

- **Name of the study:** Touchscreen Operation Among People with IDD: Assessment of Fine Motor Components Using the TATOO© Application
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- **Type of research:** Academic research
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### Abstract

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Touch screen technologies accessible to people with intellectual and developmental disabilities (hereinafter: IDD) are of great value as they can contribute to their integration into modern society, improving their quality of life and increasing their independence. This recognition was expressed in the anchoring of the right to accessibility in all areas of life in the International Convention on the Rights of Persons with Disabilities and in Israeli legislation and standards. However, there is no tool that can comprehensively and objectively assess the abilities and challenges of people with IDD when using these devices.

For this purpose, the TATOO (Touchscreen-Assessment Tool) application was developed to assess motor skills in operating touch screens. This tool, developed by Danial-Saad and Chiari (2017), was originally adapted for children and adults, but not for people with IDD over the age of 21. The application provides a comprehensive and reliable picture, reflecting the capabilities and difficulties of subjects when operating a touch screen. For this purpose, the actions required to use a touch screen are examined, including touching, dragging, pinching, and more, and a summary is presented with graphic and numerical data of measures such as pressure, execution time, range of motion, accuracy, and more. With the help of these measures, it is possible to assess the common characteristics of abilities and difficulties of fine motor components when operating a touch screen and their widespread implications on users' daily lives. The assessment is not culture and/or language dependent and does not require writing skills.

The purpose of this study was to adapt the interface of the existing TATOO tool for adults with IDD over the age of 21 in order to characterize the components of fine motor skills and their performance measures when using TATOO, and to examine the relationship between individual characteristics (IDD level, age, and user experience) and performance measures when using it. The study was also intended to examine the relationship between the performance measures of

standard diagnostic tools that assess fine motor skills and strength (The Box and Block Test (BBT) that assesses unilateral gross manual dexterity and a manual dynamometer for measuring grip and pinch strength) and the fine motor measures when operating a touch screen using TATOO among adults with IDD.

The research design was correlational, using a cross-sectional study. It included 120 subjects with IDD aged 21-58 years with various IDD levels (mild, mild-moderate, and moderate). The participants performed a variety of tasks in TATOO, including touching the screen, double tapping, dragging, and pinching. In addition, standardized tests were administered to evaluate fine motor skills (Box & Blocks) and strength Hand Grip Dynamometer (HGD). Demographic data and data on previous experience using touchscreen technology were collected.

The findings confirm a significant correlation between the IDD level, age, and user experience and the participants' performance in TATOO. It was found that the more severe the level of IDD and the older the age of the participants, the slower and less accurate the performance. On the other hand, more user experience using touchscreens was associated with faster and more accurate performance. TATOO demonstrated concurrent and discriminant validity in relation to standardized tests, with significant correlations between TATOO measures and performance on Box & Blocks and HGD tests. A high level of satisfaction was found with the use of TATOO, with reports indicating enjoyment, a sense of success, and physical comfort.

This study highlights the potential of TATOO as a unique assessment tool for this population, providing detailed information on specific motor abilities required in the digital age and supporting professionals in making touchscreen devices accessible to this population. The findings indicate the importance of adapting touch interfaces to the specific needs of people with IDD and suggest directions for future research and practical applications to improve technological accessibility for this population.

## **Keywords**

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fine motor assessment, touchscreen use assessment, intellectual and developmental disability, TATOO application, user experience.

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