

## DEVELOPMENT OF KIDDYLAUNCH APPLICATION FOR DRESSING PARTICIPATION OF CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDER

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### ABSTRACT

The increasing use of mobile technologies has created new opportunities for interventions in recent years. For children with autism spectrum disorder, the latest developments in computer technology that are incorporated into mobile devices have opened a world of opportunities. Children with autism spectrum disorder (ASD) frequently struggle with these fundamental activities of daily living, such as getting dressed, taking care of their personal hygiene, going to bed, and performing other self-care tasks. However, recent research on mobile technology applications made for children with autism focuses on cognitive, social skills, communication skills and emotional recognition. This study investigated the development of the KiddyLaunch application for mobile devices to address dressing participation among children diagnosed with autism spectrum disorder. Specifically, this study would (1) determine the factors affecting children's participation in dressing task, (2) determine parent-caregiver approach in managing dressing participation for their children, (3) determine what mobile technology application can be developed to address dressing participation in children diagnosed with autism spectrum disorder, (4) Level of acceptability among parents with the use of the KiddyLaunch Application to address children's dressing participation, (5) Technical evaluation of the KiddyLaunch application based on the Systems and Software Quality Requirements and Evaluation (SQuaRE). Overall, the factors affecting children's participation in dressing tasks, social factors ( $M = 2.64$ ) and physical factors ( $M = 2.63$ ) have been frequently chosen by the participants that influence their child's performance in the home environment. Overall, these strategies are "often" ( $M = 2.60$ ) used by the parents and caregivers in the study. According to the ISO 25010:2011 standards for systems and software evaluation, the developed KiddyLaunch application received a rating of *outstanding* ( $M = 4.11$ ). This indicates the KiddyLaunch application, designed for dressing participation for children diagnosed with ASD, has met its standards and functions effectively for its users.

**Keywords:** Mobile Technology, Dressing Simulation, Participation, Activities Of Daily Living, Autism Spectrum Disorder

### INTRODUCTION

The increasing use of mobile technologies has created new opportunities for interventions in recent years. Mobile technology includes handheld digital devices such as tablet computers, iPad touch, Personal Digital Assistants (PDA), and several brands of smartphones or mobile phones. For children with autism spectrum disorder, the latest developments in computer technology that are incorporated into mobile devices have opened a world of opportunities. Total user experience

is improved by the touch screen interface's ease of use, which contributes to its attractiveness and simplicity. Since many children with autism use pictures as their primary mode of communication and words as a secondary language, visual learning is common among these children (Lofland, 2019). According to World Health Organization 2018 data, there has been a significant increase in the use of computers, smartphones, the Internet, and other electronic devices. This increase is linked to both clearly demonstrated benefits for users and instances of excessive use, which frequently has negative effects on health. According to Leung 2021, using mobile technology as an engaging and supportive intervention tool can help people with autism spectrum disorder. However, recent research on mobile technology applications made for children with autism focuses on cognitive, social skills, communication skills and emotional recognition. There are limited studies on the domain of activities of daily living specifically dressing using mobile technology among children with autism spectrum disorder.

Occupational therapy, as described in the OTPF - 4, is the therapeutic use of everyday life activities with individuals, groups, or populations (i.e., the client) to enhance or facilitate participation. Daily chores that people perform on a regular basis are referred to as "activities of daily living" (ADL). Basic and instrumental activities of daily living make up these tasks. Activities such as eating, dressing, cleaning, bathing, and grooming are considered basic activities of daily living, or Basic ADLs (AOTA, 2020). Children with autism spectrum disorder (ASD) frequently struggle with these fundamental activities of daily living, such as getting dressed, taking care of their personal hygiene, going to bed, and performing other self-care tasks. Individuals with autism spectrum disorder have unique cognitive styles and learning styles. Given persons with autism spectrum disorder's limited ability to learn new abilities, the targeted skills should be practical and relevant to their daily lives (Levy-Dayana, 2023 & Leung, 2021).

The concept of participation is complex and encompasses two elements: involvement (the person's experience during the event) and attendance (the person's presence). Studies show that several factors prevent children with autism spectrum disorder (ASD) from engaging in meaningful activities, with research showing prevalent difficulties in everyday participation for most children with autism spectrum disorder. Furthermore, extensive research highlights the prevalent difficulties experienced by most children with autism spectrum disorder in participating in everyday activities. Different research stated that mobile technology facilitates participation among children with autism spectrum disorder and improves their skills in different domains such as cognitive, communication etc. There is a limited study on participation with the use of mobile technology in the domain of activities of daily living among children with autism spectrum disorder (Simpson & Adams, 2023).

## LITERATURE REVIEW

**ASD and Mobile Technology:** Technology is important in the day-to-day lives of individuals. Showing the importance of recognizing that technology can help enhance the everyday lives of individuals with autism, teachers, and their family members. Technology related tools enhance social and organizational skills. There are low-tech tools, mid-tech tools, and high-tech tools available. Basic technologies consist of common tools and methods that can encourage self-sufficiency and lessen challenging behavior. Computers, tablets, cell phones, electric wheelchairs, assistive technology, speech output devices, and other electronic gadgets are some

of them. Videos can aid people in comprehending gestures, cues, and facial expressions. Therefore, gadgets that produce speech or voice output can aid children in self-expression and assist them in communication barriers. It demonstrates how considerable improvements in expression, involvement, and communication are brought by the developments of technologies such as web apps, virtual reality, 3D animation, and collaborative virtual environments. Individuals with autism are utilizing applications to convert their smartphones and tablets into assistive technology. Daily items in the home can surprisingly turn into advanced technology, benefiting individuals with autism in educational settings and everyday life by enhancing social skills and communication. (Moraiti, 2023).

**Dressing-ADLs and Mobile Technology:** The use of digital technology (DT) as an intervention for adults with autism to the conventional treatment-as-usual (TAU) method. The DT approach was developed to improve day-to-day activities, such as washing dishes and clothes. The results showed improvements in activities of daily living skills using DT interventions of the participants of the study, which is found to be a better approach rather than TAU approach (Valencia, 2019). According to recent studies, there are three methods to utilize mobile technology as an intervention tool for people with ASD. First, the primary intervention tools are customized apps. King et. al. created the Proloquo2Go application to instruct individuals in the requesting. While the MyTalk mobile software installed on the iPod Touch was used to train for functional communication, another app called iTake Turns was created to train for turn-taking skills. Positive training outcomes were shown in all of these investigations. Second, speech-generating devices (SGDs) are made from mobile devices. To put it briefly, the SGDs help with communication by translating user selections—such as tapping objects on the screen—to an audio output coming from the devices. SGDs have been used successfully in previous research to help individuals with ASD with a variety of communication skills. These include training for mand repertoire and requesting the continuation of 3-step communication sequences (i.e., general request for toys, specific request for a selected toy, followed by a thank you response). Lastly, some interventions include mobile device training via video modeling or video prompting techniques, which have been shown to be effective in teaching transitional behaviors in the classroom, daily living and career skills and multi-step job performance.

According to the weak central coherence hypothesis, when processing information, people with ASD often pay attention to details but struggle to understand the importance of a larger picture. This direction makes it challenging for them to use their recently acquired skills in many contexts since they are unable to recognize the connections between circumstances or environment. The acquisition of functional communication repertoire and academic abilities could improve by mobile technology-based therapies for individuals with ASD, despite these challenges, according to prior systematic reviews. In a systematic review, Hong et al. found that tablet application interventions for individuals with ASD are helpful presented in this case study. A meta-analysis and systematic review were presented to assess the efficacy of mobile device intervention in randomized controlled trials (RCTs). According to the meta-analysis's promising findings of mobile intervention may be able to notable improvements in fine motor and visual skills. As cited, the results demonstrated that mobile technology may provide persons with ASD with a captivating and successful kind of intervention. These interventions, which have the potential to significantly impact adults and young children, could make use of the PDA (Personal Digital Assistant) or speech-generating features of mobile devices. The ability to

provide multimodal outputs, such as visual, aural, and even vibrating stimuli, is one benefit of utilizing a phone; these outputs successfully enhance the learning process for participants with ASD. Furthermore, certain PDA features, such as alerts for reminders, are helpful ways to enhance their planning and executive functioning skills. Consequently, these findings offer more proof in favor of the idea that mobile devices could be a useful intervention tool for those with ASD. Positive feedback regarding the use of mobile devices as an intervention tool was also recorded by participants with ASD and their parents in several studies. For instance, the majority of participants stated that they were motivated to take part in the intervention. This extra benefit might not be immediately realized in interventions conducted by "real persons," since it would take more time and energy to establish rapport and trustworthy relationships with participants who have ASD. Consequently, incorporating the use of mobile technology element into a typical face-to-face intervention may enhance its effectiveness (Leung, 2021).

**Factors affecting participation of children with ASD:** When it comes to ASD, many aspects such as a lack of engagement are frequently seen in young children. Because there is less verbal and social exchange, children with ASD are less likely to see their peers or participate in various activities. Personal interactions have also had an impact. It has been observed that almost half of children with ASD did not have any friends (Bashir, 2022). Less participation occurs when the kid's functioning does not match the activities in which the young children want to participate in everyday life. A multitude of contextual elements, including aspects of both the individual and the environment, have an additional impact on engagement. Participation in different settings is hard for them, anticipation and introducing the environment where the child will engage is important. (Coussens, 2019). Manifestations in sensory processing, restricted, repetitive, or stereotyped behaviors, and difficulties with social interaction and communication are the hallmarks of autism spectrum disorder (ASD). These symptoms may have varying effects on their chances to participate in daily life engagement in activities. Prior research has indicated that children diagnosed with ASD participate in activities at a considerably lower rate than their peers who are usually developing. Participation in activities was found to be significantly hampered for children with ASD by a variety of physical, social, and cognitive demands. The value of taking involvement into account when gauging children's participation is further supported by parental reports. While evaluating involvement, considering what the participant would like to do may also yield valuable information that will help shape interventions meant to improve quality of life and enjoyment in addition to participation (Mattinson, 2019).

**Parents and Caregiver Strategies:** In 2018, Schiavone et al. carried out a short study with 44 parents of children with autism spectrum disorders (M age = 4.8 years). In order to support their child's participation in nine home-based activities (such as self-care, sleep, mealtimes, and play) and twelve community-based activities (such as social gatherings, health visits, and scheduled community events like movies, libraries, and sporting events), caregivers were asked to answer open-ended questions. The two categories of techniques were person-related (i.e., modifying the child's connection with others) and environment-related (i.e., modifying the surroundings). 37 subthemes were found, and these were categorized under six themes: 12 subthemes related to facilitator or adaptation strategies; 10 subthemes related to pragmatic considerations; 6 subthemes related to sensory adjustment strategies; 3 subthemes related to social reframing strategies; 1 subtheme related to desperate measure strategies; and 5 subthemes related to non-productive strategies. Environmentally specific techniques were highlighted by the greater use of

facilitator strategies and adaptations in the home, whereas pragmatic considerations were more commonly utilized in communal events. It is noteworthy that 95% of participants gave a "non-productive response" to at least one item, indicating that they either don't go or go less frequently than intended or that they don't have any successful techniques. This study provided a thorough classification of techniques and highlighted distinctions between those utilized at home and in communities. However, because the emphasis was on the early years and participation of children on the autism spectrum varies over time, it is critical to analyze methods utilized over a range of ages and whether these patterns of strategies alter with age. Many strategies, such as positive interactions, structure, accommodating and adjusting, educating, spending quality time, supporting interests and friendships, and discipline, may be shared by parents of children on the autism spectrum (8-17 years) and parents of typically developing children. Although parents of autistic children are more particular in stating the precise tactics used (for example, a visual timeline). Parents reported uses a variety of child focused techniques. In the home context, the most often reported techniques were Reinforce, which included child-focused strategies to enhance their child's motivation to engage. Adapt and teach tactics comprised both child-focused teaching strategies (e.g., prompting and modelling) and environment-focused strategies in which the activity or task was altered or modified. These interventions improved the child's activity competency and may have addressed cognitive or physical demands that made activities more challenging. Other measures, such as anxiety reduction, may be used to alleviate participation barriers. Planning and organization were the most widely supported method in the community (younger 41.8%, older 36.5%). This involved parent identifying and developing conditions that would maximize the possibility of their child attending the activity (informal and formal), including child preferences and supportive surroundings (Simpson & Adams, 2023).

## METHODOLOGY

The study followed a descriptive-developmental design. Descriptive developmental is a systematic approach to designing, creating, and carefully evaluating instructional programs, procedures, and products that must meet specific standards or criteria. The primary sources of data were parents and caregivers who answered the surveys: 1) the factors affecting dressing participation, parents, and caregiver approach in managing children's dressing participation. 2) Data from Revised Technology Acceptance Model (TAM) questionnaire specifically, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) will be collected to assess the level of acceptability of using the mobile application in managing dressing participation for their children. The study focused on children aged 3 to 5 years old with the diagnosis of autism spectrum disorder (ASD) Level 2 in Binan, Sta. Rosa and San Pedro Laguna, involving both parents and caregivers for the collection of data from Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), Academic Year 2024. Purposive sampling will be used in selecting the respondents of this study. Thirty (30) children aged 3 to 5 years diagnosed with ASD were intended to be selected for this study. This study utilized a researcher-made questionnaire to collect data regarding the factors affecting dressing participation in children diagnosed with autism spectrum disorder. Another self-made questionnaire will be used to collect data regarding parents and caregivers' approach in managing dressing participation on their children. This will be distributed personally to the respondents including the letter. Researcher-made questionnaires were validated by 5 senior occupational therapists, or those having at least 5 years of experience

in the pediatric setting for their comments and suggestions. The reliability of the researcher made questionnaires were validated by a statistician using Cronbach's alpha.

## RESULTS

Tables 1 to 5 present every factor that affects children's participation in dressing tasks. This table shows various factors considered by parents and caregivers that impact their children's participation. Table 1 to 5 represents the weighted means, verbal interpretation, and rank of each answered question.

**Table 1**  
**Factors Affecting Children's Participation in Dressing Task: Environmental Domain**

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Do you go to wider spaces when performing dressing tasks with your child? (e.g., rooms, living room, bedroom, etc.)	2.93	Often	2
2. Do you turn on all the lights when performing dressing tasks with your child? (e.g., ceiling lights, lamps, etc.)	3.03	Often	1
3. Do you turn off electronic devices around the environment when performing dressing tasks? (e.g., television, radio, etc.)	2.17	Sometimes	3
4. Do you sometimes consider the presence of family members as a distraction when assisting with dressing tasks? (distraction = passing by, too loud when talking etc.) (e.g., siblings, grandparents, parents/caregivers, etc.)	2.00	Sometimes	4
5. Do you consider your room temperature when performing dressing tasks? (e.g., whether it's too hot or too cold)	1.87	Sometimes	5
<b>Overall Weighted Mean</b>	<b>2.40</b>	<b>Sometimes</b>	

**Table 2**  
**Factors Affecting Children's Participation in Dressing Task: Physical Domain**

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Does your child struggle to put on a shirt or top? (e.g., shirt, t-shirt, blouses etc.)	2.43	Sometimes	3

2. Does your child find it hard to put on pants or bottoms? (e.g., shorts, pants, pajama, etc.)	2.20	Sometimes	4
3. Does your child have difficulty manipulating fasteners? (e.g., buttons, zipper, buckles, snap, strap)	3.27	Always	1
4. Does your child need help putting on shirts and pants?	2.63	Often	2
<b>Overall Weighted Mean</b>	<b>2.63</b>	<b>Often</b>	

**Table 3**  
**Factors Affecting Children's Participation in Dressing Task: Social Domain**

Indicators	Weighted Mean	Verbal Interpretation	Rank
Does your child request help when putting on clothes?	2.77	Often	2
When getting dressed, does your child give the clothes to help them put them on?	2.43	Sometimes	4
Do you let your child choose what clothes to wear when getting dressed?	2.20	Sometimes	5
Do you praise your child when getting dressed to encourage them?	3.20	Always	1
Do you give enough time for your child to get dressed?	2.60	Often	3
<b>Overall Weighted Mean</b>	<b>2.64</b>	<b>Often</b>	

**Table 4**  
**Factors Affecting Children's Participation in Dressing Task: Cognitive Domain**

Indicators	Weighted Mean	Verbal Interpretation	Rank
Do you follow a consistent sequence of steps when helping your child get dressed? (e.g., when getting dressed, do you always do the same steps in the same manner, like putting on socks first then pants?)	2.17	Sometimes	3
Do you show your child how to dress by doing it yourself? (e.g., when getting dressed together, do you demonstrate how-to put-on clothes by doing it yourself for your child to copy?)	2.03	Sometimes	4
Do you give simple instructions when performing dressing task with your child?	2.47	Sometimes	2
Do you give straightforward instructions when helping your child get dressed? (e.g. When assisting your child with getting	2.57	Often	1

<i>dressed, do you give simple and clear directions like “put your arms through sleeves?”</i>			
<b>Overall Weighted Mean</b>	<b>2.31</b>	<b>Sometimes</b>	

**Table 5**  
**Factors Affecting Children’s Participation in Dressing Task: Sensory Domain**

Indicators	Weighted Mean	Verbal Interpretation	Rank
Does your child prefer textured clothes? (e.g., wearing fuzzy or rough-textured-clothes)	1.47	Rarely	7
Does your child prefer soft clothes? (e.g., wearing soft, cotton garments)	2.47	Sometimes	6
Does your child wear upper garments with sleeves? (e.g., wearing t shirt or tops with sleeves)	2.83	Often	2
Does your child wear long lower garments? (e.g., pants, pajama)	2.67	Often	3
Does your child wear short lower garments? (e.g., shorts or skirts)	2.93	Often	1
Does your child like wearing clothes that are roomy and not tight?	2.57	Often	4
Does your child show discomfort or irritability when wearing clothes with tags?	2.50	Often	5
<b>Overall Weighted Mean</b>	<b>2.49</b>	<b>Often</b>	

**Table 6**  
**Summary Table of the Factors Affecting Children’s Participation in Dressing Task**

Indicators	Weighted Mean	Verbal Interpretation	Rank
1.Environmental	2.40	Sometimes	4
2.Physical	2.63	Often	2
3.Social	2.64	Often	1
4.Cognitive	2.31	Sometimes	5
5.Sensory	2.49	Sometimes	3
<b>Overall Weighted Mean</b>	<b>2.49</b>	<b>Sometimes</b>	

Table 7 presents the result of parent and caregiver strategies in managing dressing participation for children with ASD. This table shows various strategies considered by parents and caregivers that impact their children’s participation. Table 7 presents the weighted means, verbal interpretation, and rank of each answered question.

**Table 7**  
**Strategies in Managing Dressing Participation for Children**

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Reinforce	2.90	Often	3.5
2. Facilitate, plan and organize	2.43	Sometimes	7
3. Adapt and teach	2.90	Often	3.5
4. Support tools and resources	1.77	Rarely	10
5. Encourage	3.13	Often	2
6. Child choice	2.47	Sometimes	6
7. Routines	2.23	Sometimes	8
8. Child preparation	2.07	Sometimes	9
9. Social attitude	2.60	Often	5
10. Supervision and monitoring	3.53	Always	1
<b>Overall Weighted Mean</b>	<b>2.60</b>	<b>Often</b>	

Table 8 to 9 presents the two determinants of Revised Technology Acceptance Model to determine the level of acceptability of the KiddyLaunch Application to address dressing participation for children with ASD. This table represents the weighted means, verbal interpretation, and rank of each answered question.

**Table 8**  
**Level of Acceptability of KiddyLaunch Application: Perceived Usefulness**

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Using KiddyLaunch application in dressing task would enables my child to participate easily	3.70	Strongly Agree	2
2. Using KiddyLaunch application improves my child participation in dressing	3.57	Strongly Agree	3.5
3. Using KiddyLaunch application increases my child's productivity in dressing	3.43	Strongly Agree	5.5
4. Using KiddyLaunch application enhances my child's effectiveness on dressing	3.43	Strongly Agree	5.5
5. Using KiddyLaunch application makes it easier to do dressing with my child	3.83	Strongly Agree	1
6. I would find KiddyLaunch application useful in addressing dressing participation with my child	3.57	Strongly Agree	3.5
<b>Overall Weighted Mean</b>	<b>3.59</b>	<b>Strongly Agree</b>	

**Table 9**  
**Level of Acceptability of KiddyLaunch Application: Perceived Ease of Use**

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Learning to operate KiddyLaunch application would be easy for me	3.63	Strongly Agree	5
2. I would find it easy to get KiddyLaunch application to do what I want it to do	3.17	Agree	6
3. My interaction with KiddyLaunch application would be clear and understandable	3.70	Strongly Agree	4
4. I would find KiddyLaunch application clear and understandable	3.83	Strongly Agree	3
5. It was easy for me to become skillful at using this KiddyLaunch application	3.87	Strongly Agree	2
6. I would find KiddyLaunch application easy to use.	3.90	Strongly Agree	1
<b>Overall Weighted Mean</b>	<b>3.68</b>	<b>Strongly Agree</b>	

Table 10 presents the result of the parents and caregivers' level of acceptability when using the KiddyLaunch application to their children in addressing dressing participation. This table shows the level of acceptability of parents and caregivers. Table 10 presents the weighted means, verbal interpretation, and rank of each answered question.

**Table 10**  
**Summary Table of the Level of Acceptability of KiddyLaunch Application**

Indicators	Weighted Mean	Verbal Interpretation	Rank
1.Perceived Usefulness	3.59	Strongly Agree	2
2.Perceived Ease of Use	3.68	Strongly Agree	1
<b>Overall Weighted Mean</b>	<b>3.64</b>	<b>Strongly Agree</b>	

Table 11 represents the result of the Expert Evaluation of the KiddyLaunch Application. This table shows the results of the expert who evaluated mobile technology for addressing dressing participation of children diagnosed with ASD. This table represents the weighted means, verbal interpretation, and rank of each answered question.

**Table 11**  
**Summary Table of the Expert Evaluation of the KiddyLaunch Application**

Indicators	Weighted Mean	Verbal Interpretation	Rank
1.Functional Stability	4.40	Very Satisfactory	1
2.Performance Efficiency	4.20	Very Satisfactory	5
3.Compatibility	4.00	Very Satisfactory	10.5
4.Usability	4.20	Very Satisfactory	5

5. Reliability	4.15	Very Satisfactory	9
6. Security	3.72	Very Satisfactory	12
7. Maintainability	4.16	Very Satisfactory	8
8. Portability	4.20	Very Satisfactory	5
9. Quality in Use: Effectiveness	4.20	Very Satisfactory	5
10. Quality in Use: Efficiency	4.00	Very Satisfactory	10.5
11. Quality in Use: Satisfaction	4.20	Very Satisfactory	5
12. Freedom from Risk	3.67	Very Satisfactory	13
13. Context Coverage	4.30	Very Satisfactory	2
<b>Overall Weighted Mean</b>	<b>4.11</b>	<b>Very Satisfactory</b>	

## DISCUSSION

### 1. Factors affecting children's participation in dressing tasks.

Among the factors affecting children's participation in dressing tasks, **social factors (M = 2.64) and physical factors (M = 2.63)** have been frequently chosen by the participants of this study as influencing their children's task performance in the home environment. The overall result shows that these factors are "sometimes" (**M = 2.49**) affecting their children when performing activities at home.

### 2. Parents' and caregivers' strategies in managing dressing participation for their children.

Among the strategies for managing dressing participation for children with ASD, supervision and monitoring ranked first (**M = 3.53**) and were "often" chosen by the participants of this study. Overall, these strategies are "often" (**M = 2.60**) used by the parents and caregivers in the study. Given that all participants are handling children diagnosed with ASD and undergoing occupational therapy, it is not surprising that they are familiar with these strategies.

### 3. Mobile technology application that can be developed to help children diagnosed with autism spectrum disorder on their participation to dressing task.

KiddyLaunch Application was developed with the help of a software developer and is currently implemented to android mobile devices to cater the general population of mobile users. This application is composed of the following: (1). Dressing Up! And (2). Mini Game, all these features and functions are related to activities of daily living – dressing, Resources, and Important Note. Contents of the mobile application will help parents and caregivers to guide their children with autism spectrum disorder in promoting dressing participation using innovative approach.

### 4. Level of the acceptability of parents-caregivers using KiddyLaunch application on mobile phones addressing dressing participation.

According to the Revised TAM Questionnaire for the level of acceptability of parents and caregivers to newly introduced mobile application to address a specific concern, the developed KiddyLaunch application received a rating of "**Strongly Agree / M = 3.59 in Perceived usefulness**" where parents and caregivers accepted the device functions are appropriate to address dressing participation. Additionally, for **Perceived ease of use** was "rated **Strongly Agree / M = 3.68**" in which parents and caregivers accepted the device features are easy navigate and understand without exerting too much effort. Overall, the KiddyLaunch application,

designed for mobile devices to facilitate dressing participation for children diagnosed with ASD, has met its standards and functions effectively.

### **5. Expert Evaluation of the KiddyLaunch application using the ISO 25010:2011**

According to the ISO 25010:2011 standards for systems and software quality requirements and evaluation, the developed KiddyLaunch application received a rating of '**very satisfactory/outstanding**' ( $M = 4.11$ ). Overall, the KiddyLaunch application, designed for mobile devices to facilitate dressing participation for children diagnosed with ASD, has met its standards and functions effectively.

## **CONCLUSIONS**

1) Parents and Caregivers consider different factors that affect their child's participation in dressing tasks. Social and physical factors were often experienced by them, while environmental, cognitive, and sensory factors were sometimes experienced. Overall results that these factors 'sometimes' affect their children's participation in tasks. 2) Supervision and monitoring ranked first and commonly used by the parents and caregivers who answered the questionnaire. Overall results show that different strategies to manage dressing tasks for children were often used by them to manage their children's participation. 3) The KiddyLaunch application for dressing participation was strongly accepted by caregivers and parents of children with autism spectrum disorder to address dressing participation, receiving ratings of 'Strongly Agree' for both Perceived Usefulness and Perceived Ease of Use. 4) The KiddyLaunch application on mobile devices was evaluated and rated as very satisfactory in meeting the standards and criteria using ISO 25010:2011 systems and software quality requirements and evaluation.

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