Ethical Artificial Intelligence in Telerehabilitation of Neurodevelopmental Disorders: A Position Paper

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Abstract. Neurodevelopmental disorders are a cluster of mental disorders with neurobiological origins that occur during the development of children and lead to cognitive deficits with possible behavioral and emotional consequences. Intensive and individualized interventions are required to take action on these deficits timely. Recently, telerehabilitation techniques for neurodevelopmental disorders have been implemented by automating the rules to set up the intervention protocol. The use of artificial intelligence algorithms primarily applies to this automation. Although these methods have several advantages, such as automatizing personalization and self-adaptation, ethical implications emerged. In detail, it remains unclear how ethical principles can be applied to these new interventions. The present paper outlines a framework of ethical recommendations for using artificial intelligence in telerehabilitation for children with neurodevelopmental disorders. For this aim, a review of the use of artificial intelligence in adults as users is presented and the European Union requirements for trustworthy artificial intelligence for children are explored. The paper proposes some practical applications of ethical principles for artificial intelligence systems in the telerehabilitation of neurodevelopmental disorders and research strategies in line with the European Union guidance. This review of the ethical implication of artificial intelligence is intended to be an opportunity to improve artificial intelligence telerehabilitation of children with neurodevelopmental disorders.

Keywords: Artificial Intelligence · Artificial Intelligence Algorithms · Telerehabilitation · Rehabilitation Care · Neurodevelopmental Disorders · Ethics · European Union guidelines · Ethical Recommendations

1 Introduction

1.1 Telerehabilitation of Neurodevelopmental Disorders

Telerehabilitation is a branch of telemedicine concerning the delivery of remote rehabilitative treatment with the individual working independently in a familiar environment and with clinician monitoring through the Internet and telecommunication technology [1].

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Telerehabilitation has been applied for years to treat children with neurodevelopmental disorders (NDDSs) [2]. According to the International Classification of Diseases 11th (ICD-11) Revision, the most recent version of a system used by healthcare providers to classify and code diseases [3], neurodevelopmental disorders are classified into:

1. Disorders of intellectual development (6A00-6A0Z)
2. Developmental speech or language disorders (6A01)
3. Developmental learning disorder (6A03)
4. Developmental motor coordination disorder (6A04)
5. Autism spectrum disorder (6A02)
6. Attention deficit hyperactivity disorder (6A05)
7. Stereotyped movement disorder (6A06)

These disorders imply cognitive deficits and can also affect the behavioral, emotional, and relational development of children [4]; these characteristics require the intervention of several professionals working together to enhance impaired abilities and avoid long-term cascade effects on other abilities [5]. Rehabilitation is a complex process that may require telerehabilitation to strengthen impaired functional or instrumental skills; this often occurs within integrated intervention programs. An intervention that integrates classical treatment in the clinician's presence with remote treatment, thus rehabilitative treatment in mixed delivery, can ensure effective treatment. These interventions offer the possibility of making the rehabilitation course intensive but customizable, to achieve less repetitiveness of activities, and respect for the zone of proximal development [1]. The activities are challenging but possible for the user who performs them; the activities are at a slightly higher level of difficulty than the child's current performance. This contributes to a positive effect on both child and family motivation [6].

Various platforms for the telerehabilitation of neurodevelopmental disorders have been developed recently. These platforms allow both "skills" work (training of deficit abilities) and "processes" work (training of substrate abilities for the development of more complex skills) [7–9]. The effectiveness of telerehabilitation treatments has been demonstrated in various studies involving, for example, specific learning disorders such as dyscalculia [10], dyslexia [11], or other neurodevelopmental disorders such as attention deficit hyperactivity disorder [12] or autism spectrum disorder and intellectual disability [13]. Tele-rehabilitation can partly answer the challenges posed by the COVID-19 pandemic but also the limitations of national healthcare systems. Examples are difficulties in moving frequently from one's home to perform treatment at the clinic or such in Italy the clashing with long waiting lists and the organization of public health services [2] The child connects remotely from a computer and performs many rehabilitative activities from home with adult monitoring and the clinician visiting the child in the outpatient setting only periodically. This type of intervention reduces costs for families and increases the number of children who simultaneously receive treatment from the clinician [14].

1.2 Artificial Intelligence in Telerehabilitation of Neurodevelopmental Disorders

Technology development has added the study of new applications of computing power to the opportunities of telerehabilitation. Indeed, in the last fifty years, we have witnessed

the development of Artificial Intelligence (AI) [15]. AI represents the new design of digital environments and has also begun to be integrated into the telerehabilitation of neurodevelopmental disorders in different forms. Robotics [16–19], virtual reality [20–23], and online platforms [24–26] are just some of the most popular applications of AI models in rehabilitation and learning contexts [27]. Several studies have demonstrated the effectiveness of implementing these models for the skill enhancement of children with neurodevelopmental disorders [28–30]. For example, Melis et al., (2001) [31] presented ActiveMath, a web-based intelligent tutoring system for mathematics. ActiveMath dynamically generates interactive courses based on a student's goals, preferences, skills, and knowledge. It uses various AI techniques to create self-adaptive courses, feedback, and dynamic exercises. Riedl et al. (2009) [32] designed a computer game to help adolescents with autism spectrum disorders with social skills. Teens can practice in different social scenarios with minimal monitoring by caregivers, teachers, and health professionals. Baschera & Gross (2008) [33] developed an intelligent and adaptive tutoring system that children and adolescents can use with spelling difficulties. Drigas & Ioannidou (2013) [27], in a systematic review, showed that most of the AI tools used for learning had positive results. Although these interventions have several advantages and application opportunities, fundamental ethical implications must be considered, such as those related to privacy or explainability [34]. Moreover, it is still unclear how ethical principles can be applied to these new interventions.

1.3 Ethics of Artificial Intelligence

Many definitions of AI have been proposed over the years. In 2019, the European Union defined AI as a set of software and/or hardware systems designed by humans capable of acting in both the physical and digital environment through data acquisition. They are systems with complex goals that can interpret data, make decisions, and act according to the set goal [35]. AI systems have wide applications and significant impacts in various areas of society [36].

A worldwide debate has been generated about what principles should guide AI design, use, and deployment. Organizations worldwide have worked to answer these questions [37–39] through national and international workshops attended by hundreds of AI experts. This work has led to the drafting of different policy, business, and research papers that aim to guide ethical AI [37]. A scoping review [40] of existing global ethical guidelines for AI through 2019 revealed that most documents agree on some essential principles to guide AI design and use: transparency, justice, non-maleficence, accountability, and privacy (see Table 1).

However, we believe there is a lack of a unified view of the many contributions concerning the ethics of AI and that there remain some open questions related to how ethical principles should be interpreted and implemented.

In 2020, the European Union partially answered these questions by publishing a tool for evaluating the trustworthiness of AI: The Assessment List for Trustworthy Artificial Intelligence (ALTAI) [41]. This is the first tool for the AI assessment according to the European Union's Ethical Guidelines for Trustworthy AI [42]. The ALTAI is a flexible tool that is primarily intended for organizations that want to evaluate the trustworthiness of their AI systems. It seeks to help them understand the meaning of trustworthy AI and

Table 1. Ethical principles for AI shared by worldwide guidelines.

PRINCIPLES	DEFINITION
Transparency	Concerns the concepts of explainability, interpretability, communication processes, and information diffusion. This principle covers the use of data and its objectives, human-system interaction, and automated decisions
Justice	It includes the concepts of fairness and avoidance, monitoring and minimization of bias and discrimination (such as respect for diversity, inclusion, and equality), the ability to challenge decisions, the right to redress and remedy, equitable access to data, and the benefits of AI
Non-Maleficence	Includes the concepts of safety and avoidance of foreseeable or unintended harm such as discrimination, invasion of privacy, or physical harm
Accountability	Includes the concepts of acting with "integrity," defining the allocation of responsibility in advance, paying attention to processes that could lead to harm, promoting diversity, and introducing ethics into scientific research
Privacy	Includes the concepts of protection, data security, trust, and freedom

know the risks and strategies to reduce them while simultaneously trying to enhance AI's benefits. The basic idea is to make people understand that AI affects society but also different actors, including citizens (with special attention to children and minority people). The tool envisions a systems assessment through a multidisciplinary team that also includes experts in the different application areas of AI, e.g., researchers, designers, staff who will use or work with the AI system, ethicists, and legal officers. The tool includes self-assessment questions in agreement with the seven requirements of the European Union for trustworthy AI:

1. Human Agency and Oversight
2. Technical Robustness and Safety
3. Privacy and Data Governance
4. Transparency
5. Diversity, Non-discrimination, and Fairness
6. Societal and Environmental Well-being
7. Accountability

1.4 Ethical Artificial Intelligence for Children

There is an increase in the breadth of ethical discourse related to AI applications with adults as users. However, the increased presence of intelligent systems in children's everyday lives poses fundamental ethical questions for researchers, healthcare professionals, and stakeholders [43].

In recent years, some organizations (e.g., UNICEF, UNESCO) have published documents that have addressed the issue of trustworthy AI for children as primary users [44–46]. These papers have sought to understand whether the ethical principles guiding

AI are also valid when children are involved with the aim to help develop reliable AI for children and youth and to help them and their caregivers use it safely.

AI can also impact children, so there is a need to address the ethical issues affecting them in this area. Often in technology development, children do not have the opportunity to communicate their ideas, needs, or worries, and there is a lack of figures to encourage them in this communication. Very often, children do not have all information to understand how their data are used or if they are discriminated against by a system [47]. In 2022, the European Union tried to address these needs by publishing "Artificial Intelligence and the Right of Children" [48]. This document identified some key requirements, application strategies, and research gaps that still need to be addressed to protect children when interacting with AI systems. Some key points of the paper are summarized in Table 2.

Table 2. Requirements and strategies of the European Union for trustworthy AI for children.

Artificial Intelligence and the Right of Children	
REQUIREMENTS	*AI minimization methods*. It is important to consider AI technology as a limited resource
	Transparency, explainability, communication, and accountability. Minor users must be informed and made accountable for using AI systems
	Inclusion and non-discrimination. AI must be suitable for children. Prejudice and discrimination must be avoided
	Privacy, data protection, and security. Children and their caregivers must have decision-making power over what data AI systems use, and how it is used and shared
	Respect for children's agency. Children must be aware of their interaction with AI systems. Research must respect and foster the construct of children's agency
METHODOLOGY	*Prediction, evaluation, and monitoring*. Evaluation tools and guidelines must be designed for AI stems that have children as users
	Multi-stakeholder collaboration. Multidisciplinary professional teams and users can be a resource in the design and use of AI
	Children's participation. At all stages of the process leading to the production of an AI system for children, the users' cognitive, social, and emotional developmental stages must be taken into account, not just their age
	Balancing conflicting rights. In the case of conflicting rights, there must be regulations that establish the trade-off between them

Certainly, the ethical issues raised for child users, including concerns about privacy, transparency, agency, and inclusion, also apply in the case of neurodevelopmental disorders. However, using these systems by children with neurodevelopmental disorders, most of whom use them remotely, raises the need for in-depth reflections [43].

This paper aims to conduct a comprehensive and updated review of the application of AI in telerehabilitation for children with neurodevelopmental disorders. In detail, we aim to reflect on the current literature to understand whether the guidelines for trustworthy AI for children can be applied to the characteristics of telerehabilitation for children with neurodevelopmental disorders. Further proposed is developing a possible research framework to fill some of the gaps in the ethics of AI in these telerehabilitation interventions. The first part of this paper is a general introduction to applications of AI models to the telerehabilitation of neurodevelopmental disorders. Next, a literature review is presented on the ethical principles that should guide the design and use of AI with both adults and children as users. The second part discusses EU requirements for trustworthy AI to make these requirements applicable to the telerehabilitation of children with neurodevelopmental disorders. Finally, the last part presents a proposal for a research framework.

2 EU Requirements in the Telerehabilitation of Neurodevelopmental Disorders: Some Proposals

This section of the paper will discuss the EU requirements for trustworthy AI with children as users in depth. The goal is to develop some solutions to apply these principles when AI systems are applied to the telerehabilitation of neurodevelopmental disorders.

To develop trustworthy telerehabilitation AI tools for children with neurodevelopmental disorders, the paper aims to emphasize two central elements. The first element refers to the importance of considering the needs and characteristics of these children in the processes of AI design and use. To this end, the paper proposes: solutions that can promote awareness and information about the use of AI for these children; strategies to support children's self-actualization and give them a role in design; and inclusion of caregivers. The second element refers to the importance of considering AI as an opportunity to implement the effectiveness of treatments and personalization; however, it is important to use AI with the understanding that it is a resource that may be subject to errors and limitations and cannot completely replace the therapeutic relationship with the clinician, whose presence remains central to the treatment process.

The aim will not be to discuss aspects concerning general and sectoral policies but to propose application possibilities to which research can contribute. For this reason, this paper also does not address all EU requirements for trustworthy AI for children. The requirements that have been addressed are those most related to the role of researchers, designers, and experts in the rehabilitation of neurodevelopmental disorders. This choice is also motivated by the professional background of the authors.

2.1 AI Minimization

AI minimization refers to understanding that intelligent systems are not unlimited resources and may have a potential impact on sustainable development. AI should be used only for tasks that can have a real positive impact [49].

In the telerehabilitation of neurodevelopmental disorders, AI minimization can be translated into the possibility of an integrated type of treatment with AI used in conjunction with the clinician's presence meetings. Why, however, is AI necessary in this

rehabilitation context? Because it can lead to benefits in different situations. As described previously, it could be a system to be used when treatment in the clinician's presence is limited due to accessibility problems for the user (transportation, family's work problems, covid-19 pandemic, and residence in rural areas) or in case of financial difficulties [50]. The 2012 National Guidelines for Telemedicine of the Italian Ministry of Health specify that telemedicine can be compared to other types of therapeutic intervention but that it does not replace the therapeutic clinician-patient relationship. Telemedicine can be a way to complement classical treatments, and it can improve the effectiveness of rehabilitation [51]. In this sense, AI is no exception. Families, users, and clinicians could be oriented to the application of these systems in a combined way. A substantial part of the treatment is carried out in the child's living places through a computer, supervised by a caregiver. The clinician then establishes periodic meetings to monitor and evaluate the progress of the rehabilitation training. Also, the caregiver may initiate the rehabilitation session with the patient having audio and video contact with the clinician remotely, who tracks what is happening through the data received from the system. In this way, the clinician can respond to concerns, monitor the progress of the rehabilitation training, evaluate the situation overall, and make decisions about it.

Minimization of AI can also mean, for example, that the systems aimed to promote skill generalization, autonomy, or self-regulation are used in the early stages of treatment. When the child has reached a good level of competence, gradually, the use of the system can be reduced until treatment is stopped [48].

2.2 Transparency, Explainability, and Communication

The principles of transparency, explainability, and communication refer to the need to make children knowledgeable and informed users when they use an AI system [45, 48, 52]. Critical thinking is a central element for children to have the right confidence in AI regarding risks and benefits. However, what are the most appropriate ways to explain an AI system to children with neurodevelopmental disorders? An analysis is needed that focuses on the developmental stages and types of difficulties of these children.

A pre-treatment phase could be developed to allow children to familiarize themselves with the system, with the activities proposed by the system, and ask questions about the technology as they experience it. The clinician can then provide the information appropriately to the child's level of understanding and/or intellectual functioning but needs specific training about the technology. For example, children with autism spectrum disorder can have deficits in language pragmatics. Social pragmatics is the ability to effectively use and regulate communication for several purposes, with different interlocutors, and in various circumstances [53]. For children, this involves difficulties, such as paying attention to an auditory message when they are stressed, a tendency to ask repetitive questions, or difficulties listening while doing something else simultaneously [54]. In this case, to effectively explain AI the telerehabilitation system could include some features such as a pre-treatment phase with an introduction with social stories (short stories with pictures) or comic conversations. These are widely used tools for behavioral interventions [55, 56]. In addition, the use of visual aids can provide cues or sequential steps for potential situations that may be difficult to understand.

Lemaignan et al. (2021) [57] adopted such an approach for a social robot used to support children with autism spectrum disorders in schools. The data obtained from children's questions could provide a unique perspective to guide the application of the principles of transparency, explicability, and communication in the case of AI systems for children with autism spectrum disorders.

The principles of transparency, explainability, and communication may also concern the reliability of the information provided by the AI system. For example, the system could provide intelligent warnings about the child's lack of attention during treatment or a system malfunction [46, 48]. These warnings can appear on the child's computer screen and be seen by the caregiver monitoring the treatment but also be sent to the clinician as well. The system thus provides smart warnings if the treatment does not occur as expected. However, the system must also provide information regarding the reliability of the warning. It is possible, for example, that an interruption in activity has occurred due to an external event that the system cannot detect. Therefore the possibility of an error in detection must be recognized. In this case, both the clinician and the caregiver have the choice of whether or not to accept the alert. Information on warnings' reliability is essential to allow individuals to be truly involved in the human-IA interaction [46].

Also, the involvement of caregivers is important in applying the principles of transparency, explainability, and communication. Caregivers could be trained on the AI system their child will use to avoid any negative effects on the treatment [58]. It would be useful, for example, a demo version for caregivers that could address potential questions, doubts, or curiosities raised by users during the beta test. Alternatively, a pre-treatment phase could also be provided for caregivers to allow the clinicians to answer doubts or questions or for data collection that could help to design the informative demo version.

2.3 Inclusion and Non-Discrimination

Two additional requirements for trustworthy AI for children are inclusion and non-discrimination. Various papers addressed bias and prejudices in AI systems from different points of view: gender, ethnicity, disability, and age [59–61]. Some of these documents also referred to children as victims of possible discrimination [62–64].

A possible approach in the field of neurodevelopmental disorders may be knowledge sharing. Designing systems for rehabilitating users of different ages, evolutionary needs, and stages of development also requires including the children themself. A design that includes children, caregivers, healthcare professionals, researchers, and stakeholders can help reduce the risk of discrimination and prejudice while respecting children's preferences, demands, and rehabilitation needs.

Very often, children are given little space in the design of technology [65]. For example, children with neurodevelopmental disorders may be characterized by disorders in the expressive, receptive, or pragmatic language modality or involving multiple processes [66] that can significantly restrict their access to technology. It is possible to foresee modes of activity administration and response by children that they may understand, such as the use of Alternative Augmented Communication, the use of buttons, or visual agendas integrated into the system [57, 67].

Child-centered methodologies should include children. However, critical reflections are needed to understand how children with neurodevelopmental disorders can

be included and heard in designing and implementing these AI systems [68, 69]. A possible solution could be to propose research designs that try to include and evaluate different co-design modes to find the ideal solution.

2.4 Agency

The concept of agency concerns the right of children to self-realize. Children must be free to have control, make decisions, influence their environment and events, have their own goals, and conduct themselves to achieve them [70]. As argued by Bandura, the agency is about beliefs of self-efficacy [71]. Children and young people must be helped to understand the importance of having freedom in making decisions and achieving their goals. Perceiving themself unable to engage in behaviors to achieve their goals or that their behaviors have no effects may impact the children's self-efficacy and self-esteem [43].

Spiel et al. (2019) [72] showed that children with autism spectrum disorders rarely have freedom of choice when interacting with computers. In most cases, technologies address the needs of people who care for children with autism spectrum disorders but not directly the needs of children affecting the children's sense of self-determination.

A possible solution could be to allow children to establish their treatment objectives in agreement with the clinician. The child can thus experience being the master of his own decisions and personal goals, also affecting their treatment motivation. However, the proposed solution is less related to AI and more to the approach taken by the physician.

2.5 Privacy and Data Protection

Personal data and other sensitive data can be used to train AI models. Thanks to these data, the system can make decisions, predictions or propose activities. Data protection becomes a central issue, especially for children with disabilities performing remote treatment with online access [73].

The General Data Protection Regulation (GDPR) makes it clear that in the European Union, children must have special protection for children because they may be less aware of the risks and consequences of sharing data. Parental consent is thus needed, and agencies have to make a reasonable effort to check that such consent is truly given in line with the law [74]. The need for technology to minimize the sharing of sensitive data and to protect the privacy of families and users will not be discussed here. The aim is instead to make privacy statements understandable to children with neurodevelopmental disorders. It is important to ensure the protection of children and freedom in the choice of what they want to share and to guarantee the possibility of withdrawing consent to provide and share their data at any time.

For this purpose, informed consent may be provided that is suitable for them and that they can understand although it would not be required by law. Informed consent can be a tool to make children aware and leave them free to choose concerning information about them. For example, Strickler & Havercamp (2023) [75] designed an informed consent process to help adults with intellectual disabilities understand critical aspects of research. In this process, the different dimensions of informed consent were explained to participants through multiple and dynamic approaches. The process was repeated until

participants understood all the content, gradually reducing the information provided. Similar approaches can help children with neurodevelopmental disorders understand the necessary information about using their data.

3 Proposed Search Framework

AI systems applied to the telerehabilitation of neurodevelopmental disorders could have numerous advantages: reducing treatment costs for families, the possibility of intensive and personalized rehabilitation, and a more significant number of children who benefit from rehabilitation treatments. Nevertheless, it is necessary to consider the ethical implications.

Current literature provides numerous ethical guidelines for AI. Still, these have only recently begun focusing on children's rights and so far they do not concern the ethics of AI applied to telerehabilitation for children with neurodevelopmental disorders. It is, therefore, necessary to expand the research in this field to develop trustworthy AI for children with neurodevelopmental disorders as well. For this aim, we have planned a proposal for a search framework shown in Fig. 1.

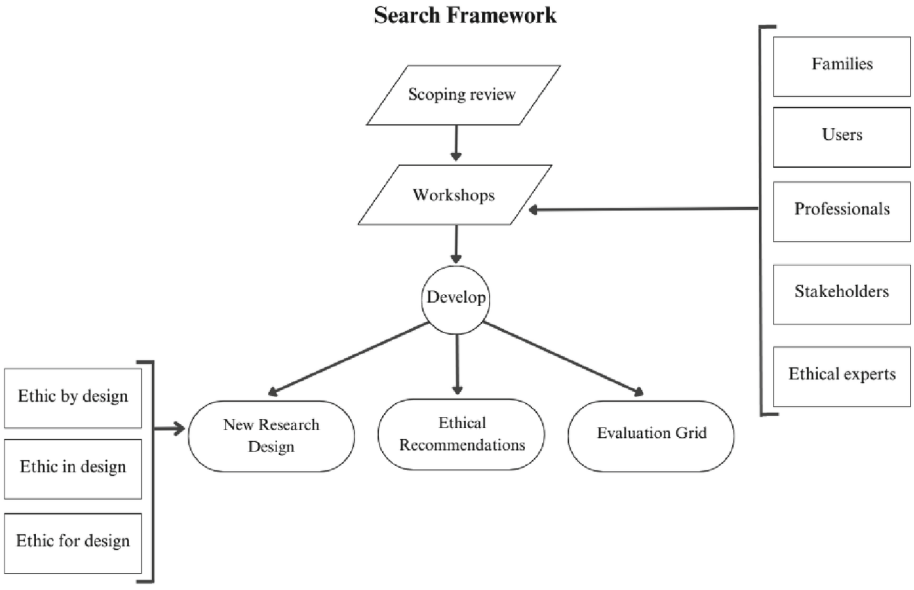

Fig. 1. Flowchart of the search framework proposed for trustworthy AI in telerehabilitation of neurodevelopmental disorders.

First, we propose a scoping review of the literature on ethical guidelines for AI with children as the primary users. It will outline a comprehensive framework for understanding what ethical principles should be applied when children come into contact with AI systems. In agreement with the protocol used by Jobin et al. (2019) [40] inspired

by the PRISMA protocol [76], multiple screening strategies will be applied, including searching with both classic databases search engines and some lists of ethics guidelines [77, 78].

Different published guidelines on trustworthy AI for children have shown that the developers of AI as well as the children must be included in the development of the AI systems to provide a complete picture of different points of view [46–48]. Therefore workshops will be conducted with experts in rehabilitation and telerehabilitation for neurodevelopmental disorders who are familiar with or use intelligent systems. These experts might be: health professionals, i.e., educators, neuropsychiatrists, psychiatrists, psychologists, speech and language therapists, occupational and neuro-psych motility therapists; stakeholders, i.e., professionals in the field of intelligent systems applied to the rehabilitation of children with disabilities as designers, professionals working as Data Privacy Officers or research and ethics officers in companies developing intelligent systems for rehabilitation; experts in AI ethics, i.e., are those who have published articles or books on the ethics of AI in rehabilitation and telerehabilitation (scientific, legal, deontological, and ethical aspects); parents, and minor users with neurodevelopmental disorders who already benefit from AI telerehabilitation (see Fig. 1). In agreement with the literature [79], the workshops will cover the participants' knowledge, personal opinions, and ideas concerning:

1. The link between professional/personal background and telerehabilitation with intelligent systems
2. Perception about telerehabilitation with AI, both from a personal perspective and the perspective of the specific profession/category of membership
3. Structural issues of AI telerehabilitation that have ethical implications and how can be overcome
4. Ethical principles that are involved in the development and implementation of an AI telerehabilitation program, both for the patient and the clinician
5. Strategies that need to be implemented to achieve improved ethics in AI telerehabilitation

The data derived from these workshops can be processed and analyzed by qualitative content analysis [80]. The workshop results and the scoping review will have three goals:

1. Producing ethical recommendations to guide the research, design, and use of intelligent systems for the telerehabilitation of neurodevelopmental disorders.
2. Creating an ethical criteria evaluation grid to be used as a guide to assess whether a telerehabilitation intervention aligns with the guidance provided by all participants involved in the process.
3. Developing a research design for AI applied to the telerehabilitation of neurodevelopmental disorders.

The research design will integrate the review and the results of the workshops with the three ethical levels that should structure AI design (see Fig. 1) [81]:

1. Ethics by design. AI is capable of ethical reasoning
2. Ethics in design. Design methods include an assessment of the ethical implications of AI systems

3. Ethics for design. There are standards of conduct that ensure the integrity of developers and users in all stages of system development

The research design has to be adapted to the characteristics of children with neurodevelopmental disorders and the telerehabilitation context.

Having recommendations that are based on the literature investigation but also on giving voice to key actors (families, caregivers, stakeholders, and children) could also have an impact on the effectiveness of treatments. Adherence to the proposed criteria could act on dimensions such as children's agency, family information, and motivation. This would mean revaluing ethics in terms of protecting professionals and children and as a central aspect of the care and effectiveness dimension of rehabilitation.

4 Conclusion

This article described current literature about telerehabilitation with intelligent systems and the ethics to propose how to implement ethical principles for a trustworthy AI for the telerehabilitation of children with neurodevelopment disorders. We have developed a proposal for a future research framework that, through a systematic review of the literature and workshops with stakeholders, could lead to ethical recommendations for AI applied to the telerehabilitation of neurodevelopment disorders; an evaluation grid of ethical criteria to be used as a guide to assess the adherence of these types of treatments with the recommendations provided; and the development of a research design for AI applied to the telerehabilitation of neurodevelopment disorders.

This ambitious proposal must clash with the feasibility and timelines of research and the realities of companies, clinicians, and families. Multi-parties collaboration presents significant challenges. For example, the parties involved may have different goals, ideas, and strategies; these can sometimes conflict. The EU paper highlighted how even in various situations, principles that want to protect children's rights might conflict with each other such as protecting privacy with the need for data to train algorithms. Complex and joint work between multiple parties will be needed to develop concrete solutions respectful of children with special needs.

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