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RELIABILITY AND VALIDITY OF THE DIGITAL VERSION OF THE MODIFIED STANDARDIZED NINE HOLE PEG TEST WITH AN AUTOTIMER

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SUMMARY

Objective: Manual dexterity is the capacity to move the fingers and hands in a coordinated way to grasp and manipulate things. It depends on the interaction of musculoskeletal and neurological systems to make precise and intentional motions. The study's main goal is to compare the traditional Nine Hole Peg Test with a stopwatch with the dmS-NHPT with an autotimer in terms of concurrent validity, inter-rater reliability, and test-retest reliability. Methodology: Eighty healthy adults were included and randomized into two groups. Group A was tested by Evaluator I with the dmS-NHPT, with an autotimer (digital version of the modified standardized Nine Hole Peg Test), and then with the tNHPT with a stopwatch (traditional Nine Hole Peg Test) on the same day. Group B was tested by Evaluator II. Ten days after the first testing, the second testing is done with the evaluators being reversed. Results: The mean age of participants was 36.14 ± 1.027 years. Concurrent validity between tNHPT and dmS-NHPT with an autotimer was strong by Pearson correlation ($r = 0.9603$, $p < 0.05$). The Bland-Altman LoA are used to analyze the pairs of observations between the tNHPT and dmS-NHPT with an autotimer. A scatter plot is used to display the variability between these pairs, and the mean difference is 0.82 seconds. Test-retest reliability after 10 days shows significant correlation with a coefficient of ICC = 0.983 ($p = 3.3$; < 0.05), and inter-rater reliability was significant with ICC = 0.987 ($p = 3.16$; < 0.05). Novelty: The digital auto timer and battery are incorporated within the pegboard, with the detector sensor placed within the hole of the board. The material of the pegboard is made of PLA, a bioplastic that is lightweight, which gives tactile feedback and makes gripping of the pegs easier for the subjects. The pegs are colored (visual feedback). The scores are displayed immediately at the end of placing the last peg into the hole (knowledge of results and feedback). Conclusion: The dmS-NHPT with an autotimer's relative reliability and measurement errors are improved by spatial strategy, thereby increasing the degrees of freedom by biofeedback techniques. A valid tool to measure dexterity for healthy individuals and also patients with neurological disorders.

Key words: *dexterity, dmS-NHPT with an autotimer, reliability, validity. LoA—limits of agreement.*

INTRODUCTION

The ability to perform tasks and grasp objects with coordinated hand and finger movements is known as manual dexterity, and it depends on the interaction of the neurological and musculoskeletal systems to enable precise and intentional movements [1]. Manual dexterity is mostly associated with bilateral sensorimotor region activation in normal healthy adults [2] [16]. In older persons, dexterity is attributed to activation of the prefrontal cortex and primary sensorimotor cortices [3]. The NHPT a dexterity test designed by Kellor (1971) et al. The test involves placing nine pegs in a certain order within a time limit. NHPT requires participants to hand-pick the nine pegs and put them into nine corresponding holes as quickly as possible and one at a time [4].

The Nine-Hole Peg Test has several versions, which may have changes in the pattern of the container, the size and shape, and the material quality. However, key elements like distances between the holes and the size of the holes and pegs remain consistent to ensure the test's validity and reliability. The NHPT is simple, affordable, and portable. The instrument's ease of use and precise timing make it an excellent option for testing manual dexterity in both clinical and research settings. [5].

Johansson et al. have significantly improved the NHPT's accuracy and stringency by adding cameras and markings to the test subject's body. The modified and standardized version is now called the "Modified Standardized Nine-Hole Peg Test" (dmS-NHPT) and comes with an autotimer. The dmS-NHPT improves the accuracy of measuring manual dexterity by keeping track of small movements and using more precise performance standards. This makes the test results more reliable and valid. [6] The setup consists of two pegboards that are analogous with each other, evaluating three various strategies of accomplishing the task of NHPT, focusing the tasks in a virtual setting. It is composed of a control unit and a pegboard that is customized to meet the requirements of G.M. Johansson and K. Hager (2019).

An extensive level of technical knowledge, as well as improved and more automated ways to collect data are required. Thus, Eveline Prochaska and Elske Ammenwerth (2023) created a digital version of the NHPT that is improved and standardized, combining the benefits of automatic data collecting and user-friendliness. [7]

In an attempt for a similar form of the traditional NHPT, our newly created prototype with a combination of prototypes formed by G.M. Johansson (2019) and Eveline Prochaska (2023) includes one test board and a separate control unit. The electronics and software included in the dmS-NHPT with an auto timer are built-in components to make the test process easy and automate the data collection.

This study focused on the reliability and validity of the dmS-NHPT with an autotimer, primarily on three key aspects: i) Concurrent Validity: The dmS-NHPT with an autotimer is evaluated against other traditional assessment tools of manual dexterity. ii) Test-Retest Reliability: When the same individual takes the dmS-NHPT with autotimer many times, the results obtained are same and valid iii) Inter-Rater Reliability: Different users of the dmS-NHPT with autotimer get the same results, which shows that the scores are consistent with multiple users. [26].

The dmS-NHPT with an autotimer works on the principle of motor learning with biofeedback techniques. The dmS-NHPT with an auto-timer is quick and easy to administer and an advanced method of recording the duration taken to complete the task as a finger dexterity measurement.

Figure 1 shows the setup consisting of two pegboards in analogy with each other evaluating three various strategies of accomplishing the task of NHPT, focusing the tasks in a virtual setting, i.e., it involves: 1. An additional similar nine-hole pegboard is used in place of the original peg container. 2. Inserting the pegs from the main pegboard into the corresponding pegboard's holes. 3. A precise order is employed as per G. M. Johansson and C. K. Hager 2019.

Figure 1. MS-nine hole peg test with autotimer

The setup is carefully designed to ensure consistency and comfort for participants. A back-supported adjustable chair is chosen, and the participant sits in a chair with their palms facing down. The arms are resting on a table with elbows at a 90° flexion, and that is 74.5 cm high. This standardized position is the same for all participants so that the data collected is accurate and reliable.

The double pegboard was placed on the table between their arms, with pegs filled in the lateral pegboard towards the hand to be assessed and at the midline, the empty medial pegboard, and the Hall sensor detects a magnetic field once the pegs are placed into the lateral pegboard. The lateral pegboard's pegs (No. 1 to No. 9) were picked uni-manually one at a time. Magnetic field loss is detected by the Hall sensor when the first peg, No. 1, is picked, and the cycle starts and the timer starts. The pegs are moved and placed into the medial pegboard holes and then returned to the lateral pegboard (from No. 9 to No. 1) one by one. The hall sensor picks up a magnetic field when Peg No. 1 is put in the lateral pegboard and the timer stops, and the monitor indicates the duration in seconds. The workflow of the procedure is as in Figure 2.

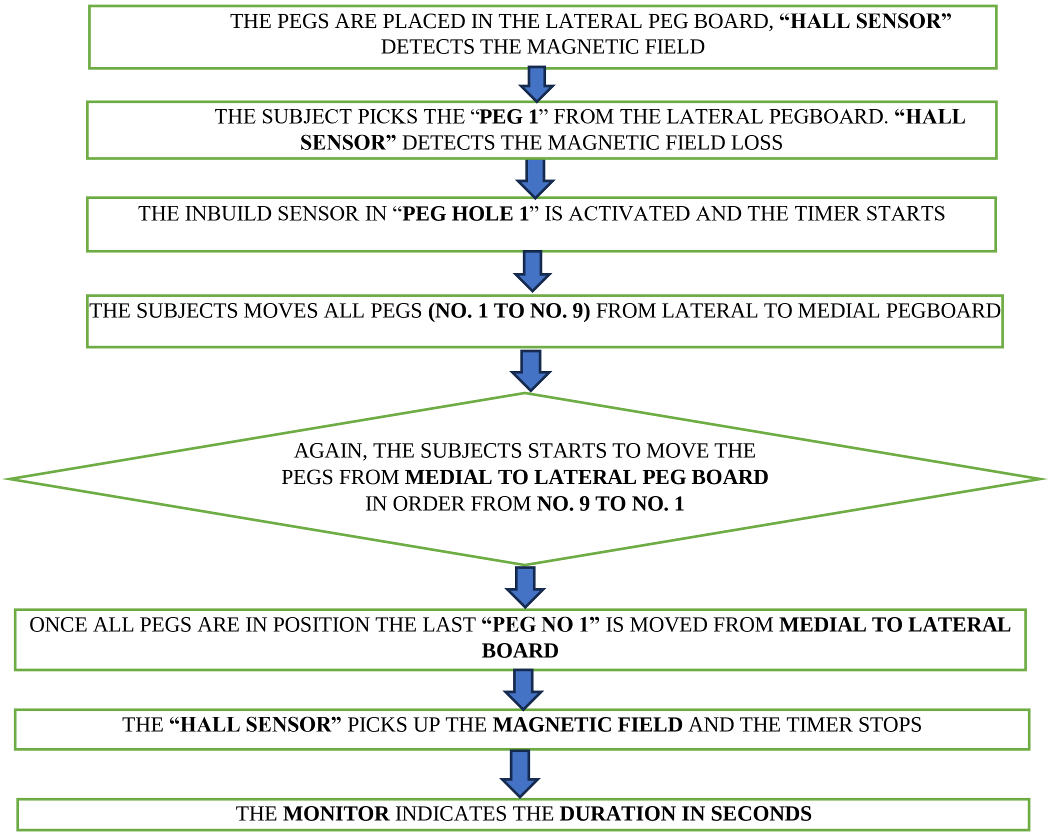

Figure 2. Workflow of dmS-NHPT

If the peg falls on the participant's knee or table, they pick it up and keep going with the test. If a peg falls on the ground, the subject goes to the next peg. The subjects are instructed to do the test quickly using the "vertical row strategy." If they don't follow the order, they can't try again (Figure 2)

Hardware

The dmS-NHPT with autotimer was developed using the latest version of Autodesk Design software (Fusion 360 v-2.0.20476), which enhances the design process and ensures the device meets the needs of its users. Fusion 360 is a combination of CAD (computer-aided design) and CAM (computer-aided manufacturing) enabling a smooth workflow from design to manufacturing that lets designs be stress-tested and functionally analyzed to make sure they are safe and effective [8]. The cloud-based environment makes it easy for team members to work together in real time, which accelerates feedback and changes to get better product outcomes. 3D printing allows one to make designs that are very flexible and fit exact needs, making therapy sessions more comfortable and effective [9].

Poly Lactic Acid is safe for contact with skin and also nontoxic, as it's a biodegradable, renewable resource that has advantages for both individuals and the environment. PLA with a wide range of colors, ensuring reliability and aesthetically pleasing designs with adequate strength for many applications, enhancing the user experience with biofeedback techniques. [10]

Design Overview

The dmS-NHPT has two pegboards that are 12.7 cm x 12.7 cm with nine holes (0.70 cm wide) placed 3.2 cm apart and nine pegs that are 3.8 cm long and 0.64 cm wide. The two pegboards are 18 centimeters apart from the center holes of each other. They are attached to a panel. Depending on user needs, the container can be put on either side of the participant. (G. M. Johansson 2019)

Neodymium magnets keep the pegboard in place. A neodymium magnet is one of the strongest permanent magnets, and these magnets don't lose their magnetism and keep their magnetic properties over time, keeping therapeutic devices working for longer periods. Magnets hold the components in position by using the magnetic force based on their size during assessment sessions. [11]

Both polarities of a magnetic field can be identified by the Bipolar Hall Effect sensor 49E, which is very sensitive, and this sensor operates reliably in providing accurate readings for positioning and motion detection for therapeutic interventions. Its compact size allows for easy space integration. The sensor's fast response time and durability ensure consistent performance during assessment and intervention procedures, enhancing the system's overall precision and reliability. [12]

Battery Configuration: 3S2P—three lithium-ion cells in series and two lithium-ion cells in parallel. Specifications: Type: Lithium-ion, each cell has a nominal voltage of 3.7V and a capacity of 2.1Ah. The total capacity is 4.2Ah, The total voltage is 11.1V and the total energy capacity is 46.62Wh. The device has a rechargeable battery that makes it easy and portable. The battery can be charged and it holds 46.62 Wh and gets its charging voltage (12V DC) from a barrel connector.

Electronics

Neodymium magnets (Type: N42) measuring 4 mm in diameter and 2 mm in thickness are attached to peg ends (32). Below is the formula to determine the neodymium magnet's magnetic flux density (B) and strength, and the direction of the magnetic field is at a certain place in space. It shows how much magnetic flux goes through a unit region that is perpendicular to the magnetic field's direction [13].

The expression is:

$$B = \frac{Br}{2}\left(\frac{D+Z}{\sqrt{R^{2+(D+z)R^2}}} - \frac{z}{\sqrt{R^{2-z^2}}}\right.$$

- **B**: Magnetic flux density at a point along the axis (in tesla or gauss)
- **Br**: Remanent magnetization (a material property, in tesla)
- **R**: Radius of the magnet or coil
- **D**: Thickness or height of the magnet
- **z**: Distance from the magnet's surface along the axis

Internal circuitry is being used with the two digital Hall sensors (N42). Sensors are installed on the pegboard; the magnetic field of the peg is detected when the distance between the magnet and sensor is ≤ 5 mm

Accuracy of the therapy relies on the test and prototype being executed precisely, which is monitored when the magnetic fields of the nine pegs are detected. An 11.1V lithium battery pack powers the entire system, and an Arduino UNO is used to connect all the electronic components. Other features include an LCD, a buzzer, and a sensor to track movements; the system also features a mini-computer for testing. Overview of Components: Mini-Computer: 1 unit (Arduino UNO); Sensors: 2 digital Hall Effect sensors**;** Battery Pack**:** 1 unit (11.1V lithium-ion); LCD Display**:** 1 unit; Buzzer: 1 unit

Software

The dmS-NHPT with Autotimer software was developed using the Arduino Integrated Development Environment (IDE), provides a flexible platform for programming the device. The IDE is intuitive and accessible, allowing for quick learning and adaptation for the user [14]. IDE supports real-time debugging and monitoring, ensuring immediate feedback during development, which is crucial for adjusting therapy parameters and enhances the overall functionality of the dmS-NHPT with an autotimer, a digital version to meet the specific therapeutic needs of the user.

STUDY DESIGN

This study uses a crossover test-retest design. Using a random sample technique, the participants were divided into two groups. Ten days following the initial measurement point, data from the dmS-NHPT with an autotimer and the tNHPT with a stopwatch were collected at two periods of time. Data collected by two testers (Evaluator 1 and Evaluator 2) [32] [33]. The two evaluators performed two pre-tests before the study. To improve the accuracy of the data to be gathered, the pre-test was designed to train the testers and monitor the dmS-NHPT with the autotimer's workflow.

PARTICIPANTS

In total, 80 participants, faculty of Jaya Educational Trust, Thiruninravur, age ≥20 years, both male and female, without any history of orthopedic or neuromuscular conditions that would significantly affect dexterity, participated in the study. The participant's dominant hand is noted.

EXPERIMENTAL PROCEDURE

The study is done at Jaya College of Physiotherapy OPD. The test procedure includes testing at two times with an interval of 10 days. The tNHPT and dmS-NHPT with autotimer test setup and instructions matched the benchmark established by Gudrun M. Johansson in 2019 [5]. Prior to the recorded test, the subjects did a practice run without timing. 80 participants were involved. There were 40 Nos. in Group A and 40 Nos. in Group B by random sampling. The tests were tNHPT with a stopwatch and dmS-NHPT with an autotimer. Data was collected at two measurement intervals, separated by 10 days [15, 16].

Group A was assessed first by Evaluator I using the dmS-NHPT with an autotimer and subsequently the tNHPT with a stopwatch on the same day. Evaluator II assessed Group B using tNHPT with a stopwatch and then with dmS-NHPT with an autotimer, in reverse order. The second assessment was taken after ten days following the first. The NHPT using a stopwatch and the dmS-NHPT with an autotimer for both groups were done. Here, both groups changed the evaluator: Group A by Evaluator II and Group B by Evaluator I.

DATA ANALYSIS

Version 28.0 of IBM SPSS Statistics was used. The study population is explained by summary or descriptive statistics. Table 1 and Figure 3 show the data normality was determined with the Shapiro-Wilk (W test). The Pearson correlation coefficient (PCC) was used to evaluate concurrent validity in the relationship between using the tNHPT with a stopwatch and the dmS-NHPT with an autotimer. $p < 0.05$ was chosen as the level of statistical significance [17] [21].

Bland-Altman analysis evaluates for any bias and determines the limit of agreement (LoA) between the dmS-NHPT with an autotimer and the tNHPT with a stopwatch [18] [19]**.** The y-axis of the scatter plot displays the difference of the two paired measurements, and the x-axis gives the average of the measurements. A 95.0% CI of the difference of means between the tNHPT and dmS-NHPT with autotimer values at the measurement point was used to statistically evaluate the fixed bias.

Test-Retest Reliability, Inter-Rater Reliability, and Intra-Class Correlation Coefficients (ICC): An accepted minimum for measurement method reliability is an ICC of 0.7 or above [19, 20]. Classification to estimate correlation: 0.5 to 0.75 is poor, 0.75 to 0.9 is good, and >0.9 is excellent (Figure 3).

RESULTS

80 healthy participants with an average age of 36.24 ± 1.027 years.

Table 1. Normality of data—The Shapiro-wilk test

PARAMETERS	VALUE	PARAMETERS	VALUE
p- Value	0.001831	Sample Standard Deviation	9.2524
W	0.9451	B	79.9485
Sample Size	80	Skewness	-0.05933
Median	36.5	Skewness Shape	Potentially Symmetrical (pval = 0.825)
Average	36.0375	Excess Kurtosis	-1.2002
		Kurtosis Shape	Platykurtic, Short Thin tails (pval=0.024)

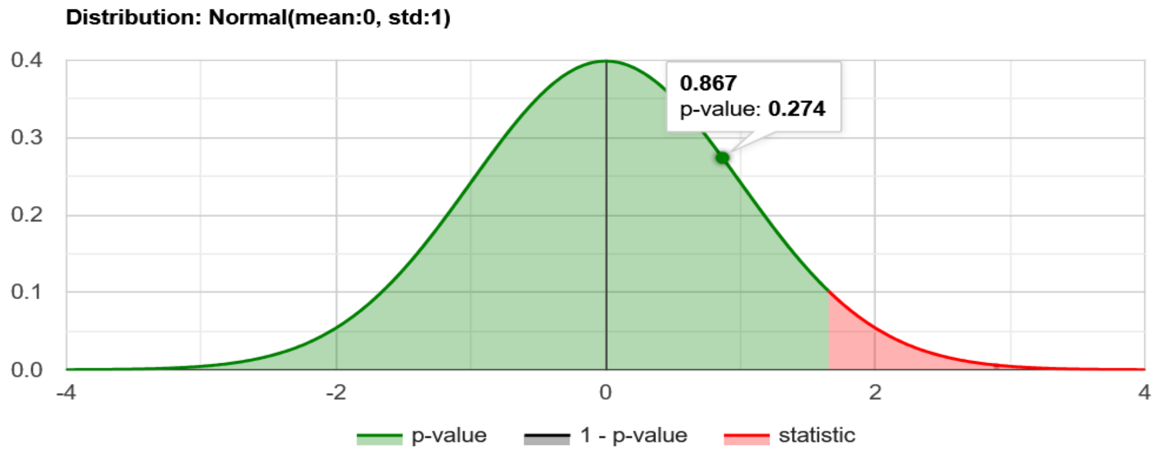

Figure 3. Normality of data: shapiro-wilk (W) test

Concurrent Validity

The tNHPT and dmS-NHPT with autotimer had a strong Pearson correlation coefficient (r = 0.9603) at the first measurement point, and the "p-value" was less than 0.5, less than 0.0000105, so the result was significant Table 2 shows the means, Standard Deviation., maximum, and minimum scores. The number of valid values for the three measurements: NHPT (at the initial measurement time point), dmS-NHPT autotimer-1, and dmS-NHPT autotimer-2 (at the subsequent measurement time point).

Table 2. Performance of tNHPT and dmS-NHPT with autotimer at two measurement points on average

	MEAN	SD	VARIANCE	MIN	MAX
Tnhpt	25.26	3.131	9.804	20.15	34.55
dmS-NHPT, Autotimer – 1	26.14	3.594	12.91	20	37.29
dmS-NHPT, Autotimer – 2	25.38	3.35	11.22	19.35	35.25

tNHPT - Traditional Nine-Hole Peg Test

dmS-NHPT with autotimer – digital version modified standardized Nine-Hole Peg Test

Figure 4 shows Bland-Altman limits of agreement (LoA) evaluating observations from the same individuals using both the tNHPT with a stopwatch and the dmS-NHPT with an autotimer [21]. A scatter plot depicts the mean and variance of tNHPT and dmS-NHPT with autotimer values for each subject [22]. The plot displays a line representing the mean difference estimated as -0.82 [95.0% CI] between the two NHPT versions. The Line of Agreement indicated with two dashed lines (LOA: +1.96 SD: 2.75; -1.96 SD: -1.11). The range of scores in stable probands is indicated by the LOAs.

The dmS-NHPT with an autotimer typically takes 0.82 seconds longer than the NHPT, according to the mean difference of 0.82.

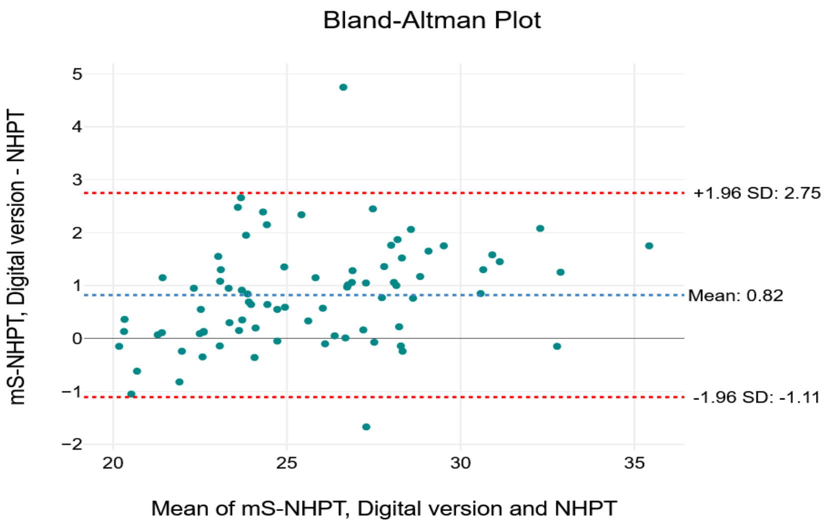

Figure 4. Analysing pairs of observation using the traditional NHPT and dmS-NHPT with auto timer by bland–altman plots

Test-Retest Reliability

The dmS-NHPT scores with autotimer were compared at the two points of measurement. 80 healthy participants performed trial I, and after 10 days with trial II, at the two measurement points, the dmS-NHPT with autotimer scores with autotimer were compared (22). ICC is calculated to determine the test-retest reliability after 80 healthy participants completed their 1st trial and after 10 days with the 2nd trial; ICC = 0.983 indicates a significant correlation coefficient (p = 3.3; < 0.05).

Inter-Rater Reliability: The ICC was used to evaluate inter-rater reliability**,** with a context of two evaluators' measures of the same participants [24]. This was accomplished by comparing the outcomes of Evaluator I and Evaluator II for the 80 participants who completed the dmS-NHPT with autotimer at both measurement points. With ICC = 0.987, Inter-Rater reliability was significant (p = 3.16; < 0.05)

DISCUSSION

The modified standardized Nine Hole Peg Test with autotimer (dmS-NHPT) provides a more valid, reliable, and detailed assessment of dexterity than the traditional version for normal healthy individuals.

The traditional NHPT is quite simple; the subject, picking with one hand, picks up nine pegs and puts them in the holes in the board in any order. [25] and also for neurological conditions like post-stroke patients [15]. The dmS-NHPT with a standardized order of pegs and double pegboards shows discriminant validity distinguishing motor performance. The original NHPT measures completion time that varies on the examiner, and the digital NHPT has a unique color and a single pegboard as per the research review of Eveline Prochaska and Elske Ammenwerth 2023, but the dmS-NHPT with autotimer provides accurate results as sensors are incorporated and the timer is displayed once the task is completed. The dmS-NHPT strongly correlates with the traditional NHPT for clinical assessment of dexterity among healthy adults [26] [30] and also in neurological conditions like stroke, Parkinson's, Down syndrome, CP, autism, etc. (28). The dmS-NHPT suitable for both clinical monitoring and research [20]. The design of dmS-NHPT enhances the confidence of the user with the type of material, colors, and the monitor displaying the accurate timing of task completion, providing the user with biofeedback and with knowledge of results with the principles of motor learning.

The research analyzes the concurrent validity, test-retest reliability, and inter-rater reliability of the digital version of the modified Standardized Nine-Hole Peg Test with autotimer. The concurrent validity of dmS-NHPT was evaluated and contrasted with the conventional NHPT, a benchmark for assessing manual dexterity. The test-retest reliability and inter-rater reliability were assessed by two evaluators at two points of time at an interval of 10 days. The study focused on 80 healthy participants; repetitions are performed by the participants with the modified Standardized Nine-Hole Peg Test with autotimer. A lot of research backs up the traditional NHPT, which is a tool to evaluate hand dexterity.

In 2019, Gudrun M. Johansson and Charlotte K. Häger developed a new version of the modified version of the NHPT, which is analogous to the traditional NHPT, which consists of a double pegboard. The procedure involves the subject picking the peg from the lateral pegboard towards the medial pegboard with precise order and the reversal of pegs from the medial pegboard towards the lateral pegboard. This study focuses on finding the validity and reliability of a newly developed digitalized modified standardized NHPT with autotimer, which consists of a built-in sensor and display. It has digital features that assist with the measurement, guide through the process, measures the time, and execution without errors

Concurrent Validity of the Dms-Nhpt

The comparison of the new digitalized dmS-NHPT with the autotimer, in relation to the traditional NHPT, has yielded a strong Pearson coefficient correlation. A correlation coefficient is significantly influenced by the sample's variability. As we had used only samples of healthy adults, the correlation coefficient alone is insufficient for evaluating the concordance of two measurement methods; consequently, a Bland-Altman plot was subsequently conducted [31].

The Bland-Altman plot showed that the traditional NHPT scores were, on average, 0.82 seconds less than the dmS-NHPT scores. Bland-Altman suggested the 95% confidence interval of the data of mean difference. In our data, the limits of agreement are 1.96 SD: 2.75; -1.96 SD: -1.11. The subjects found it harder than the traditional NHPT because they needed extra time to pick up the pegs from the original board of dmS-NHPT and move them to the corresponding board and back to the original board.

The second factor to ponder about is that the tNHPT is made of wood and is the same color, while the dmS-NHPT is made of PLA, which is biodegradable. The fact that the pegboard (grey) is a different color than the pegs (red and blue) in the dmS-NHPT version, the first and last pegs are red to make sure the task goes smoothly and in a coordinated way. The pegs are easier to access in the board, so it's easier to pick them up than the tNHPT. Because the dmS-NHPT pegs are easier to identify in the board, they can be picked up faster than the tNHPT pegs.

Test-Retest Reliability of the dmS- NHPT: The dmS-NHPT scores with autotimer were compared at both measurement points. Eighty healthy participants performed trial I, and after 10 days with trial II, at the two measurement points, the dmS-NHPT with autotimer scores were compared. ICC is calculated to determine the test-retest reliability after 80 healthy participants completed their 1st trial and after 10 days with the 2nd trial. ICC = 0.983 indicates a significant correlation coefficient ($p = 3.3; < 0.05$). This could suggest that the results of dmS-NHPT with autotimer on healthy participants exhibit greater variability between the two sessions [23] Watanabe N, Otaka Y, et al. (2022).

Interrater Reliability of the dmS-NHPT: An increased inter-rater reliability, evaluated by ICC, was attained in a case of two evaluators assessing the same participants, with a 10-day interval between the two assessment points. From the results of Evaluator I and Evaluator II for the 80 people with dmS-NHPT who had an autotimer at both measurement points. These findings confirm earlier studies that showed strong inter-rater reliability for dmS-NHPT. Nonetheless, these studies done with healthy people used Pearson's (r) or Spearman's (p) methods to find the correlation, which led to the following results: For healthy individuals, $r = 0.987$. Inter-rater reliability was significant ($p = 3.16$; < 0.05). In conclusion, our results demonstrate significant reliability, making them independent of the tester.

Clinical Implications

The Digital Auto Timer, a key component for precise timing for tasks, likely adds on accuracy and reliability, ensuring it is more efficient and user-friendly. A detector sensor placed within the holes of the board accurately detects when a peg is picked and placed. It provides real-time feedback. The battery is incorporated for multiple uses, and it's shockproof without compromising performance. Polylactic acid (PLA), a biodegradable thermoplastic made from renewable resources like cornstarch or sugarcane, is what dmS-NHPT is made of. It's lightweight, easy to handle, and has a texture that ensures a secure grip, is environmentally friendly and eco-friendly, and reduces waste. The dmS-NHPT is made of the colors of grey, red, and blue along with numeracy marked on the board, providing tactile and visual feedback. The immediate scoring enhances motivation and is more efficient with principles of motor learning and knowledge of results. This study focused on healthy individuals; further research can be done with patients of neurological conditions [27] [28] [29].

CONCLUSION

The dmS-NHPT with an autotimer is appropriate for evaluating hand dexterity according to the quality standards. Features of the digital dmS-NHPT with the autotimer version, like automated timing and instruction during the standardized test, could enable users to further objectively assess hand dexterity. The dmS-NHPT with autotimer provides accurate results as sensors are incorporated and the timer is displayed once the task is completed, and it measures hand dexterity more easily and objectively. As the timer is digitally implemented on the dmS-NHPT with an autotimer, no additional materials, such as a stopwatch, are required. The dmS-NHPT strongly correlates with the traditional NHPT for clinical assessment of dexterity among healthy adults and also in neurological conditions like stroke, Parkinson's, etc. The dmS-NHPT is suitable for both clinical monitoring and research. When compared to the traditional NHPT, the dmS-NHPT yielded higher scores (an average of 0.85 seconds) and showed good reliability values. Therefore, the dmS-NHPT is suitable for measuring hand dexterity for healthy adults and other neurological conditions.

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Conflicts Of Interest

No conflicts of interest were declared by authors.

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Ethical and Consent

The Ethical approval obtained from the institution's Ethical Committee (EC/JCP/OCT/2024), The CTRI registered number CTRI/2025/08/092373, and informed consent from the participants were obtained

Abbreviations

dmS-NHPT (modified standardized nine-hole peg test with autotimer, and then with tNHPT - (traditional nine-hole peg test)

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