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AI in Childhood Development Monitoring: Attitudes, Needs, and Concerns in Dutch Youth Healthcare

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Abstract. Traditional methods can miss subtle patterns or abnormalities in movement, speech, and language behavior, which are early signs of developmental disorders in young children. Artificial intelligence (AI) technologies offer a multi-modal approach, capturing a wider range of digital biomarkers. By analyzing video and speech data on child development, AI can detect abnormalities earlier. This study explored the attitudes, needs, and concerns of parents, healthcare (HC) professionals, and youth HC managers regarding AI's use in monitoring children's development as a prerequisite for its potential successful implementation and usage. Semi-structured interviews with 28 participants showed generally positive attitudes towards AI, recognizing its potential to enhance efficiency, support HC professionals, and improve monitoring. Parents and managers appreciated reducing visits for healthy children and allowing more time for those identified through triage, while HC professionals emphasized objective and standardized tests, and maintaining personal interactions. Concerns included AI's accuracy, privacy, consent, and ethical issues.

Keywords. Youth healthcare, developmental monitoring, multi-modal approach

1. Introduction

Dutch Youth Healthcare (YHC) routinely monitors the developmental milestones of children aged 0-4 years using the Dutch Development Instrument (DDI) [1]. This instrument includes 75 milestones across various developmental domains. YHC professionals observe these milestones during routine visits to track development and

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identify potential delays due to disorders such as Duchenne Muscular Dystrophy (DMD) and Developmental Language Disorder (DLD).

Despite aiming for early detection, the DDI can miss subtle patterns or abnormalities in movement, speech, and language behavior, leading to late identification of developmental delays and missed opportunities for early intervention and treatment. Efforts to address these issues have focused on providing instructional videos for parents [2]. A more advanced solution involves using artificial intelligence (AI) technologies to enable a multi-modal approach, capturing a wider range of digital biomarkers. By applying AI to video and speech data to capture visual (movements) and auditory (sounds) cues, abnormalities are expected to be detected at an earlier stage.

It is important to address stakeholders' attitudes, needs, and concerns as a prerequisite for its potential successful AI implementation and usage. This study therefore aims to qualitatively explore the attitudes, needs, and concerns of parents, healthcare (HC) professionals, and YHC managers regarding the use of AI in analyzing video and speech data to monitor children's development and identify developmental disorders at an early stage.

2. Methods

This qualitative research used semi-structured interviews with parents, HC professionals, and YHC managers who provided written informed consent. The inclusion criteria were parents of children aged 0-4 years from the general population, parents of children diagnosed with DMD or DLD, YHC professionals and managers, physiotherapists, and speech therapists. For parents of children with DMD or DLD, a broader age range up to 11 years was eligible due to varying ages of diagnosis. A convenience sampling strategy was used, combined with a purposive strategy for parents of a child with DMD or DLD. A specialized center for language disorder (Auris) and a patient association (Duchenne Parent Project) supported recruitment by advertising the study on their website and actively approaching parents who met the inclusion criteria.

The interview protocol was based on a framework combining the Technological Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) [3,4]. This study did not cover 'Actual System Use' as the AI to monitor children's development is not yet in use in Dutch YHC.

Parents were given three scenarios: (1) AI tools for video/speech analysis at YHC for early detection of motor or speech-related disorders, (2) independent use of AI at home for insights into their child's development, and (3) AI tools used by HC professionals to track development. HC professionals were presented with scenarios 1 and 2. Each scenario was read aloud during interviews, followed by open-ended questions to elicit participants' thoughts. Misunderstandings about AI were not corrected, and follow-up questions prompted further reflection. The protocol ensured comprehensive participant feedback.

The interviews were conducted in October and November 2024. Interviews were transcribed in intelligent verbatim for analysis and stored pseudonymously. Thematic analysis was conducted using ATLAS.ti, combining deductive coding based on TAM and UTAUT constructs [3,4] with inductive coding to capture emergent, context-specific themes. Line-by-line coding was applied to all transcripts. While the initial coding scheme reflected theoretical dimensions, the researchers remained open to insights that extended beyond the predefined framework. Two researchers independently coded a

subset of four interviews and refined the codebook through consensus. The remaining interviews were coded by one researcher and verified by a second. Thematic saturation for parents and HC professionals was continuously assessed during the analysis. After 15 interviews with parents and then 7 with HC professionals, no new themes emerged in the data. For the YHC managers, we were dependent on their availability and did not aim for thematic saturation.

3. Results

A total of 27 interviews were held with 28 participants (one parent couple participated together). The interviews lasted between 22 and 55 minutes, with an average duration of 34 minutes. Of the 28 participants, 17 were parents (one with a child with DMD, two with DLD and 14 from the general population), nine were HC professionals (seven YHC professionals, one physiotherapist, and one speech therapist), and two were YHC managers. Ten parents had a high educational level, four had intermediate, one had low, and for two, the educational level was unknown. Four parents reported that they were highly familiar with AI and regular users, six were familiar, five had basic AI awareness but limited understanding, and two had minimal to no knowledge of AI technologies. All HC professionals had at least eight years of experience in HC. The following results were found within the conceptual frameworks of the TAM and UTAUT models.

3.1. Perceived Usefulness (TAM)

Advantages: Most participants valued AI as a supportive tool that could improve efficiency and monitoring. Parents and managers appreciated that AI could conduct developmental assessments at home, reducing visits for healthy children and allowing more time for those identified through triage. HC professionals noted that AI could simplify tasks such as making referrals. Parents focused on the accuracy of AI outcomes, leading to improved monitoring of children's development. HC professionals emphasized AI's potential to make development assessments more objective and standardized, and support professionals with less experience. Managers highlighted AI's role in involving parents and HC professionals more in assessing development.

Concerns: Several participants shared concerns about AI's accuracy, privacy, and consent issues. Ethical concerns were noted among several HC professionals. Some parents and HC professionals doubted AI's ability to draw correct conclusions from the provided information, as HC professionals may have access to more comprehensive data, such as family background, medical history, and the child's previous outcomes on developmental milestones. They also emphasized the importance of HC professionals knowing how to use AI tools appropriately.

Types of advice: Most participants agreed that AI-generated advice should be clear and detailed for HC professionals, but concise for parents. Parents valued periodic and personalized advice, and followed recommendations to contact YHC if AI indicates abnormalities in development. HC professionals wanted detailed, guideline-specific advice and preferred AI use with a follow-up visit at the YHC if needed. Managers emphasized using AI for monitoring healthy children, while HC professionals supported AI for diagnostic purposes.

Fewer YHC visits: Most parents and some HC professionals supported reducing visits for efficiency. However, some HC professionals were concerned about missing comprehensive data and losing connection with parents due to less frequent interactions.

3.2. Perceived Ease of Use (TAM)

Dedicated recording facilities: Parents were divided on whether they would use a dedicated space for recordings, preferring to conduct recordings at home instead. Most HC professionals supported the idea of such facilities to ensure equitable AI application.

Ideas for design: HC professionals and managers emphasized the importance of including stakeholders in the design of the AI tool, particularly those with lower digital literacy. They suggested developing a supportive AI tool, for which the responsibility for its use should remain with the HC professionals. Some HC professionals emphasized that the AI tool should use similar age-specific milestones as the DDI and consider cultural differences when interpreting communication milestones. Initially, the AI tool should focus on identifying alarm symptoms, with more specific diagnoses incorporated in later designs.

3.3. Attitude Toward Using (TAM)

Almost all parents had positive attitudes towards AI -driven development analysis, while HC professionals were more cautious. They expressed concerns about parents' ability to use the tool effectively, increased anxiety among parents, and the potential for AI to create monotonous workloads. They emphasized AI's role in supporting clinical reasoning. Parents appreciated combining AI with regular visits and the ability to make YHC appointments. Managers suggested using AI individually to support parents at home for information provision rather than detecting developmental delays. They found AI useful at YHC for identifying abnormalities in development related to rare diseases.

3.4. Behavioral intention to Use (TAM)

Most parents were willing to share audio or video for AI-analysis, emphasizing the importance of transparent data handling practices and clear communication regarding their children's data usage. Some parents favored audio analysis over video due to privacy concerns, feeling that audio recordings were less intrusive than video recordings.

3.5. Social influence (and norm) (UTAUT)

Participants were generally positive about the use of AI, which supports its future implementation and usage. This collective endorsement creates a supportive environment for AI adoption. The role of AI in YHC practice needs to be clearly defined, with everyone agreeing on their responsibilities. Participants viewed HC professionals as taking on a leadership and advisory role, which is needed for guiding the effective use of AI. The importance of face-to-face contact and individualized care was emphasized by the participants. This highlights the need for AI to complement, rather than replace, human interaction. Connection and human qualities were found important alongside the use of AI, ensuring that technology enhances, rather than diminishes, the personal touch in HC.

3.6. Facilitating Conditions (UTAUT)

Trust in AI: Some parents expressed high trust in AI, while others would trust it to some extent, emphasizing the necessity of HC professional oversight. Several parents stressed the importance of a proven track record before trusting AI insights. A few parents indicated their trust in AI was directly linked to their trust in their HC professional.

Facilitation conditions: Some HC participants mentioned that implementing AI tools is possible with adequate financial support and additional time. Barriers included current feasibility, as applicability and evidence need to be proven. Managers emphasized that AI should replace existing services to avoid extra costs.

4. Discussion

A key strength of this study was its focus on AI in the YHC setting, rather than in pediatric and hospital settings, where most research has been conducted [5]. Agreement with literature include regulatory uncertainties related to data privacy and responsibility, the need for stakeholder involvement in the design of AI tools to promote fairness and accessibility, and the importance of making AI results explainable for YHC professionals [5]. Additionally, this study agrees with the literature on several advantages of AI, such as improved efficiency, and offering support and personalized advice [5]. This study may be generalizable to broader contexts, as the diverse perspectives of the stakeholders align with central themes identified in the literature [5]. A limitation was that responses were based on general applications rather than specific AI tools that have yet to be implemented.

5. Conclusions

The findings highlight the specific advantages and concerns of stakeholders regarding AI use in child development monitoring, supporting the co-design of AI tools that meet their needs.

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