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# Cognitive impairments that everybody has

Sergio Della Sala

Phone: +44 131 6513242

Email: sergio@ed.ac.uk

RobertD.McIntosh

Phone+44 131 6503444

Email r.d.mcintosh@ed.ac.uk

Human Cognitive Neuroscience, Psychology University of Edinburgh 7 George Square Edinburgh EH8 9JZ UK

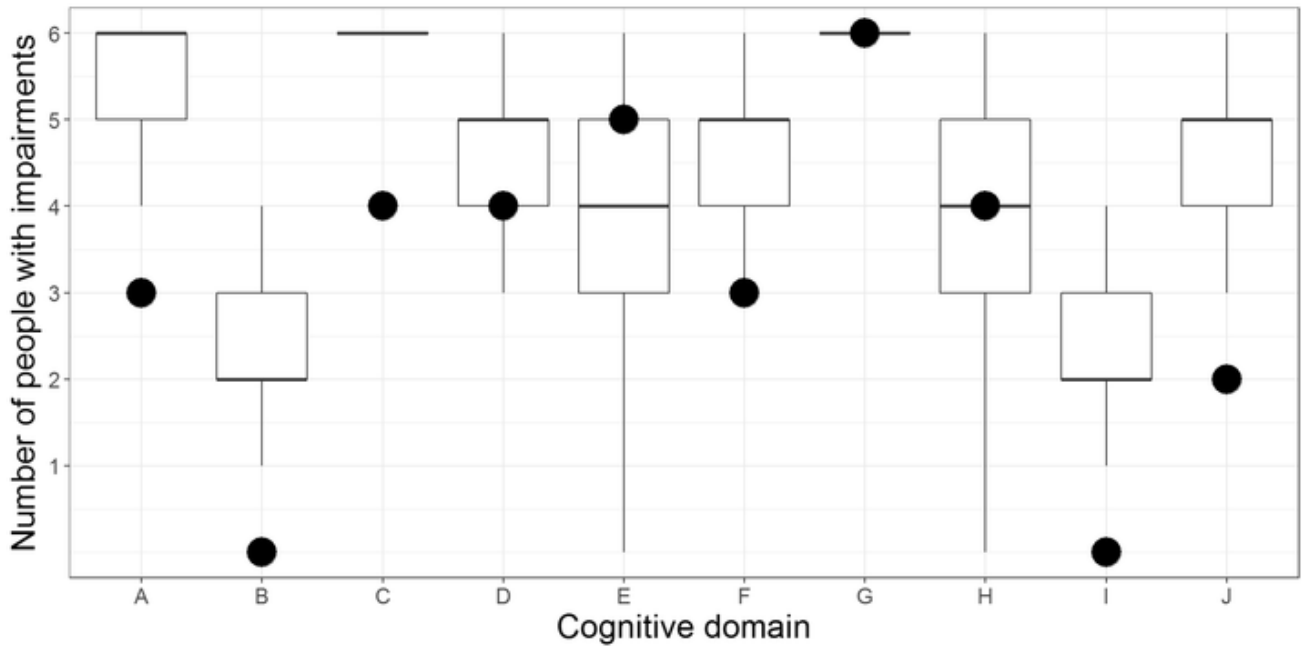
Dear Sirs,

A recent high-profile paper in JAMA reported on a case-series with neurological and cognitive symptoms due to an undetermined cause [1]. Under study were US government personnel who had been working in Havana, and had reported auditory and sensory phenomena of unknown origin. Six of the 21 people in the study were assessed with a neuropsychological battery of 37 tests divided into 10 cognitive domains. In each domain, the person was considered impaired if their score fell below the 40th percentile in at least one of the tests. The authors reported that all six people showed impairment in at least one domain, supporting the idea that they had sustained neurological injury in the absence of any head trauma. Concerns over possible 'health attacks' have led to the ongoing withdrawal of staff from the US embassy in Havana.

By definition, 40% of people score at or below the 40th percentile on any task. Using this threshold for impairment, and without any correction for the number of test scores examined ( $37 \text{ tests} * 6 \text{ people} = 222$ ), we should expect around 89 false positives. We ran a simulation to explore the range of outcomes, using the authors' system for counting impairments. Our method was to substitute their test scores with random numbers from a uniform distribution between 1 and 100, and to count how many people showed at least one impairment per domain ( $< 40\text{th percentile}$ ). We did this 1000 times, and compared the distributions of our outcomes with their findings (see Fig. 1). The only deviations were where the number of impairments reported by Swanson and colleagues was fewer than expected by chance (possibly because the people tested were smarter than average).

**Fig. 1**

Boxplots (excluding outliers) summarising the number of people with impairments per domain, across 1000 simulations, using the criteria of Swanson et al. [1]. The filled circles show the data from the paper. The domains (with the number of sub-tests in brackets) are as follows: A = auditory attention and working memory (5); B = visual working memory (1); C = auditory and visual memory (11); D = visual-spatial perception and visual-motor construction (3); E = motor functions (2); F = language functioning (3); G = executive functions (6); H = processing speed (2); I = academic achievement (1); J = reasoning (3)



With the criteria used, the cognitive symptoms of the proposed new syndrome have a worrying lack of specificity: everybody is affected.

## Reference

1. Swanson RL, Hampton II, Green-McKenzie S, Diaz-Arrastia J, Grady R, Verma MS R. et al (2018) Neurological manifestations among US government personnel reporting directional audible and sensory phenomena in Havana, Cuba. *JAMA* 319(11):1125–1133. <https://doi.org/10.1001/jama.2018.1742>