Movement Disorders
CLINICAL PRACTICE
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Touchscreen Smartphone Interaction in Parkinson's Disease and Healthy Subjects in Outpatient Clinics

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We read with interest the article by De Vleeschhauwer et al[1] about touchscreen skills in patients with Parkinson's disease (PD). We acknowledge that this pioneer and exhaustive effort highlights precisely some of the main difficulties that these patients encounter while interacting with touchscreen devices. One of these examples is the prolonged duration of the sliding tasks performed by the patients. The article reveals that the patients' accuracy and their intertap interval is similar to those shown by participants without PD. We achieved comparable results in previous research.

In previous research, we designed a pilot study focusing on routine outpatient clinics by a trial with a prototype smartphone application (previously used by patients with essential tremor).[2] A total of 18 patients with PD and 22 controls matched by age and sex (Table 1) were recruited. They performed 5 repetitions of 4 simple tests that were designed to be common touchscreen activities when using smartphones (further methodological details can be found in Supplementary Material S1). Despite the different methodologies and devices used, both studies shared small sample sizes and easy reaching, sliding, and tapping tasks. In both studies, patients with PD achieved similar accuracy and a similar intertap interval time (Table 1) to healthy participants. In contrast to De Vleeschhauwer et al, we did not find significant differences in the duration test performance between patients with PD and controls. This could be explained by the limited statistical power, more recent onset of the disease, the milder severity of our patients, and fewer repetitions of the tasks and the fact that the most complex sliding tasks were not performed. In addition, there were differences in the touchscreen interface settings[3] concerning the type of device, software, button size, and the double-tapping act. We consider that the approach of De Vleeschhauwer et al dealing with more repetitions of the tasks makes the bradykinesia of the patients more obvious. Consequently, it could be useful to detect it in touchscreen interaction as a diagnostic tool.[4,5] It may be possible that the most basic touchscreen smartphone tasks do not require multidirection sliding movements or very repetitive tasks and could be performed when accuracy is preserved, reaching the targets displayed on the screen in a slower way, unless dexterity or cognition would be affected.[3]

Hence, the severity of the disease could affect the touchscreen interaction notably[1]; nevertheless, it should be examined whether the slower performance of the task found in patients with moderate severity really affects the usability of a touchscreen display significantly. As long as this limitation is provided, these issues should be taken into consideration by touchscreen smart device developers to ease the touchscreen interaction process for patients with PD.[3] In the case that it is not given, both studies may support the continuation of using touchscreen technology for PD care research in patients with mild to moderate PD.

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Author Roles

(1) Research project: A. Conception, B. Organization, C. Execution; (2) Statistical Analysis: A. Design, B. Execution, C. Review and Critique; (3) Manuscript Preparation: A. Writing of the first draft, B. Review and Critique.

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TABLE 1 *Demographic characteristics of the participants and the summary of results of touchscreen smartphone interaction in patients with Parkinson's disease and healthy participants*

Demographic Characteristics					
Participants			**Healthy Participants, n = 22**	**Patients With Parkinson's Disease, n = 18**	***P* Value**
Sex, n (%)					
Female			9 (40.9)	7 (38.9)	n.s.
Male			13 (59.1)	11 (61.1)	n.s.
Nonmobile users, n (%)			2 (9.1)	3 (16.7)	n.s.
Age (in years), mean ± SD			72.1 ± 7.7	74.0 ± 6.5	n.s.
Number of times smartphone use per day, mean ± SD			8.5 ± 10.9	5.2 ± 7.3	n.s.
Years of disease, mean ± SD			–	5.3 ± 3.4	–
Unified Parkinson's Disease Rating Scale, Part III, mean ± SD			–	19.8 ± 9.5	–
Research Smartphone Application Performance[a]					
Task		**Outcome**	**Healthy Participants**	**Patients With Parkinson's Disease**	***P* Value**
Test 1	Press the circle in a screen that randomly change its position	Accuracy 100% 80% 60% 40% 20% 0%	99.09 ± 4.2 21 1 0 0 0 0	97.78 ± 6.5 16 2 0 0 0 0	n.s.
Test 2	Press the shown number in a virtual keyboard (number dialing)	Accuracy 100% 80% 60% 40% 20% 0%	96.36 ± 10.0 19 2 1 0 0 0	95.56 ± 10.9 15 2 1 0 0 0	n.s.
Test 3A	Turn off an alarm by tapping twice on circle	Time to stop an alarm	1677.82 ± 666.54	1657.39 ± 644.56	n.s.
Test 3B		Time between 2 touches	524.64 ± 405.53	573.17 ± 332.97	n.s.
Test 4	Turn off an alarm by scrolling a circle along the screen to reach a goal	Time to turn off the alarm	2297.59 ± 537.87	2479.72 ± 768.97	n.s.

"n.s." indicates not significant at $P > 0.05$.
[a]Results are given in mean time in miliseconds ± SD.
Abbreviation: SD, standard deviation.

Disclosures

Ethical Compliance Statement: All procedures were approved by the ethical standards committees on human experimentation at the University Hospital "12 de Octubre" (Madrid). Informed consent was obtained from all participants. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this work is consistent with those guidelines.

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Supporting Information

Supporting information may be found in the online version of this article.

Appendix S1. Further methodological details of the case-control study are given.