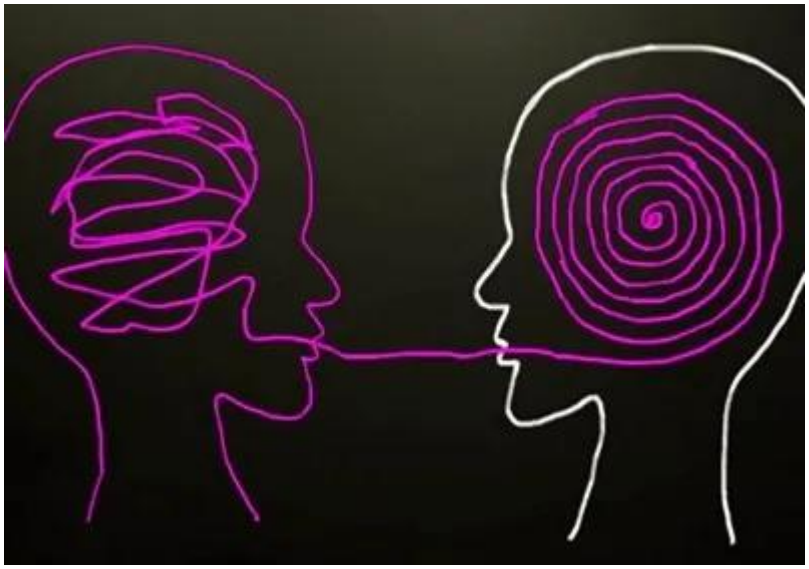
Cognitive dysfunction, also known as “brain fog”, is now a widely recognized feature of the post-COVID syndrome alongside physical symptoms. Problems with memory, planning, reasoning, attention, and language characterize cognitive dysfunction. In this article, the author from Hong Kong, China, analyzed cognitive-linguistic disorders in individuals who developed long COVID syndrome after acute COVID-19 disease. The author examined cognitive-linguistic difficulties in three areas: discourse informativeness, confrontational naming, and verbal fluency, and suggested that language difficulties in individuals with long COVID should be considered less as a primary language disorder such as aphasia, and more as a cognitive-communication disorder.

Long COVID is a term that encompasses a wide spectrum of organ dysfunction and clinical symptoms. A significant number of individuals with the post-acute phase of COVID-19 exhibit symptoms of central nervous system disorders, such as anosmia, dizziness, headache, stroke, cognitive and memory disorders, extrapyramidal and movement disorders, mental disorders, encephalitis or encephalopathy.



About the study

The author examined the language skills of 110 individuals diagnosed with long COVID syndrome. Among them, 99 reported significant cognitive-linguistic difficulties as part of their ongoing neurological symptoms. The author also conducted an online survey of 973 participants diagnosed with long COVID, who were asked whether they experienced any cognitive-linguistic difficulties.

Results

The participants with long COVID syndrome had relatively good structural language skills. Most of them used well-formed, meaningful language, and an appropriate range of vocabulary. They also had good auditory-verbal comprehension and were able to follow task instructions in complex language, although in many cases these instructions required repetition to facilitate language comprehension.

The researcher suggested that the linguistic knowledge of individuals with long COVID remained intact and that their language problems were cognitive. Further examination revealed several cognitive-linguistic difficulties. They performed significantly worse than healthy participants in the following areas: delayed and immediate verbal recall, informativeness of spoken discourse, letter fluency, and category fluency for animals.

To examine discourse production the author used three discourse production tasks: the Cookie Theft picture description task from the Boston Diagnostic Aphasia Examination, Flowerpot Incident narration (storytelling based on a sequence of six, black-and-white line drawings), and Cinderella narration (telling the story of Cinderella after viewing pictures in a wordless picture book). The results showed that these tasks were particularly sensitive to the cognitive-linguistic difficulties in participants with long COVID. Their language, for the most part, was grammatically well-formed and meaningful, but of reduced informativeness compared to discourse produced by healthy controls. As the cognitive demands of these tasks increased, from picture description (Cookie Theft) to production of a fictional narrative (Cinderella), the performance of individuals with long COVID showed a stepwise decrease.

The author stated that the observation of reduced language informativeness on these tasks among participants with long COVID was not solely related to memory problems, but rather to higher-level discourse processes involved in the management of information. These processes extensively utilize cognitive skills, specifically executive functions such as planning and organization.

The examination of cognitive executive functions showed that individuals with long COVID retained knowledge of language form and meaning, but were unable to use this knowledge to produce discourse because of cognitive difficulties. This resulted in a well-formed and meaningful discourse, which was markedly under-informative.

To examine verbal fluency, the author used letter and category fluency tasks.

Letter fluency is regarded as a measure of executive function, although it has been questioned in some studies. During letter fluency testing, participants were asked to say a maximum number of words that begin with the letters F-A-S within a time limit of 60 seconds. In numerous individuals with long COVID, reduced processing speed seemed to compromise the production of words beginning with F-A-S. They produced a small number of words within 60 seconds, with extended pauses between each word.

Category fluency examines lexical generation. Participants must access a specific semantic field in their mental lexicon to produce as many examples of the field as they can. Healthy people who undertake category fluency tasks typically use *clustering* and *switching* strategies. Clustering involves the generation of consecutive words from the same subcategory, whereas switching involves the generation of consecutive words from different subcategories. In two category fluency tasks, participants were asked to say a maximum number of names of animals and vegetables within 60 seconds. Individuals with long COVID demonstrated significantly poorer performance in category fluency for animals, but not in category fluency for vegetables compared to healthy controls. However, some of them effectively used clustering during the category fluency tasks and got scores for naming animals similar to healthy controls.

Language problem	Frequency
I struggle to find words	93.10%
I forget what I wanted to say	90.90%
I lose concentration easily when talking to others	89.60%
I mix words up and produce incorrect words	72.40%
I cannot recall what was said earlier in the conversation	65.40%
I find reading difficult	61.70%
I cannot recall what has been said in conversation after it has taken place	60.60%
I find writing difficult	51.20%

I veer off-topic in conversation and cannot get back	50.80%
I struggle to produce utterances and sentences	46.60%
I struggle to understand what people are saying	38.20%

Table 1. Language and communication difficulties in 973 adults with Long COVID. The original table from the article of Cummings L, 2023

Among the 973 adults who completed the online long COVID survey, word-finding difficulty was the most common self-reported language symptom. 93% of participants with long COVID syndrome reported that problem (Table 1). Further examination of the naming performance in every participant revealed a considerable cognitive inefficiency during naming.

Conclusion

Participants with long COVID performed worse than healthy controls in delayed and immediate verbal recall, informativeness of spoken discourse, letter fluency, and category fluency for animals. The author suggested that language difficulties in individuals with long COVID should be viewed less as a primary language impairment like aphasia and more as a cognitive communication disorder.

The cognitive-linguistic difficulties in individuals diagnosed with long COVID, found in the present study, are typically assessed and treated by speech-language pathologists who manage communication difficulties in individuals with traumatic brain injury, right-hemisphere damage, and neurodegenerative diseases like Alzheimer's disease. These patients have a relatively intact syntax at the sentence level although they struggle to tell a story or give an informative scene description. These discourse-level difficulties arise from cognitive deficits in areas such as executive function.

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Journal Reference

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