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Virtual Versus Face-To-Face Neuropsychological Assessment: A Pilot Study Towards Its Benefits and Its Limitations

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Abstract

During the COVID-19 pandemic many people – especially older adults – had drastically decreased their visits to health centers, causing a new concern among the professionals: if these patients were not assisting physically to their doctors, who is watching over their health, diagnosis, and follow-ups? Novel cognitive and emotional concerns are frequent in older adults and must be seen by a specialist who can determine whether these complaints may be compatible with a neurologic or psychiatric disorder. In this context, during the pandemic telemedicine services had been replacing and compensating some of these demands. Teleneuropsychology (TNP) is the application of virtual methods with neuropsychological aims, to assess or treat patients with suspected or confirmed cognitive impairment. Several studies from around the world are showing TNP and face-to-face (FTF) assessments are similar, and TNP approaches may be reliable and accurate, but this type of data is scarce in the Latin America region.

The objective of this pilot study is to analyze the differences in TNP and FTF assessments, and to describe the pros and cons reported by the participants. For this purpose, 20 healthy adults were assessed in 2 instances (virtual and physical meeting) with a selection of classic neuropsychological tasks. After their last session, they answered an ad-hoc survey reporting the main benefits and concerns regarding both approaches. The results of this study show that no significant differences were found between TNP and FTF performance. The main benefits reported from the FTF session were the real-time interaction and feedback, while the main benefits reported from the TNP session were the flexibility, comfort, and the travel-time they saved. In the other hand, the main concerns reported from the FTF session were that it was more time-consuming and less flexible to arrange the session, while the main concerns with the TNP session were associated to technological potential problems and the lack of a direct eye contact. In conclusion, this study is aligned with previous research and provides empirical local evidence of the usefulness of virtual approaches in health-related services.

Keywords: Telemedicine; Teleneuropsychology; Neuropsychological assessment; COVID-19

Abbreviations:

TNP = Teleneuropsychology.

FFT = Face-to-face.

Introduction

The use of telemedicine to distribute medical services regardless the location is not new, but due to the COVID-19 pandemic and the consecutive lockdown measures, the offer of this type of assistance has grown rapidly. The health emergency policies required that most of the people (especially older adults)

had to stay at home and avoid face-to-face (FTF) contact with others, including medical centers and health professionals. These circumstances led to veer from a physical contact to a virtual contact with family, friends, work colleagues and health professionals, making telemedicine not only just an alternative but a mandatory



way to assess and follow the patients [1,2]. Telemedicine is a tool originally created as a way to help people living in geographically isolated areas, offering the possibility to connect this people with specialized health professionals without the limitations of transport and time consumption [3]. In this way, its benefits were mainly the reduction of the economic cost, a reduced loss in time and the access to health services no matter the physical location [4]. Specifically, teleneuropsychology (TNP) is the application of telemedicine methods for neuropsychological objectives of patients with suspected or confirmed cognitive damage. Thus, TNP is known for the use of audiovisual tools to carry out neuropsychological assessments and treatments [5].

Since the beginning of the COVID-19 pandemic, most countries adopted restrictive measures that promoted to stay at home and avoid non-urgent visits to health centers. An Argentinian study [6] compared the outpatient visits to one of the most renowned neurological centers in the country during the first weeks of the 2020 lockdown and the same period during 2019, and the results were drastic: diagnostic tests dropped a 60% and the cognitive neurology area suffered a 66% drop in patients visits. While severe neurological cases still assisted to health centers, patients with minor complaints stayed at home and avoided the hospital. These results replicated in many parts of the world [7-9]. These patients with apparent minor complaints (e.g., cognitive, or emotional complaints) may represent an at-risk group that was not assessed and treated at an opportune time. Older adults are a particularly affected group due to the pandemic: not only they were the first who should not get infected with the COVID-19 virus but also, they lacked medical assistance for these suspected minor complaints, such as novel cognitive failures or higher levels of depression, anxiety, and isolation [10-11]. In this context, telemedicine in general (and TNP in particular) has become a critical tool to aid and provide a follow-up assistance to these vulnerable groups [12-14].

Although TNP is a relatively new area which is quickly developing, several studies had shown this approach may be reliable to produce valid neuropsychological assessments [15-21]. A recent systematic review analyzed the reliability of traditionally FTF neuropsychological assessment used in a telemedicine context with Alzheimer's Disease patients [22], concluding that widely used screening tools and other neuropsychological tests resulted in general reliability and enough accuracy. In this way, this study affirms that performing virtual assessments is accepted and appreciated by patients and their families, and therefore may be useful to provide a personalized follow-up in the treatment of cognitive disorders. Another recent study [23] analyzed the acceptance and concerns associated to TNP assessment, concluding that this approach is satisfactory, especially during the COVID-19 pandemic while limitations should be addressed, as technological concerns may arise.

Although there is valuable information that supports TNP as a trustworthy method to assess people in a virtual mode, evidence of these type of studies is scarce in Latin America. In

this context, the objective of this study is to analyze preliminary results of the similarities and differences between TNP and FTF neuropsychological assessments, as well as address the benefits and limitations perceived by the participants.

Methods

A pilot study with 20 healthy young adults (age $X=28.2$; $SD=5.18$ / educational level in years $X=16.1$; $SD=2.92$; 80% female) was carried out to analyze the differences between TNP and FTF neuropsychological assessment, as part of a first step before assessing older adults with these same procedures. The selected neuropsychological tests for this study were the Signoret battery for mnemonic efficiency (serial and logical episodic memory subtests), the digit span test (forward and backwards), the Boston naming test (short version of 12 stimuli), verbal fluencies (semantic and phonological tasks) and the matrix reasoning subtest of the WAIS IV. The participants were assessed in both ways (FTF and TNP) in a random order (10 participants started with TNP and then FTF, and the other 10 participants started with the FTF session and did the TNP session afterwards), to avoid a correlation between the performance and the order of administration of the tests. Participants were assessed with at least 5 weeks of difference, to minimize memory effects in the selected tasks. To analyze the benefits and concerns informed by the participants, an ad-hoc survey was conducted after their second session, where they were openly asked which were the pros and cons, they perceived in both type of meetings (FTF and TNP). In this adhoc survey, participants were asked what they liked most about the TNP and FTF session, and what were their main concerns or discomforts associated with both type of sessions. A descriptive and qualitative analysis was done to study their answers. To analyze the differences between FTF and TNP in neuropsychological performance a dependent sample Student t-test was conducted, and differences were considered statistically different with a p value $<.05$.

Results

As Table 1 shows, no statistically significant differences ($p>.05$) were found in the performance of the selected neuropsychological tests between the virtual (TNP) and traditional (FTF) neuropsychological assessment in the present sample.

The Table 2 summarizes the descriptive and qualitative analysis of the ad-hoc survey done after the last session. This preliminary analysis revealed that participants liked the FTF session because they could interact with the professional in a real-time situation, without delays or audio problems. They also highlighted that real eye contact and having the possibility of touching the material (e.g., the visual stimuli, booklets, etc.) felt beneficial for their performance. In the other hand, participants reported that the FTF session was far more time consuming, informing concerns about time, traffic, or transport problems, and that coordinating the time of the session were both parts could physically assist was more difficult. Moreover, the participants reported that the benefits of the TNP session were that presented more flexibility in terms of

time to schedule the meeting, they may organize better to assist to the assessment and continue with their daily activities. Also, they reported that they could do it from the comfort of their homes, saving time associated with travel. In terms of their main worries

regarding TNP, they reported potential connectivity concerns (e.g., being alert of their Wi-Fi connection), the lack of physical eye-contact with the professional and the possibility to touch the materials, and the added stress of seeing themselves in the screen.

Table 1: Difference analysis between FTF and TNP sessions in the neuropsychological assessment.

Test Score	FTF		TNP		t	Df	p
	X	SD	X	SD			
BME serial episodic memory – free delayed recall	8.7	1.9	9	2.6	-0.5	19	0.6
BME serial episodic memory – recognition	11.7	0.5	11.5	0.9	1.37	19	0.2
BME logic episodic memory – immediate recall	8.3	1.4	8.23	2.1	0.12	19	0.9
BME logic episodic memory – delayed recall	8.15	1.3	8.1	2.1	0.09	19	0.9
Digit span – forward	8	1.7	8.05	2.5	-0.1	19	0.9
Digit span – backwards	6.45	3.3	7	2.2	-0.7	19	0.5
Boston naming test	11.9	0.4	11.6	0.5	2.03	19	0.1
Semantic verbal fluency	20.5	4.2	20.9	3.6	-0.7	19	0.5
Phonological verbal fluency	14.8	4.5	15.5	3.4	-0.5	19	0.6
Matrix reasoning	19	3.9	19.3	5	-0.3	19	0.7

Note: X= mean; SD= standard deviation; t= dependent sample t test value; Df= degrees of freedom; p= p value (significant when < .05); FTF= face-to-face assessment; TNP= teleneuropsychological assessment; BME= battery for mesic efficiency

Table 2: Summary of the pros and cons perceived by the participants with the ad-hoc survey.

	Pros (benefits)	Cons (concerns or discomforts)
FTF	- Real-time interaction	- More time consuming (travel)
	- Eye contact	- Difficult coordination
	- Physical contact	
TNP	- Time saving (travel)	- Connectivity concerns
	- Comfort	- Lack of physical contact with professional and material
	- Time and space flexibility	- See him/herself in the screen
	- Better organization	

Note: FTF= face-to-face assessment; TNP= teleneuropsychological assessment

Discussion and Conclusion

This preliminary pilot study shows that a TNP approach may be as reliable as a FTF approach, allowing access to health-related services (such as a neurocognitive assessment) to people that cannot physically reach a specialist, or prefer to be assessed by a particular specialist who is not in their hometown. These conclusions are aligned with previous findings [15-21]. During the last two years, telemedicine services expanded their frontiers rapidly due to the COVID-19 pandemic and the associated restrictions, to give an answer to patients who could not physically assist to a health center [3,4,12-14]. Future studies should address and profoundly analyze the concerns reported by the participants associated to virtual health sessions, as the conclusions of the present study are in line with previous research in other countries [23]. It seems that virtual approaches for educational, social and health reasons had come to stay [1], and TNP appears to be part of this upcoming technological era.

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None.

Conflicts of interest

None.

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