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WRITTEN REPORT, Activity 2.3

Selection of technology adoption models for children with neurodevelopmental disorders

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1 Introduction

The TE(A)CHADOPT project aims to develop guidelines for evaluating the accessibility of technologies tailored to children with neurodevelopmental disorders. One of its primary objectives is to promote awareness and foster expertise in the development of accessible technologies. By teaching our main findings to students – future technology developers – we aim to ensure that future technological solutions are better adapted to the needs of children with neurodevelopmental disorders.

To achieve this, it is essential to understand how users adopt and interact with technologies. Several technology adoption models exist, which describe factors that influence technology adoption in various fields and user groups. Some of these models have already been applied in their original or modified forms in the context of neurodevelopmental disorders [1, 3, 5]. Related technology adoption studies include not only children with neurodevelopmental disorders themselves, but also their parents, teachers, and therapists [2, 4, 6]. They rely on a variety of constructs (such as effort expectancy or social influence) and external variables (such as age or experience). Based on the existing studies and their reported challenges and recommendations, appropriate technology adoption models with a set of valuable constructs and external variables for this particular group need to be selected.

This report relies on the results of a selection process conducted during an online workshop organized by the project consortium. We propose a set of constructs and external variables that seem to be particularly well-suited for assessing technology adoption in children with neurodevelopmental disorders. The constructs and external variables can be evaluated through interviews or observations. Taking the selected and proposed constructs into account, a base model was selected for use in the context of children with neurodevelopmental disorders.

The report extends its focus beyond children with neurodevelopmental disorders to also include their parents, teachers, and therapists, recognizing that technology adoption in the context of neurodevelopmental disorders occurs within a broader system. As such, this work serves as a foundational step toward future evaluations of how children with neurodevelopmental disorders adopt and interact with technology.

2 Method

The selection of technology adoption models for children with neurodevelopmental disorders (NDDs) was conducted through a structured process that combined evidence synthesis, collaborative refinement, as well as model selection and modification. This work is based on two previous systematic literature reviews (SLRs) developed by the consortium: (1) a broad review of technology adoption models [7] and (2) a focused SLR on technology acceptance in the context of neurodevelopmental disorders (manuscript currently under review). These reviews provided a comprehensive foundation, ensuring that all team members were familiar with established models, such as TAM, UTAUT, and UTAUT2, as well as their key constructs and variables.

The process began with a detailed analysis of the key findings from the aforementioned systematic literature reviews. This knowledge formed the foundation for a structured online workshop, which served as the primary forum for collaborative synthesis and ideation. The workshop guided consortium members through a systematic process of proposing, grouping, and discussing constructs that were appropriate for children with NDDs and their support networks, including parents, teachers, and therapists. The workshop's outcomes directly informed the final stage of the process: selecting and modifying an existing model. The following subsections provide a detailed description of each phase.

2.1 Analysis of Systematic Literature Reviews

The first stage of the process involved conducting a detailed review of two previously developed systematic literature reviews within the project [7]. These reviews formed the empirical basis for Activity 2.3. The analysis focused on identifying the most suitable constructs and external variables that could be incorporated into the developed model.

This stage allowed us to highlight the limitations of existing models when applied to children with neurodevelopmental disorders. The main aim was to synthesise insights from the reviews to guide the next stages of model development. Another objective was to ensure that all consortium members began the collaborative work with a shared, evidence-based understanding. The resulting list of models, constructs, and variables served as essential preparatory material for the subsequent workshop phase, providing a structured starting point for model construction.

2.2 Workshop

An online collaborative workshop was conducted on June 23, 2025. The workshop brought together consortium members who had knowledge of technology adoption models and a multidisciplinary perspective. Participants, including at least one representative from each partner organization, joined the meeting remotely via Zoom and used Canva's whiteboard tool. This approach was selected to facilitate dynamic interaction and provide a persistent visual record of the process.

The workshop was divided into distinct phases to encourage independent and collective contributions. During the silent phase, participants were asked to individually propose constructs and external variables relevant to two key stakeholder groups: children with neurodevelopmental disorders and their support networks (parents, teachers, and therapists). These proposals were then reviewed and grouped thematically by all participants. The subsequent discussion phase involved critically evaluating the proposed constructs, focusing on identifying overlaps, gaps and opportunities to extend existing models. The collaborative use of the whiteboard enabled iterative refinement, resulting in a preliminary model structure that informed the final construction phase.

2.3 Model construction

In the final stage, the constructs and variables proposed during the workshop were systematically analyzed to support the development of a tailored technology adoption model. The first step involved identifying which existing technology adoption model aligned most closely with the selected constructs and variables. This comparative mapping helped determine the best-fitting model to serve as a structural foundation for the new framework. By using an established model as a reference, the team ensured methodological rigor while allowing for adaptation to the specific needs of the target population.

Next, the proposed elements were grouped and integrated into the structure of the selected model. Constructs and variables that overlapped or were conceptually similar were combined under shared categories within the model. For those that could not be meaningfully grouped or did not align with existing constructs, new constructs were defined and added. This iterative process enabled the creation of a flexible meta-model structure that can later be tailored based on the characteristics of the technology or the target group.

3 Technology Adoption Model for Children with Neurodevelopmental Disorders

The proposed Technology Adoption Model for Children with Neurodevelopmental Disorders was developed as a direct outcome of the structured, collaborative workshop. The process began with a shared whiteboard that had been pre-filled with the most common constructs and external variables identified in prior systematic literature reviews. During the

initial phase, participants reviewed this knowledge base and selected the elements they considered most relevant to the target population. Crucially, they were also encouraged to propose new constructs and variables that they felt were missing from existing models but were essential for understanding technology adoption in the context of children with NDDs. After this period of individual contributions, the complete set of selected and newly proposed elements was discussed, grouped thematically and refined by the entire consortium.

During the discussion phase of the workshop, it was agreed that two distinct but complementary models should be developed. The first model is intended for key stakeholders in the child's support network, including caregivers, parents and therapists. It is expected to be validated using traditional self-report instruments, such as questionnaires. The second model focuses directly on the child with NDD. Recognising the difficulties of using self-report measures with this group, this model is intended to be evaluated primarily through observational methods and interviews, capturing behavioural indicators of engagement, interaction patterns and emotional responses. This dual approach is necessary to capture the unique perspectives and interactions of both the end-user and their support system. The ultimate goal is to integrate these two models into a comprehensive framework that considers all the factors influencing technology adoption in this context.

For the model focusing on children with neurodevelopmental disorders, several constructs were selected from existing technology adoption frameworks due to their relevance and applicability. These included: **Perceived Usefulness, Behavioral Intention, Perceived Ease of Use, Facilitating Conditions, Effort Expectancy, Ease of Use, Hedonic Motivation, Use Behavior, Social Influence, and Affect Toward Use**. These constructs were considered adaptable to observation and interview based assessment and suitable for capturing key aspects of children's interactions with technology. In addition to these, several new constructs were proposed to better reflect the specific needs and behaviors of children with neurodevelopmental disorders. These included: **Satisfaction, Perceived Enjoyment, The Joy of Playing, Playfulness, Encouraging Interface, Change to Current Practice or Routine, Relevance to an Important Activity, and Technology Anxiety**. These additions aim to capture emotional, sensory, and behavioral dimensions that may not be fully addressed by traditional models but are critical in this context.

Similarly, the external variables intended to moderate the model's constructs were carefully selected and refined. Of the many variables present in existing models, only **Gender** was adopted directly. Recognizing that broad demographic factors are often insufficient in this context, the team derived more nuanced variables from standard concepts. The generic variable of **Age** was separated into two distinct factors: **Developmental Age** and **Chronological Age**. This acknowledges that a child's developmental stage is a more critical determinant of their abilities than their age in years. Similarly, **Experience** was divided into **Experience in Therapy** and **Experience with Technology**. Finally, to ensure the model's relevance to the target population, two highly specific variables were incorporated: **Type of Disorder** and **Severity of Disorder** since these factors are expected to profoundly influence how a child interacts with and benefits from technology.

Several established constructs from existing technology adoption theories were selected for the caregiver/therapist model, including **Performance Expectancy, Effort Expectancy, Ease of Use, Perceived Ease of Use, Social Influence, Subjective Norm, Hedonic Motivation, Price/Value, Facilitating Conditions, and Habit**. These constructs were selected due to their proven relevance in self-report validation studies. Additionally, new constructs were introduced to better capture the unique dynamics of caregiver-mediated technology adoption for children with neurodevelopmental disorders. These include *Relevance to an Important Activity*, assessing perceived disruptions or

ease of integration into existing therapeutic or daily activities; **Technical Anxiety**, reflecting apprehension about using the technology; and **Perceived Behavioral Control** represents the caregiver's confidence in facilitating the child's use of the technology.

The selection of external variables for the caregiver/therapist model also involved a careful process of adopting established factors and introducing new, context-specific ones. A number of variables were selected directly from existing models, including **Gender**, **Age**, **Voluntariness of Use**, and **Education**. Consistent with the approach taken for the children's model, the general concept of **Experience** was separated into the more specific factors of **Experience in Therapy** and **Technology Experience**. Furthermore, two novel external variables were introduced to account for critical contextual nuances. The first, **Relation to the Child**, was added to differentiate the unique perspectives and motivations of therapists, parents, and other caregivers. The second, **Affordability**, was proposed as a crucial moderator because the perceived financial barrier of technology varies significantly across regions and economic conditions. Thus, **Affordability** provides a more nuanced understanding than the Price/Value construct alone.

With comprehensive lists of constructs and variables established for the child and caregiver/therapist models, the next logical step was to analyze which theoretical model would best serve as the foundation for the Technology Adoption Model for Children with Neurodevelopmental Disorders. A comparative evaluation was conducted to determine which prominent model, primarily TAM, UTAUT, or UTAUT2, contained the highest number of constructs selected by the consortium and best aligned with the overall structure required in this context. After thorough discussion, the consensus was that the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) was the most suitable base.

With the base model selected, the next phase of construction involved systematically mapping the constructs selected in the workshop onto its structure. Initially, all constructs present in UTAUT2 were retained. Then, the remaining workshop-derived items were critically analyzed to determine if they could be logically integrated or subsumed within these base items. Finally, constructs that were fundamentally distinct from the existing UTAUT2 structure yet essential for capturing the unique context of children with NDDs were formally added to the model.

For the model tailored to children, the core UTAUT2 constructs were operationalized and refined based on the specific themes and variables identified during the workshop:

- **Performance Expectancy** was refined to include both *Perceived Usefulness (PU)* and the *Relevance to an Important Activity*.
- **Effort Expectancy** included *Ease of Use*.
- **Habit** incorporated child's adaptation to a *Change to Current Practice or Routine*.
- **Hedonic Motivation** was significantly expanded to encompass a range of enjoyment-related factors, including *The Joy of Playing*, *Perceived Enjoyment*, *Playfulness*, an *Encouraging Interface*, and overall *Satisfaction*.
- **Social Influence**, **Facilitating Conditions**, **Behavioural intention** and **Use behaviour** retained its standard definition, as no additional workshop-derived concepts were integrated into it for the children's model.

Finally, the model was expanded to include two new constructs: **Attitude Toward Use** and **Technology Anxiety**. Similarly, for the model tailored to therapists and caregivers, the UTAUT2 constructs were adapted as follows:

- **Performance Expectancy** was refined to include the *Relevance to an Important Activity*.
- **Effort Expectancy** was significantly expanded to encompass *Ease of Use*, *Perceived Ease of Use*, the availability of *Technical Support*, *Perceived Adaptability/Accessibility Matching*, and *Perceived Behavioural Control*.
- **Social Influence** included *Subjective Norm (SN)*.

- **Hedonic Motivation** was expanded to include factors such as *Encouraging Interface*, and *Satisfaction*.
- **Habit** incorporated both the need to *Relevance to an Important Activity* and the pre-existing *Habit of Using Tech/Apps*.
- **Price Value**, **Facilitating Conditions** and **Behavioural intention** retained their standard definitions, as no additional workshop-derived concepts were integrated into them.

In the end, the model was expanded to include three new constructs: **Technology Anxiety**, **Attitude Toward Use**, and **Alternative Coping Solution**. Regarding the external variables, all those proposed during the workshop were added to the models.

After finalizing the constructs for both models, we defined the relationships between them. For the children's model, we adopted the UTAUT2 structural framework without modifications. In this schema, all selected constructs were linked to **Behavioral Intention** as the primary determinants. Following the established relationships of UTAUT2, **Behavioral Intention** directly influenced **Use Behavior**. Additionally, in line with the original UTAUT2 design, both **Habit** and **Facilitating Conditions** were connected directly to **Use Behavior**, to account for their more immediate impact on actual usage patterns. This approach maintained theoretical consistency with the validated UTAUT2 framework while applying it to neurodevelopmental context. The proposed model is presented in Figure 1.

In contrast, the therapist/caregiver model required a more nuanced structural arrangement to accommodate the pivotal construct of **Alternative Coping Solution**. To achieve this, a structural element inspired by the Technology Acceptance Model (TAM) was integrated into the primarily UTAUT2-based framework. Specifically, key psychological constructs related to technology use were linked to an umbrella **Attitude Toward Use** construct. This construct was then positioned as a key predictor of **Behavioral Intention (BI)**, alongside **Alternative Coping Solution** and **Facilitating Conditions**. As in the children's model, **Behavioral Intention** was linked to **Use Behavior**. Additionally, consistent with UTAUT2, both **Habit** and **Facilitating Conditions** were specified to have direct effects on **Use Behavior**, reflecting their influence on actual technology adoption independently of intention. The proposed model is presented in Figure 2.

Finally, concerning the role of external variables, a simplifying yet comprehensive assumption was made for the initial construction of both models. At this stage, it is proposed that all identified external variables, such as user demographics, prior experience with technology, and context-specific factors like the severity of the disorder, act as global moderators, potentially influencing the key causal pathways within the models. This initial, broad-stroke approach acknowledges the importance of these variables without prematurely defining their specific interaction effects. It is important to note that this is a provisional step. The detailed specification and empirical refinement of these moderating relationships are planned for a subsequent stage of the project.

The proposed models for both children with neurodevelopmental disorders and their caregivers/therapists will be empirically validated using Structural Equation Modeling (SEM). This technique enables the simultaneous analysis of multiple relationships between observed and latent variables, making it well-suited for testing complex theoretical models. By applying SEM, we will assess the validity of the hypothesized constructs and their interrelationships, as well as evaluate the overall model fit. The models will be tested using data collected through observation (for the children's model) and questionnaires (for the caregiver/therapist model). In addition, moderating effects of external variables,

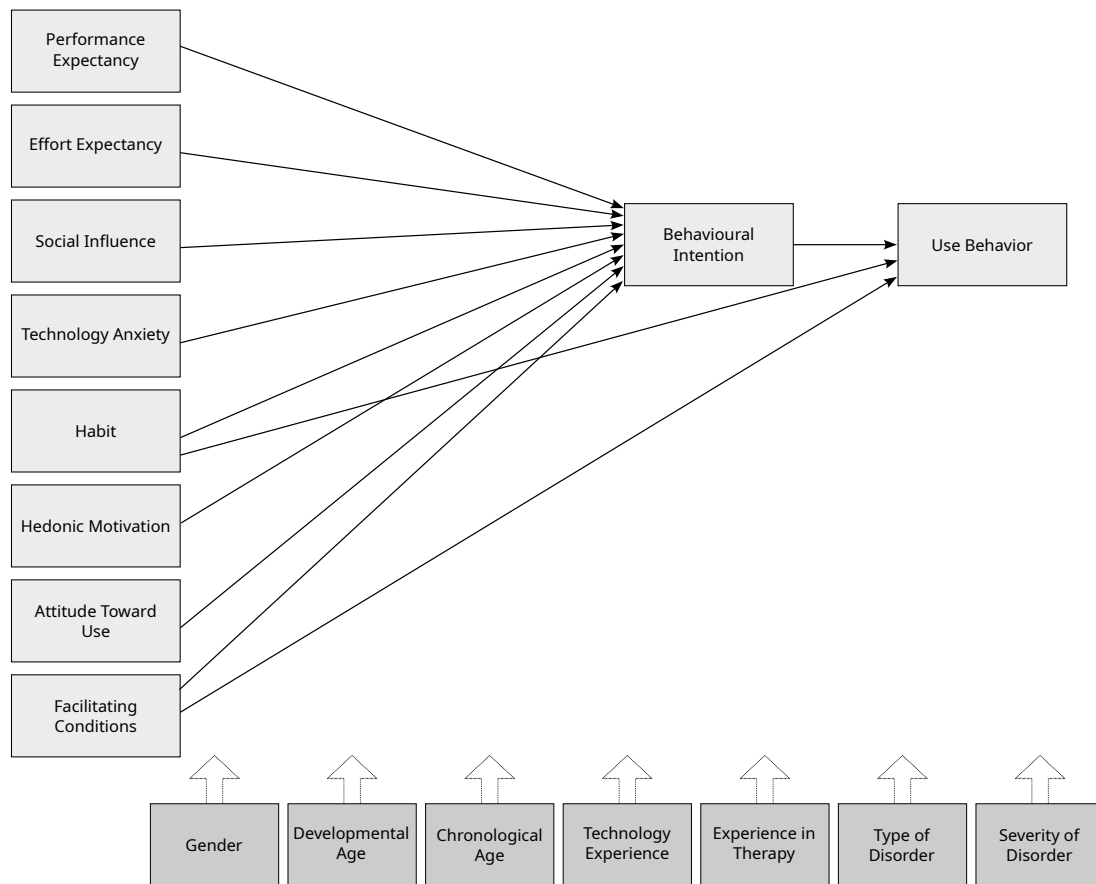


Fig. 1. Children model

such as age, experience, and severity of disorder, will be examined to explore how individual and contextual factors influence the strength of relationships within the models. It is anticipated that some constructs may prove redundant and certain relationships may be dropped during the model refinement process to improve parsimony and fit.

4 Conclusions

This report summarizes TE(A)CHADOPT's Activity 2.3, which aimed to identify the most suitable technology adoption model for use in the context of children with neurodevelopmental disorders. UTAUT2 was selected as the base model, and ultimately, two tailored technology adoption models were developed – one for children with neurodevelopmental disorders and one for their support networks (i.e., parents, teachers, therapists). The development process was based on two systematic literature reviews and benefited from the consortium's interdisciplinary expertise through a structured workshop, resulting in theoretically robust models that are contextually well-suited. The models include both established constructs and external variables as well as new elements specifically tailored to the needs of individuals with neurodevelopmental disorders and their support networks. In a next step, the models shall be empirically validated

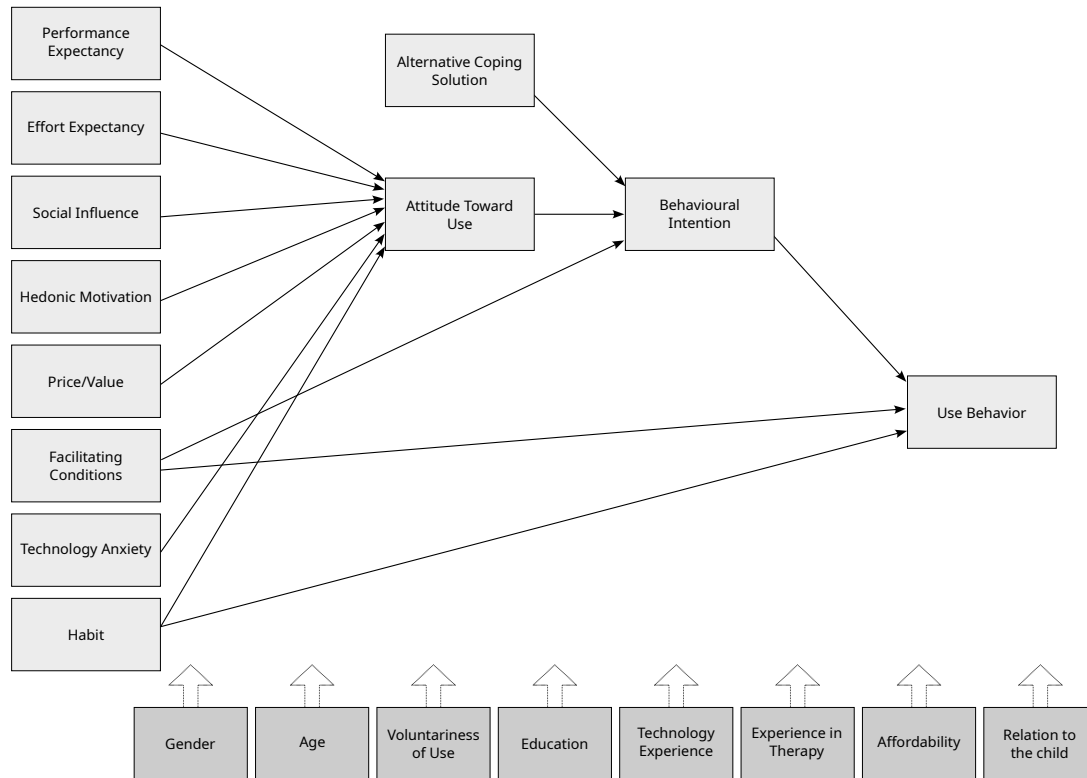


Fig. 2. Caregivers/Therapist model

using Structural Equation Modeling (SEM) and refined according to the results of the validation. In the future, the application of our Technology Adoption Model for Children with Neurodevelopmental Disorders shall help to advance the development of more inclusive technologies that better meet the needs of children with neurodevelopmental disorders and their support networks.

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