performance cannot be understood outside of context (Dunn et al., 1994). For the purposes of this study, the OT can identify if a parent and caregiver of a client is more willing or receptive to the use of AI depending on the

setting they are using it in, how much prior knowledge is acquired regarding AI, and how much guidance is provided from the therapist during sessions. The EHP emphasizes that these perspectives are influenced by social or cultural context (Cole & Tufano, 2020). Understanding the child and family's environmental contexts is equally vital to understanding their social and cultural context. A child's performance range can be narrowed when the context resources are limited or unavailable to a person and can be high when their personal components match the demands of the environment (Cole & Tufano, 2020). The use of AI in rehabilitative settings is still either unknown or a reasonably new concept. It may not be an area of expertise and a feasible resource for most participants, which may also affect varying personal opinions and perspectives based on each caregiver and parent's individual contexts.

In addition to the EHP framework, this study will consider the family-centered service model. Family-centered care includes critical components such as collaboration between family members and healthcare providers, consideration of family contexts, policies and procedures, and patient, family, and healthcare professional education (Kokorelias et al., 2019). Families and caregivers, especially those of pediatric OT clients, are involved in the plan of care. OTPs work with parents and caregivers from different backgrounds and must be able to adapt to varying cultures and family dynamics. According to the EHP framework, an intervention entails collaboration between the client, family, and the therapist in order to enhance individuals' occupational performance (Cole & Tufano, 2020). Family-centered practice encourages families to be engaged and support the child's well-being and safety while working alongside the therapist to ensure quality outcomes. Families and caregivers want to ensure their

children's safety regarding personal information and privacy. Parents or caregivers may be skeptical or not trusting of AI and how that might present harm using the information given to it by the children receiving services. Seeking opinions of parents and caregivers on the use of AI allows them to be involved in their child's rehabilitative process and allows OTPs to have an idea of what may or may not work for each family regarding the use of AI during interventions.

Methodology

Study Design

This study gathered and analyzed demographic information alongside knowledge and opinions of AI and ideas for future uses in pediatric rehabilitation through a survey design (see Appendix A). The demographic information obtained provided context for the information discovered about opinions and trust levels of AI. Our target population included parents and caregivers of children receiving or who had received OT services in the past. We aimed to survey 40-60 individuals with varying backgrounds, including caregivers of various ages, race, ethnicity, educational backgrounds, socio-economic backgrounds, and career backgrounds. We used social media platforms such as Facebook community groups to distribute virtual flyers to gain a sample of individuals with different backgrounds (see Appendix B). We also contacted 28 pediatric OT clinics within Southern California for permission to post the flyers for clients to participate. Six clinics agreed to post our study flyer to their clinics via site permission letters (see Appendix C). Some clinics had multiple locations where the flyer was posted. Prior to beginning our study, we submitted a study application to Stanbridge University's Institutional Review Board (IRB) for approval (see Appendix D).

In order to be included in this study, participants were required to be parents and caregivers of children aged 3-18 who had participated in pediatric OT at any time in the past or were currently participating in pediatric OT. The literature review revealed that most interventions that used robotics and AI were conducted with patients over three years old. Much of the research in the field of pediatrics also identified children as those under 18, which influenced the age range we decided to use for our study.

Participants of this study could not be OTPs. Participants who were OTPs were excluded from this study due to potential biases, which could have skewed the data. OTPs may have had increased experience and knowledge regarding robotics and interventions using AI, or they may have had a vested interest in promoting the use of AI robotics in OT, which could influence the results of the study. Participants who did not have access to a device to take the survey were also excluded, and if participants could not fluently read English, they were excluded. The survey could only be completed with an electronic device with the internet, and if an individual could not read English, they would not be able to understand our questions and answer appropriately.

A new, shared Google email was created so participant information could be independently protected, as only the researchers had access to the information stored through the email's drive. This email was used for correspondence and compiling consent forms or other applicable documents in a protected Google Drive. We developed a Google Form survey, which would be administered for parents or caregivers to send in their responses. The survey was created to include both quantitative and qualitative questions to gain insight into our research questions. The team contacted individual pediatric clinics throughout Southern California to gain consent for them to post flyers at

their clinics with QR codes for the survey in the clinics. Consent and permission documents were protected in our password-protected drive. The survey was also distributed via Facebook groups such as Occupational Therapy Treatment Ideas & Information, Occupational Therapy Community, OT4OT, Research Survey Exchange Group, and Occupational Therapy and Educational Tips. Permissions from social media sites were obtained via email or with a review of the sites' terms and conditions and were stored within the shared drive. We also distributed our survey on an online community forum, AOTA CommunOT, under the Summer and Fall 2023 Survey Requests threads.

The survey included initial forms and questions that gained permission and informed consent to participate in the study. The survey's quantitative questions gathered information on various demographics, familiarity levels of AI and various AI programs and trends. These questions were followed by questions aimed at gaining qualitative information on opinions of AI used in pediatric rehabilitation and the potential benefits and risks of AI robots to increase engagement in family occupations. A brief definition of AI was also included with these questions in the survey to offer context to participants.

Data Collection

This survey was designed and launched as a Google Form survey. This survey was distributed via social media groups and flyers posted in clinics. The data collected through the Google Survey was automatically converted into Google Sheets, where the data was easily viewed and analyzed. The survey remained active through October 4th, 2023. The benefit of using a Google Form survey as our survey platform was that the data could be anonymously collected and easily shared with potential participants.

Data Storage

Once the surveys were completed, the information was stored in the password-protected Google Drive. The virtual survey method allowed participants to be less influenced or biased by in-person interviewers. The data collection also allowed more effortless protection of the data. The researchers provided screening questions through Google Forms for evaluating inclusion and exclusion criteria. To minimize the risks taken by parents and caregivers, no personal identifiers, such as names and addresses, were collected as part of the data collection process to ensure participants would be protected and completely anonymous.

Data Analysis

This mixed-method survey was beneficial as the qualitative information gave further insights into the quantitative data. As the team received survey responses, all researchers reviewed the data to identify points of interest. One researcher collected and organized the data based on education level, age, race, income, and OT goals reported by respondents and an analysis was conducted to provide insight into the research question. The qualitative data was coded and manually analyzed using Google Sheets. The team determined that the themes would be categorized for each of the qualitative questions.

One researcher reviewed and transcribed the qualitative data and further identified conceptual labels and trends. This same researcher identified key concepts and created label codes from each set of responses, which were compiled in a Google Sheet. All researchers reviewed and organized all transcribed qualitative data into common themes to identify underlying open-ended trends. All four researchers agreed upon and finalized the themes for four of the qualitative questions to include in the data analysis. For the

quantitative analyses of the survey answers, the research team reached out to a Stanbridge University Statistician to run tests on the data. We worked with a Stanbridge University Statistician to discuss recommendations on statistical tests to use for our data collection based on sample size. The Statistician ran significance tests on the quantitative data, providing the team with information from various T-tests.

Ethical and Legal Considerations

Our study adhered to the Occupational Therapy Code of Ethics and Standards of Conduct, ensuring anonymity, autonomy, and secure data collection (AOTA, 2020). Our research proposal was submitted through Stanbridge University's IRB. Before collecting our survey results, we obtained the necessary permissions from the IRB and followed the guidelines set in place per the Code of Federal Regulations and US Department of Health and Human Services. Once approval was received, we began to collect data through Google Forms. To ensure anonymity, we did not ask for any identifiable information on our survey, and the survey was completely anonymous. The Google Form was created to ensure anonymity by not requiring participants to enter their names, email addresses, or other personal information. This was done by going to the Google Forms settings and unchecking the box requiring participants to enter their email addresses. To establish autonomy, we ensured participants were aware of the study's objectives, benefits, risks, and funding when we were recruiting them so they could make an informed decision about participating or not. We provided consent forms that each participant must complete before starting the survey. When recruiting, we also informed participants that they were free to withdraw from the study at any point in time. We created a new Google email dedicated only for research purposes to ensure secure data collection. This helped

isolate research-related activities from our personal emails, which reduced the risk of unintended data exposure. This email had a unique and complex password to enhance the safety and security of our email. Only researchers involved in this study had full access to this email to protect the data that will be collected.

Our qualitative and quantitative data analysis process adhered to ethical principles by promoting transparency, validity, and reliability. For qualitative data analysis, the process involved transcription of the survey responses, identifying conceptual labels and trends and creating label codes for the data, which were then organized in a Google Sheet. Collaboratively, the research team organized the data into common themes, promoting transparency and objectivity in the interpretation. The quantitative analysis involved data organization based on variables such as education level, age, race, income, and other factors, and we collaborated with a Statistician from Stanbridge University to determine appropriate statistical tests based on sample size. Rigorous data analysis was promoted, as evidenced by the collaboration of each team member to ensure the validity and reliability of the findings. The team-building process for the qualitative themes minimized individual bias in our data interpretation.

Results

Quantitative Results

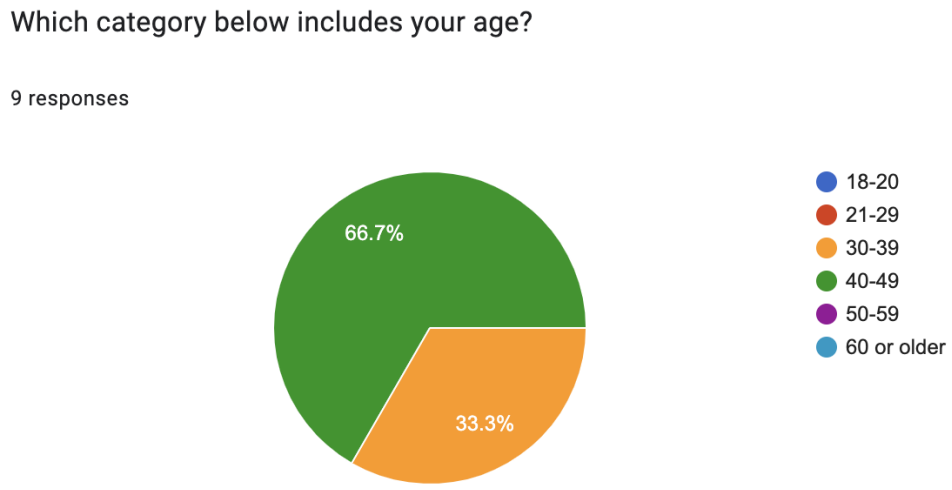
Our survey collected a total of 10 responses, however, only nine of the ten were used, as one of the participants was an OT, which was part of the exclusion criteria for this study. It is also important to note that there were minimal respondents once the survey launched. This prompted the research team to submit a modification form to Stanbridge University's IRB to include snowball sampling and direct contact with

participants who qualified to take the survey. By modifying the recruitment practices to include snowball sampling and direct contact, it was easier to receive a greater volume of responses, increasing the data analysis's reliability.

The demographic information collected in this study included participant age, race, gender, marital status, highest level of education, and household income. Of the nine participants, six were between the ages of 40 and 49, and the remaining three were between the ages of 30-39 (see Figure 1). Two of the participants reported to be White, one reported to be White Hispanic, one reported to be both Native Hawaiian or other Pacific Islander and White Hispanic, one was Middle Eastern, one was Armenian, and the highest number of participants (3) were Asian (see Figure 2). All the study participants were married individuals. There was an equitable distribution between participants with bachelor's degrees or higher and those with some college but no degree. Four responses indicated that the participant held a bachelor's degree, and one participant held a graduate degree (see Figure 3). The remaining four participants indicated they received some college schooling but no degree. 60% of participants, six individuals, reported a household income range of over $110,000, and three had a household income below $109,999.

Figure 1

Age of Participants



Note. Participants in the survey were divided into age groups as shown in this chart.

Figure 2

Ethnic Demographics of Participants

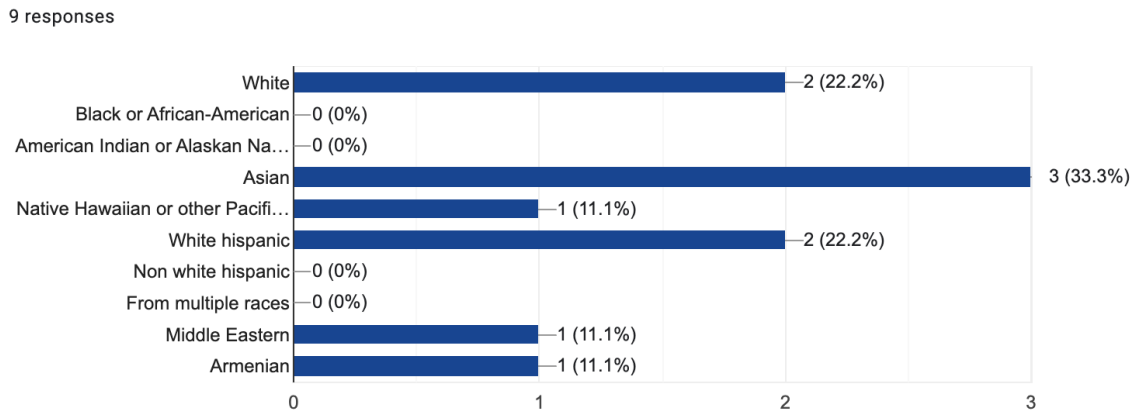
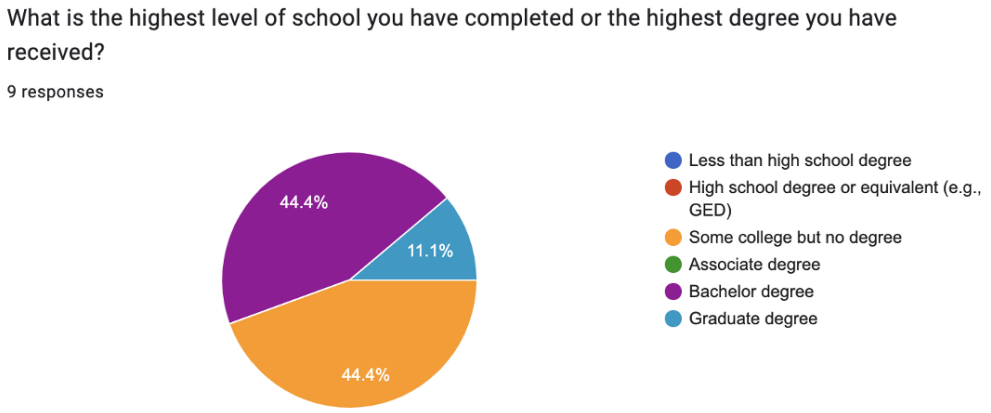


Figure 3

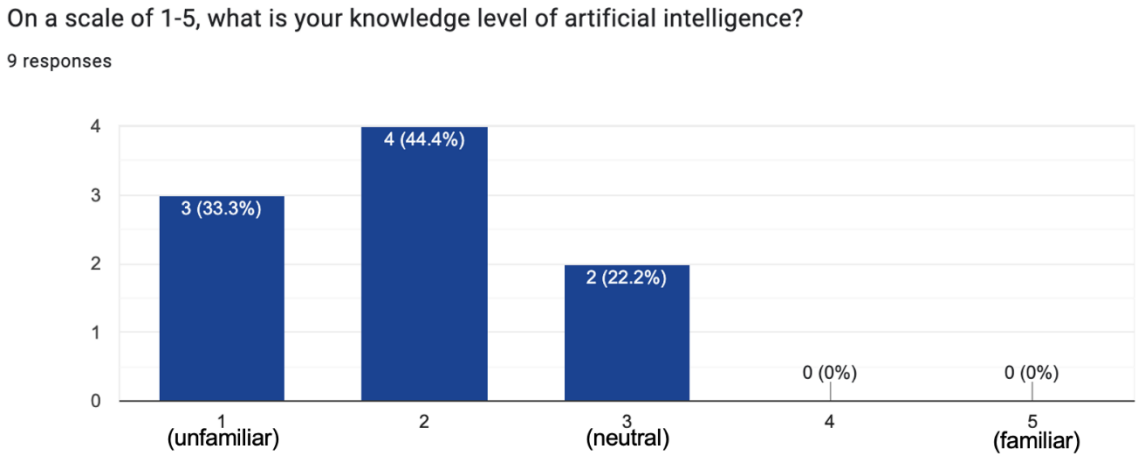
Highest Level of Education of Participants



Notably, three respondents indicated a 1/5, with “1” indicating unfamiliar and “5” indicating familiar with AI. Two more participants maintained a neutral stance, three out of five, in their familiarity and four participants indicated a 2/5 familiarity (see Figure 4). Further investigation into their familiarity with various AI types revealed that four were the most unfamiliar with ChatGPT, while six were the most unfamiliar with Grammarly, demonstrating these as the least known AI applications among the respondents. Moreover, three participants were the least familiar with AI used in social media. Seven out of nine respondents were the least familiar with social robots, emphasizing the substantial gap in understanding of this particular AI application.

Figure 4

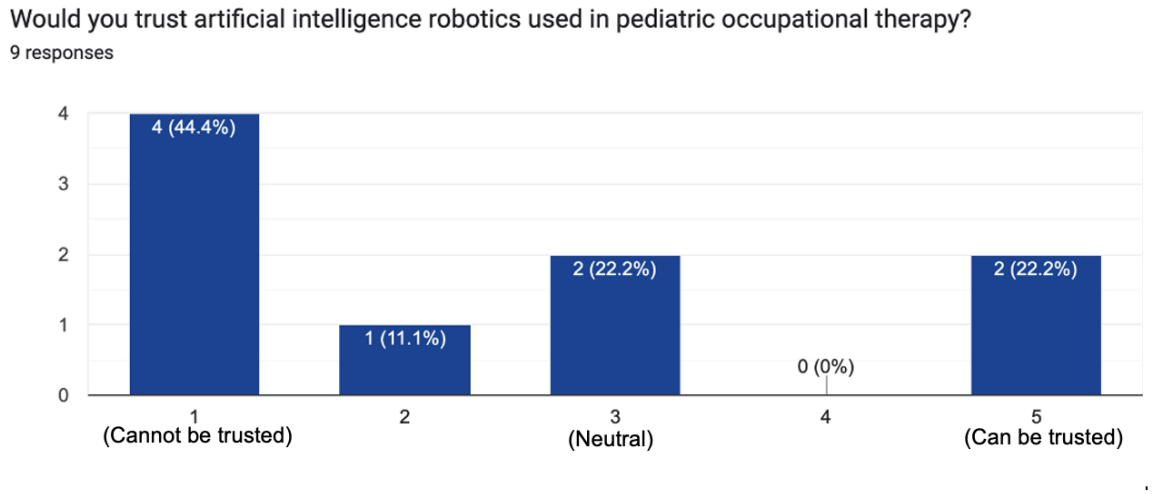
AI Familiarity



Regarding trust levels, the results were equally divided. When asked, "Would you trust AI robotics used in pediatric OT?," the highest level of distrust was seen in four respondents who would not trust AI robotics in pediatric OT (see Figure 5). Two participants remained neutral in their stance, and another two expressed the highest level of trust in the application of AI in pediatric OT. However, it is important to note that all respondents reported having little experience with robotics in pediatric OT, suggesting a lack of direct exposure to AI in this field.

Figure 5

Trustworthiness of AI



Statistical Analysis

When determining the significance between demographics and knowledge and familiarity of AI, there were no statistically significant relationships found from the data collected. A comparison of age groups on knowledge and familiarity of AI was done using a Mann-Whitney test. As indicated in Table 1, there was no significant differences ($p > .05$) between age groups as it relates to knowledge and familiarity with AI. There were also no significant mean rank differences for groups based on income levels and their knowledge and familiarity of AI. As shown in Table 2, a Kruskal-Wallis test indicated no statistically significant comparisons ($p > .05$) between income groups. Another Kruskal-Wallis test comparing education level on knowledge and familiarity of AI (see Table 3), found no statistically significant differences ($p > .05$) between education levels; some college but no degree, bachelor's degree, and graduate degree. It is important to note that although the results were statistically insignificant, when researchers compared the averages of those with higher than a bachelor's degree and

those who had no degree, those with a bachelor's or higher indicated overall higher knowledge levels of AI. As indicated in Table 4, there was also no significant mean rank differences ($p > .05$) among participants racial/ethnic groups as it relates to knowledge and familiarity with AI. Ultimately, the data yielded no statistically significant results, however, comparisons of group averages were evaluated and compared in the analysis process.

Table 1

Comparison of Age Groups on Knowledge and Familiarity of AI using a Mann-Whitney test (N = 9)

Items	Age group	*N*	*Mean Rank*	*p*
On a scale of 1-5, what is your knowledge level of artificial intelligence?	30-39	3	4.33	.714
	40-49	6	5.33	
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? ChatGPT	30-39	3	6.00	.548
	40-49	6	4.50	
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Grammarly	30-39	3	4.67	.905
	40-49	6	5.17	
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence filters on social media (Examples: Instagram photo filters, Snapchat video filters, TikTok video filters)	30-39	3	5.17	.905
	40-49	6	4.92	
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence chatbots such as customer service on websites/apps	30-39	3	5.50	.714
	40-49	6	4.75	
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Social robots (Examples: Moxie, QTRobot)	30-39	3	6.00	.548
	40-49	6	4.50	
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Digital Assistive artificial intelligence (Examples: Siri, Alexa, Google Assistant, Cortana)	30-39	3	6.17	.381
	40-49	6	4.42	
Would you trust artificial intelligence robotics used in pediatric occupational therapy?	30-39	3	4.50	.714
	40-49	6	5.25	

Table 2

Comparison of Income Groups on Knowledge and Familiarity of AI using a Kruskal-Wallis test (N = 9)

Items	Income	*N*	*Mean Rank*	*p*
On a scale of 1-5, what is your knowledge level of artificial intelligence?	$70,000-$89,999	1	2.00	.270
	$90,000-$109,999	2	3.75	
	Over $110,000	6	5.92	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? ChatGPT	$70,000-$89,999	1	2.50	.532
	$90,000-$109,999	2	6.00	
	Over $110,000	6	5.08	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Grammarly	$70,000-$89,999	1	3.50	.787
	$90,000-$109,999	2	5.25	
	Over $110,000	6	5.17	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence filters on social media (Examples: Instagram photo filters, Snapchat video filters, TikTok video filters)	$70,000-$89,999	1	2.50	.450
	$90,000-$109,999	2	6.50	
	Over $110,000	6	4.92	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence chatbots such as customer service on websites/apps	$70,000-$89,999	1	5.50	.515
	$90,000-$109,999	2	6.75	
	Over $110,000	6	4.33	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Social robots (Examples: Moxie, QTRobot)	$70,000-$89,999	1	4.50	.174
	$90,000-$109,999	2	6.75	
	Over $110,000	6	4.50	
	Total	9		

What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Digital Assistive artificial intelligence (Examples: Siri, Alexa, Google Assistant, Cortana)	$70,000-$89,999	1	5.00	.513
	$90,000-$109,999	2	6.75	
	Over $110,000	6	4.42	
	Total	9		
Would you trust artificial intelligence robotics used in pediatric occupational therapy?	$70,000-$89,999	1	2.50	.125
	$90,000-$109,999	2	2.50	
	Over $110,000	6	6.25	
	Total	9		

Table 3

Comparison of Education Level on Knowledge and Familiarity of AI using a Kruskal-Wallis test (N = 9)

Items	Education	*N*	*Mean Rank*	*p*
On a scale of 1-5, what is your knowledge level of artificial intelligence?	Some college but no degree	4	2.88	.073
	Bachelor's degree	4	7.00	
	Graduate degree	1	5.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? ChatGPT	Some college but no degree	4	4.25	.294
	Bachelor's degree	4	6.38	
	Graduate degree	1	2.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Grammarly	Some college but no degree	4	4.38	.479
	Bachelor's degree	4	6.00	
	Graduate degree	1	3.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence filters on social media (Examples: Instagram photo filters, Snapchat video filters, TikTok video filters)	Some college but no degree	4	3.75	.353
	Bachelor's degree	4	5.63	
	Graduate degree	1	7.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence chatbots such as customer service on websites/apps	Some college but no degree	4	4.50	.875
	Bachelor's degree	4	5.38	
	Graduate degree	1	5.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Social robots (Examples: Moxie, QTRobot)	Some college but no degree	4	4.50	.535
	Bachelor's degree	4	5.63	
	Graduate degree	1	4.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Digital Assistive	Some college but no degree	4	5.00	1.000

artificial intelligence (Examples: Siri, Alexa, Google Assistant, Cortana)	Bachelor's degree	4	5.00	
	Graduate degree	1	5.00	
	Total	9		
Would you trust artificial intelligence robotics used in pediatric occupational therapy?	Some college but no degree	4	5.00	.561
	Bachelor's degree	4	5.63	
	Graduate degree	1	2.50	
	Total	9		

Table 4

Comparison of Racial/Ethnic Groups on Knowledge and Familiarity of AI using a Kruskal-Wallis test (N = 9)

Items	Race	*N*	*Mean Rank*	*p*
On a scale of 1-5, what is your knowledge level of artificial intelligence?	Asian	3	6.50	.292
	White	2	3.75	
	Native Hawaiian or other Pacific islander, White Hispanic	1	2.00	
	Middle Eastern	1	5.50	
	Armenian	1	8.50	
	White, Hispanic	1	2.00	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? ChatGPT	Asian	3	5.67	.388
	White	2	6.00	
	Native Hawaiian or other Pacific islander, White Hispanic	1	2.50	
	Middle Eastern	1	2.50	
	Armenian	1	8.50	
	White, Hispanic	1	2.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Grammarly	Asian	3	6.83	.606
	White	2	5.25	
	Native Hawaiian or other Pacific islander, White Hispanic	1	3.50	
	Middle Eastern	1	3.50	
	Armenian	1	3.50	
	White, Hispanic	1	3.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence filters on social media (Examples: Instagram photo filters, Snapchat video filters, TikTok video filters)	Asian	3	5.67	.471
	White	2	6.50	
	Native Hawaiian or other Pacific islander, White Hispanic	1	2.50	
	Middle Eastern	1	7.50	
	Armenian	1	2.50	
	White, Hispanic	1	2.50	
	Total	9		

What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence chatbots such as customer service on websites/apps	Asian	3	4.50	.713
	White	2	6.75	
	Native Hawaiian or other Pacific islander, White Hispanic	1	1.50	
	Middle Eastern	1	5.50	
	Armenian	1	5.50	
	White, Hispanic	1	5.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Social robots (Examples: Moxie, QTRobot)	Asian	3	4.50	.623
	White	2	6.75	
	Native Hawaiian or other Pacific islander, White Hispanic	1	4.50	
	Middle Eastern	1	4.50	
	Armenian	1	4.50	
	White, Hispanic	1	4.50	
	Total	9		
What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Digital Assistive artificial intelligence (Examples: Siri, Alexa, Google Assistant, Cortana)	Asian	3	6.17	.340
	White	2	6.75	
	Native Hawaiian or other Pacific islander, White Hispanic	1	1.50	
	Middle Eastern	1	5.00	
	Armenian	1	1.50	
	White, Hispanic	1	5.00	
	Total	9		
Would you trust artificial intelligence robotics used in pediatric occupational therapy?	Asian	3	7.83	.179
	White	2	2.50	
	Native Hawaiian or other Pacific islander, White Hispanic	1	6.50	
	Middle Eastern	1	2.50	
	Armenian	1	5.00	
	White, Hispanic	1	2.50	
	Total	9		

Qualitative Results

OT Goals

Various qualitative questions were posed to respondents to provide context for the quantitative data. These questions resulted in the identification of specific themes. One question asked parents, "What are some goals your child was/is working on in OT?" In their answers, parents reported goals that fell into the themes of activities of daily living (ADLs), feeding, sensory regulation, and handwriting. Some parents identified multiple goals that were addressed in OT with their children (see Table 5).

Table 5

Common Goals of Children of Participants

	OT Goals			
Participant	**ADLs**	**Feeding**	**Sensory regulation**	**Handwriting**
1		X		
2	X	X		
3	X			
4			X	X
5	X			
6		X		
7	X			X
8	X			
9			X	

Note. Four goals children of participants were working on in OT interventions: ADLs (5), Feeding (3), Sensory regulation (2), and Handwriting (2)

Definition of AI

In order to gain context for participant's knowledge levels of AI, they were asked their definition of AI. Participant responses showed varying understandings, with one respondent saying, "not sure." Many responses related AI to technology, including "programmed software," "robots," or "machine learning."

General Opinions of AI

When asked, "What are your general opinions on AI," participant responses fell into the three categories of skeptical, not open, or concerns of impact. Those who were skeptical of AI spoke to the fact that they "don't want to rely too much on AI" and said it is "not comparable with humans." The individuals who were not open said they "don't see a positive outcome available from using AI" and "don't see it fitting in." Finally, those who fell into the theme of concerns of impact mentioned how their children "are being groomed to think it's normal" and that AI "should be regulated due to privacy concerns and the spread of false information."

How AI Fits in With Family Values

In conjunction with the previous question, participants were asked, "How do you see AI fitting in with your current family values?" These answers fell into the themes of uncomfortable, open, or seeing no benefit. The respondents who were not comfortable with AI mentioned how they saw AI fitting in at a "minimum" and "do not think I would feel comfortable with versions of this technology tested on my family." Those who were open stated, "I'd be open to it. There's something to be said about how programs these days can almost read our minds by using past behavior data" and "We are surrounded by AI, so we are not against it." Many participants, however, saw no benefit to the use of AI

in their family life, stating, “I do not see the benefit of AI in my household,” “I don’t see a positive outcome available from using AI,” and “I don’t see it fitting in.”

Opinions on AI in Pediatric OT

Participants were asked, “What do you think of the use of artificial intelligence in robotics in pediatric OT?” Following this question, we identified three themes such as lack of sufficient information to make a determination, viewing it as a helpful tool, and rejecting its use. For participants who wanted more information regarding AI, one respondent out of the four who fell under this theme was familiar with what the Moxie social robot could do and “did not agree with the goals that Moxie is designed to help kids work toward.” The same participant stated, “If the programming of the AI were neurodiversity affirming, I am not sure if I would have a problem.” One respondent stated, “It is very new to me since I haven’t imagined how a session with AI and the OT are together yet. I am willing to try out.” Another stated, “I think it’s wonderful that there’s progress for autistic children with the robots, but it does scare me. Humans are not robots. How can we work on regulation without human emotion?” For those who think AI would be a helpful tool, one out of the three respondents expressed that “if it improves efficiency, it is worth exploring.” The other two respondents expressed that “I’m all for it but as a supplemental tool” and that “I’m sure it can be helpful.”

Potential Benefits of AI

Participants were asked, “What potential benefits do you see with the use of AI robotics in pediatric OT?” The themes that followed this question were efficiency, increased engagement, behavioral conditioning, tool/toy, and saw no benefit. For those who answered efficiency, tool/toy, and increased engagement, there were five out of nine

participants who expressed these potential benefits. One respondent stated that it "might make some part of the evaluation run quicker; some interactive fun games with patients," and another stated that AI could be used for "turn taking games, perhaps able to sense a child's emotions or translate gibberish into language." One respondent expressed that their son "has always been very interested in robots, so there may be increased engagement if it happens to be the child's area of interest." One respondent's responses considered "behavioral conditioning" a benefit and expressed that AI "could work like hypnotism" and "condition children to do certain things like a robot would expect."

Potential Risks of AI

Participants were asked, "What potential risks do you see with the use of AI robotics in pediatric OT?" The themes that followed this question were privacy, child's reactions/interactions, lost human interaction, and so many things. For those participants who had responses to privacy, two respondents expressed that AI could be risky because "private information could be collected and analyzed." They mentioned the "use of personal data by bad actors." Two respondents had responses for child's reactions/interactions and expressed that "so far the technology is not neurodiversity affirming and I feel like my child has enough trouble with humans understanding and accepting his differences, he does not need to be fighting this same battle with AI." Another had concerns that their child would "not be responding to it or be scared." Three participants had responses that expressed concerns for lost human interaction and expressed that "children may become void of empathy and emotion, reliant on technology" and that AI "might not read all of the child's emotions or nonverbal language."

Discussion

Quantitative Results

In terms of demographics, the most notable relationship found in this study was between average education levels and knowledge of AI and robotics. In our study, participants with a bachelor's degree or higher, on average, reported greater knowledge levels of AI than those with some college education but no degree. Although knowledge levels of AI varied widely among participants, on average, trust levels in AI robotics were low. This may suggest that AI technology is not widely discussed or explained across educational institutions or that those with knowledge of AI technology do not believe it is suitable for use by children.

According to our study, average trust levels of AI were low, however, this conversely relates to research that has looked at the overall sentiments surrounding AI. Past research has found that the tone of discussion of AI in healthcare has trended to be hopeful over the years (Fast & Horvitz, 2017). This may point to a disconnect between beliefs regarding the personal healthcare options of parents and their children. Parents may be more conservative when it comes to their children and may need more reassurance when looking at AI technology.

All nine participants fell under either the 30-39 or the 40-49 age group. Because there were no significant differences between the two groups in areas of familiarity and trust, this suggests that age does not play a significant role in familiarity and knowledge with AI. All participants indicated that they had no prior exposure to AI robotics within their child's pediatric OT intervention, which may signify that views on AI are neutral and unbiased. Additionally, five out of nine of the participants in the study reported a

household income of over $110,000. Data analysis revealed no statistically significant differences in knowledge and familiarity with AI across different income groups. Furthermore, our study examined the influence of racial and ethnic backgrounds on participants' perceptions of AI in pediatric OT. The sample included a range of racial and ethnic groups such as White, Middle Eastern, Asian, etc. The findings showed that there were no statistically significant differences among these groups in terms of knowledge and familiarity with AI. A scoping review on the use of AI in rehabilitation found that factors such as race and ethnicity, socioeconomic status, parental education, and family income have an impact on the participation of children and youth but only a small fraction of studies (9%) consider these demographic factors when examining child and youth participation in rehabilitation and AI interventions (Kaelin et al., 2021). In contrast, when considering the findings from our study, it appears that racial and ethnic background as well as income levels were not influential in shaping their opinions regarding the use of AI in pediatrics OT.

When examining the results, it became apparent that parents and caregivers varied significantly in their familiarity with and trust in AI within the realm of pediatric OT. It is evident that a substantial portion of the respondents needed more essential information about AI applications, as indicated by the three who were the most unfamiliar with AI, while an additional three remained neutral. The trust levels among respondents were evenly distributed, with four participants expressing the highest distrust in AI robotics for pediatric OT, two remaining neutral, and another two showing the highest level of trust. However, it is crucial to acknowledge that all respondents had little experience with robotics in pediatric OT, suggesting that their trust levels might evolve as they become

more familiar with these technologies in practice. The relationship between education and knowledge levels of AI was not statistically significant in our study, but this may have been due to a lack of ample participants. It was found that, on average, those with higher than a bachelor's degree indicated higher levels of knowledge of AI than those with no degree, indicating a possible relationship between these two factors. When comparing averages, education was found to relate to knowledge levels of AI. However, other demographic factors did not influence knowledge or trust levels of AI. It is important to consider the small sample size of this project. However, future studies in OT should evaluate how factors such as race, age, gender, or socioeconomic status may impact treatment outcomes when using AI. Health services research is imperative to maximize the health and well-being of all people, populations, and communities, especially those of minority groups. Although the statistical analysis yielded no significant results for all demographics, the information gathered from this study can potentially inform future research on how demographics influence opinions of AI.

Qualitative Results

Definition of AI

The qualitative portion of our study revealed that parents and caregivers had varying backgrounds but similar perspectives on AI. When asked to define what AI was, responses implied that participants had differing views on what AI was before taking the survey, ranging from "programmed software" and "machine learning," which serve as a foundational component of AI, to "robots." These technologies may not all use AI, as non-humanoid robots currently exist and are used frequently. This also poses the question of how they were aware of or what their primary source of information regarding AI is,

whether that be gathering information through sources either by word-of-mouth or through the media. The definition of AI varied among participants, demonstrating diverse understandings, which is relevant to the research questions exploring parents' backgrounds and knowledge of AI. This variation could significantly influence their opinions about AI and its uses in pediatric OT.

General Opinions of AI

When asked their general opinions about AI, responses imply that there is still more to be understood and explored about what AI is, as there seem to be common misconceptions regarding its use. The responses from the participants revealed skepticism, resistance, and concerns about the impact of AI, which indicates a hesitancy for its use in pediatric settings. Those who reported skepticism expressed hesitation about relying too much on AI and believe that AI cannot replace human capabilities. This reflects current literature that shows parents prefer interventions that rely on the clinical expertise of human therapists (Butchart et al., 2021). Sentiments of skepticism and concern show the importance of the continued presence of OTPs and how OTPs need to use evidence-based practice and clinical reasoning when including AI robotics in interventions. Participants who were resistant to AI in pediatric OT did not foresee any positive outcomes and could not envision AI's integration in the field. Those expressing concerns about AI's impact were worried their children were being normalized to AI and emphasized the need for regulation due to privacy and misinformation concerns. In many studies reporting parental opinions surrounding robotics, parents have indicated their desire for human interaction and security concerns (Butchart et al., 2021). This notion was supported by the quantitative and qualitative data collected in this survey.

How AI Fits in With Family Values

When asked about how they would see AI fitting in with their current family values, responses implied that some participants are willing to see more of what AI can do since it is now becoming a large part of society but are very much wary of the use of AI in their everyday lives. In relation to social context and family values, three out of nine of the participants saw no benefit from AI's incorporation into their family life and another three out of nine were skeptical or not comfortable with AI. This could be due to a lack of knowledge of the technology or a lack of confidence in how to use such technology without the assistance of therapists and other professionals. Participants who expressed discomfort with AI were reluctant to embrace it and preferred minimal use, expressing concerns about the testing of AI technology on their families. It was important to note all ethical and legal considerations when working with children and their families, and this study emphasized how confidence in AI technology can waver if parents are concerned about their children's wellbeing. The few responses that indicated an openness to AI and its potential benefits noted that AI is already prevalent in their lives. This shows that, as this technology becomes more relevant and commonplace in society, the public will likely become more comfortable or more understanding of its use. Current research supports this consideration, as studies have explored how parents can incorporate AI and AI robotics into home programs to support their children's therapeutic goals (Lee et al., 2022). In this research, parents indicated that this technology could be convenient and beneficial for their children.

Opinions on AI in Pediatric OT

When asked what they thought of the use of AI in robotics in pediatric OT, four out of nine participants seemed to share a common idea of what AI was. However, those same participants were curious to understand what AI's further capabilities were and what overall outcomes may result from its use. This curiosity could point to an opportunity for OTPs to educate parents and caregivers about AI. It also showed that much of the parental hesitancy towards using AI robotics stems from a lack of education or knowledge of AI's abilities and contributions to success in pediatric interventions. Those who believed AI would be helpful as a tool indicated that using AI might be worthwhile. As a supplemental intervention strategy, it was only used if a therapist was present or if effective. These conditions reflect the distrust of AI in pediatric OT; however, they also demonstrate areas of opportunity for education or further research into the most efficient and successful ways to use AI. These hesitant responses support this study's hypothesis as parents reported varying levels of trust and openness towards AI; however, they also indicated a desire for more information, transparency, and clear communication regarding AI's role in therapy. In pediatrics, there is a lack of well-designed and effective devices available to this population (Gonzalez et al., 2021). This implies a need for practitioners to investigate more AI-enabled technology to advocate and educate parents and caregivers regarding these tools and to demonstrate its use in pediatric settings so that parents and caregivers may form more informed opinions.

Potential Benefits of AI

When asked what potential benefits participants might see with the use of artificial intelligence robotics in pediatric OT, the mentioned benefits include efficiency,

increased engagement, and behavioral conditioning. These findings aligned with the hypothesis that parents may be open and recognize the potential benefits of AI; however, this study did not explore why parents feel a certain way regarding AI. Although many respondents identified benefits, it is still being determined where these opinions stemmed from or if these parents were aware of known benefits of AI technology that stem from research in the field.

Potential Risks of AI

The question of the potential risks of AI in pediatrics OT reflects parents' considerations surrounding the drawbacks of AI integration. The responses received emphasize the need to address parents' concerns to build trust in AI-assisted therapy, whether that be through exposure or further research on its use with various abilities and diagnoses. The qualitative results consisted of various opinions, values, and knowledge levels among parents regarding AI in pediatric OT. This affirms the importance of considering these factors when implementing AI in therapeutic settings and supports the hypothesis that parents' trust and openness towards AI may vary based on experiences, values, and perceptions.

Significance of Parental Opinions

This study offers some insight into why parents are skeptical of AI and AI robotics. Two respondents brought up privacy concerns, and four discussed a need for human interaction that the use of AI may inhibit. These responses indicate that participants have an overall concern with how invasive AI might be with personal information and how AI may prove to be a detriment to a child's development or even reverse their progress in social participation. These responses also suggest that parents

trust traditional therapy-led sessions more due to these concerns. This reflects current research that suggests privacy concerns and loss of human interaction are considered by parents to be the main drawbacks of social robotics that may use AI (Butchart et al., 2021). Further research into the uses and purpose of AI robotics and AI technology may be needed to establish higher trust in these advancements. It is critical to determine if parents could become more receptive to AI robotics through education, further research, or more exposure. In reference to the AOTA research agenda's translational research section, this study provides insight into the perceived effectiveness of AI and AI robotics in pediatric OT (AOTA, 2018). AI is a developing area of technological advancement, and OT needs to keep up with current technology trends. When introducing AI technology into treatment sessions, OTPs can encourage parental support by offering transparency about how and why the technology may be beneficial to incorporate into intervention activities with children.

Future Research

As a result of our study, we have gained insight into parents' and caregivers' perspectives and knowledge about AI. Our study highlights the need for future studies to consider various factors, including demographics, to gain a better understanding of how AI impacts children and youth. Even though our study remains inconclusive concerning how various racial/ethnic groups receive AI, it still offers context for future studies designed to evaluate AI and AI robotic interventions.

The disparity in AI knowledge deduced from our study's results underscores the potential need for more education and dissemination of information about AI's potential in this field. Although research has been conducted investigating AI robotics and its uses,

it is imperative that therapists continue to educate parents and create awareness surrounding these AI robotic interventions. Moving forward, OTPs can contribute to the trust of AI technology through further research on outcomes and education about AI. This type of research may contribute to a broader acceptance or confidence in AI robotics and can potentially alter negative views.

A better understanding of the applications of AI to OT can also significantly improve patient care for pediatrics. Future studies should be conducted on a larger scale in order to confirm if there are statistically significant correlations between education levels and knowledge and trust of AI. Continuing research is crucial for staying up-to-date and ensuring that more people embrace the use of AI in pediatric OT, making it more effective and widely accepted. Collecting further data will help identify how to create a more accepting environment for AI technology in pediatrics and can help ensure that children benefit from these technological advancements.

Limitations

Limitations arose when recruiting survey participants, which may have influenced our data. One limitation was that our recruitment materials were not translated into different languages, which may not have captured a larger population and diverse backgrounds in our sample size. Another limitation was that participants may not have qualified to take our study and may have provided inaccurate or faulty data. Our study could not be generalized to the broader population because of language barriers and varying familiarity with technology. Time constraints also contributed to sample size limitations. Other limitations of our study included a lack of participants with lower income levels and more participants with higher education levels. Although there were a

variety of ethnicities identified, none of the participants identified as Black or African American, American Indian or Alaskan Native, or of multiple races, which indicated a need for more participants of varying race in future research. Only one participant was male, with the other eight identifying as female. This may indicate a gender bias in the data, meaning that the majority of opinions were from females as opposed to males, which calls for further research to investigate a mix of more male and female opinions. Possible reasons for these limitations could have been that the phrasing of our survey questions could have been more effective, and we needed to contact more online community groups and pediatric clinics to gain a wider and larger sample size.

Conclusion

After reviewing an extensive amount of peer-reviewed research focusing on robotics implemented in OT as well as other areas of practice, gaps remain regarding parent and caregiver perspectives on the use of AI as an element of their child's intervention. AI is a novel scope of technology that is still foreign to most individuals regarding its usage in healthcare settings. This study aimed to bridge this knowledge gap by addressing two main research questions. The first research question, "How does background and knowledge of AI in parents of children who have received pediatric OT affect opinions of AI used in pediatric interventions?" was addressed through our survey, which gathered demographic information, knowledge levels, and parents' opinions of AI use in pediatric intervention. Our survey's findings provided insights, suggesting that parents and caregivers exhibit a degree of openness to the use of AI in pediatrics OT, although trust levels in AI varied. The second research question, "What are parents' and caregivers' general perceptions of AI, and what do they believe are potential risks,

benefits, and uses for AI robotics in pediatric OT?" was also explored through our survey, and data allowed for an understanding of parents' and caregivers' perspectives of AI, their views on the integration of AI robotics in interventions, and their concerns related to AI's application.

Seeking insights from those most involved in the client's plan of care – in this case, the families or caregivers – could help identify what may cause barriers or facilitate future use. This study gathered and analyzed demographic information alongside knowledge and opinions of AI and its uses in pediatric rehabilitation through a survey. Our original hypothesis stated that parents would report openness to the use of AI but hesitancy and wavering trust levels of AI. Additionally, we proposed that demographic factors like age and educational background would influence parent/caregiver trust levels of AI usage in OT.

The results of this survey provide insight into the perspectives of parents and caregivers on AI. The survey results were consistent with previous literature on the usage of AI in pediatrics, sharing similar findings in that less educated parents and caregivers were more likely to distrust the use of AI in healthcare compared to those who made a six-figure income (Wahl et al., 2018). Educating those caregivers and parents on the use of AI interventions may support an openness to explore AI as an option for facilitating efficient and effective care for their children. Social robots are currently used in OT, but this study indicated that parents were hesitant and untrustful of such technology. It is imperative for OTPs to conduct further research on the use of AI technology and to consider best practices for better educating and informing parents about its benefits.

Upon review and analysis of collected data, we arrived at conclusions about both of our hypotheses. Notably, there is reasonable evidence to suggest that parents/caregivers are open to using AI in pediatric OT despite varying levels of trust in AI. However, there is insufficient evidence from this study to confirm that demographic factors play a significant role in parent/caregiver trust levels of AI. While not significant in statistical testing, there was a relationship between education and AI knowledge when examining the averages. However, knowledge levels did not correlate with trust levels. This study promoted a greater understanding of views on the use of AI and robotics in the intervention process. It helped determine areas of concern that parents and caregivers may have. Our study also provided insight into how AI robotics may be applied to pediatric rehabilitation in the future. As AI is becoming an integral part of everyday life, the field of pediatric OT can benefit from ongoing exploration and research to ensure the effective and responsible use of AI technology in enhancing the well-being of children.

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Appendix A

Survey

Informed Consent

Institutional Review Board (IRB) APPROVED
Approval Date: 8/14/2023
STANBRIDGE UNIVERSITY.

Stanbridge University - Department of Occupational Therapy

Title of Study: The use of artificial intelligence in pediatric occupational therapy interventions: Parent and caregiver perspectives

Research Team: Samantha Joy Escobar, Ariana Hans, Megan Lefebvre, and Kimberly Yu

* Indicates required question

Informed Consent to Participate in Research

Purpose of Study:
The purpose of this research is to explore perspectives and trust levels of the use of artificial intelligence in pediatric interventions by surveying parents and caregivers with children undergoing pediatric occupational therapy or who have received pediatric occupational therapy services in the past.

Inclusion / Exclusion:
In order to be included in this study, participants must be parents and/or caregivers of children aged 3-18 who have participated in pediatric occupational therapy. Exclusion criteria include occupational therapists because our study implements the family-centered service model, which focuses on family-centered care and potential biases. Participants without access to a device or fluency in English will also be excluded.

Procedure:
Participation in this online survey requires completing a consent form, indicating that you have read and agreed to participate. The time for participation varies from 15 to 20 minutes, depending on the depth of your responses. Your participation in this online survey is completely anonymous. No information you share electronically can be traced to you or the computer you used.

Risk:
Despite our best efforts to minimize risk to study participants, we acknowledge that participating in any study comes with certain possible risks. While filling out our survey, participants may experience psychological effects from recalling possibly upsetting or stressful interactions with occupational therapy services and/or robotics. The participants have the right to withdraw at any time during the survey without any negative consequences. It is essential to clarify that this study is primarily designed to advance knowledge on artificial intelligence and robotics in occupational therapy and any therapeutic benefits for the children are not anticipated as a result of their parents' participation in this study.

Benefits:
Benefits for the participants of this study include increased awareness of artificial intelligence and personal analysis of the potential benefits and costs of the use of artificial intelligence in robots used in pediatric therapy.

Anonymity:
Participation in this research is completely anonymous, ensuring no electronic trace of information or computer usage. All data collected will be stored on password-protected Google Drive, with access restricted only to researchers. Your agreement to participate and your survey responses will be kept strictly confidential and will never be shared with your child's occupational therapist or any clinic staff. Your privacy and autonomy are of utmost importance to us.

Voluntary:
Participation in this research is entirely voluntary, and there will be no penalty or loss of benefits. While you may have been asked to participate due to your child receiving OT services at specific clinics, your decision to participate or not will not result in any penalties or loss of benefits for your child at the clinic. You have the right to discontinue participation at any time without facing any negative consequences, and you may choose to skip any survey questions without any impact on your child's entitlement to clinic benefits.

Who do I contact for questions?
If you have questions about this study, you may contact us via email at:

- **Research Team**: samantha.escobar@my.stanbridge.edu, ariana.hans@my.stanbridge.edu, megan.lefebvre@my.stanbridge.edu, kimberly.yu@my.stanbridge.edu
- **Primary Investigator:** sdavis@stanbridge.edu

The Stanbridge University Institutional Review Board, which is concerned with protecting research volunteers, can be contacted if you have any issues concerning your rights as a participant in the study. You may contact the IRB office via phone at 949-794-9090 or via email at irb@stanbridge.edu.

Survey Questions

Multiple choice

Are you an occupational therapist?
a) Yes
b) No

What category below includes your age?
a) 18-20
b) 21-29
c) 30-29
d) 40-49
e) 50-59
f) 60 or older

Select which race/ethnicity you identify with. (Select all that apply)

a) White
b) Black or African-American
c) American Indian or Alaskan Native
d) Asian
e) Native Hawaiian or other Pacific Islander
f) White hispanic
g) Non white hispanic
h) From multiple races
i) Other

What is your gender?
a) Female
b) Male
c) Other (specify)

What is your marital status?

a) Married
b) Widowed
c) Divorced
d) Separated
e) Never married

What is the highest level of school you have completed or the highest degree you have received?

a) Less than high school degree
b) High school degree or equivalent (e.g., GED)
c) Some college but no degree
d) Associate degree
e) Bachelor degree
f) Graduate degree

What is your household income range?

a) Under $29,999
b) $30,000-$49,999
c) $50,000-$69,999
d) $70,000-$89,999
e) $90,000-$109,999
f) Over $110,000

Has your child received occupational therapy services in the past or is your child currently receiving occupational therapy services?

a) Yes
b) No

Have you had experience with robotics in pediatric occupational therapy settings? (Examples: Social robots such as Moxie and QT; adaptive devices such as Obi Robot)

a) Yes
b) No

Free-response

What language(s) do you mainly speak at home?

What are some goals your child was/is working on in occupational therapy?

How would you define artificial intelligence?

If you answered “yes” to the above question, how has your experience influenced your opinion of artificial intelligence in robotics? If you answered “no”, what would you expect from an experience with artificial intelligence robotics?

What are your general opinions on artificial intelligence and how do you see artificial intelligence fitting in with your current family values?

What do you think of the use of artificial intelligence in robotics in pediatric occupational therapy?

What potential benefits do you see with the use of artificial intelligence robotics in pediatric occupational therapy?

What potential risks do you see with the use of artificial intelligence robotics in pediatric occupational therapy?

5-point Likert scale

Familiarity (1 = "Unfamiliar" to 5 = "Familiar")

On a scale from 1-5, what is your knowledge level of artificial intelligence?

What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? ChatGPT

What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Grammarly

What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence filters on social media (Examples: Instagram photo filters, Snapchat video filters, TikTok video filters)

What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Artificial intelligence chatbots such as customer service on websites/apps

What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Social robots (Examples: Moxie, QT Robot)

What is your familiarity level (scale of 1-5) of the following artificial intelligence programs and trends? Digital Assistive artificial intelligence (Examples: Siri, Alexa, Google Assistant, Cortana)

Trust Levels (1 = "Cannot be trusted" to 5 = "Can be trusted)

Would you trust artificial intelligence robotics used in pediatric occupational therapy?

Appendix B

Study Flyer

STANBRIDGE UNIVERSITY

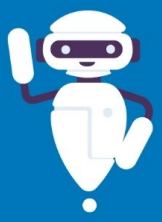
Masters in Occupational Therapy Thesis Research Survey Study

We are seeking parents and caregivers of children who are ages 3 to 18 who have received or is currently receiving occupational therapy services.

Purpose: To investigate perspectives, trust levels, and general knowledge of parents and caregivers regarding the use of artificial intelligence within pediatric occupational therapy and family-centered service care.

Eligibility:

- Must not be an occupational therapist
- Must be fluent in English
- Must have access to electronic device



The survey will take approximately 15-20 minutes to complete.

Study will be available from August 2023 to November 2023

If you would like to participate, scan the QR code below or visit the link to take the survey:

https://forms.gle/nVaqeba3yMS6vy6D8

Contact the research team for any questions:

sdavis@stanbridge.edu
ariana.hans@my.stanbridge.edu
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Principal Investigator:
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Research Team:
Ariana Hans
Kimberly Yu
Megan Lefebvre
Samantha Joy Escobar

Appendix C

Site Permission Letter

DATE

NAME

ADDRESS CITY, STATE ZIP

Dear Ms./Mr./Dr. NAME:

I have reviewed your request regarding your study and am pleased to support your research project entitled “The use of artificial intelligence in pediatric occupational therapy interventions: Parent and caregiver perspectives." Your request to use the facilities at **FACILITY/ORGANIZATION/INSTITUTION NAME** as a research or recruitment site is granted, in the form of posting flyers with study recruitment information at our facility. The research will include online survey completion with participants who have given informed consent to participate in your study. This authorization covers the time period from the date of this signed letter to the end date of the study (finalized end date to be included in final study flyer details but will not go beyond 12/31/23). This site authorization is contingent upon receiving Institutional Review Board (IRB) approval from the Stanbridge University IRB (and STATED INTERNAL IRB, if a site requirement). We look forward to working with you.

In the event that the research team is unable to deliver hard copies of the flyers to the site for posting, we are (please select one option):

____ NOT willing to print and post flyers that are emailed to us from the research team

____ WILLING to print and post flyers that are emailed to us from the research team

Sincerely,

Name

TITLE

Signature and date

Appendix D

Institutional Review Board Approval

Fri 8/11/2023 10:44 AM

IRB APPROVAL NOTIFICATION – IRB Application #06MSOT012

Hello,

After review of the requested revisions to your IRB application for Study ID #06MSOT012 it has now been approved by the IRB and you may initiate your study at this time. NOTE, this approval is limited to the activities described in your IRB application. Any anticipated changes require submission of an IRB Modification Form, with subsequent IRB approval required, prior to initiation of those changes to the approved protocol or supporting study materials (including your approved recruitment materials, study instruments, and consent documents). Note this also includes a prospective submission of an IRB Modification Form for a change in the total number of subjects stated in your approved IRB application, with NO additional subjects enrolled until you have received IRB Modification application approval.

Please submit a single pdf file containing only your IRB approved Informed Consent Form. It will be stamped to notate official IRB approval and returned to you via email for your use with subjects. Note only copies (electronic/screen-shot is acceptable) of this final approved version of your Informed Consent for your study clearly displaying the IRB approval stamp may be utilized with subjects.

Congratulations and we wish you success with your thesis project.

Sincerely,

Julie Grace, MS, MA | IRB Chair

jgrace@stanbridge.edu | **P.** 949.794.9090 **| F.** 949.794.9094