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Editorial: Children's digital cognitive assessment in a time of cultural adaptation: Lessons from the Moroccan context

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Paediatric neuropsychology is going through a period of profound transformation, marked by the rise of digital cognitive assessment tools. Tablets and web platforms are gradually replacing the traditional paper-and-pencil, promising greater efficiency, enhanced standardization, and the capture of unprecedented behavioural data such as reaction times or micromovements (1,2). This digitalization, accelerated by the need for remote assessment during the recent pandemic (2,3), opens fascinating prospects for early detection, longitudinal follow-up and access to care in underserved regions. However, this transition, seductive as it may be, raises crucial challenges that require careful thought on the part of clinicians and researchers, particularly about cultural adaptation and interface design for young users.

The fundamental question of psychometric equivalence between digital and paper formats seems to have been generally resolved for many major tests, provided that the digital conversion is carried out rigorously, respecting the principles of functional isomorphy (4,5). Studies carried out by major publishers and independent researchers often converge on a high correlation of scores and negligible mean differences (4). However, this equivalence should not be regarded as universal or automatic. Subtle variations may appear for certain tasks, notably those involving processing speed or fine visuo-motor components (2,4), and children's varying familiarity with tactile interfaces may introduce biases (3,6). More worryingly, most of these validations have been carried out in Western contexts (7). Extrapolating these results to culturally and linguistically diverse populations, as in Morocco, without specific local validation, would be scientifically hazardous and potentially clinically damaging.

Beyond simple transposition, the very design of the digital interface is a critical factor in validity. An interface poorly adapted to the child's cognitive and motor skills can generate an extrinsic cognitive load, polluting the measurement of the targeted function (7,8). Paediatric human-computer interaction research argues for child-cantered interfaces: large tactile targets, clear and concise oral instructions, immediate feedback, and judicious use of engaging but non-distracting visual elements (7,9). Involving children and clinicians in an iterative co-design process appears to be a sine qua non for developing truly usable and acceptable tools(10). Gamification, often mentioned, must be handled with care to avoid distorting the evaluation itself (11).

The most complex challenge undoubtedly lies in cultural and linguistic adaptation. The idea of totally "culture-free" tests is largely a myth (7). Even non-verbal tests are imbued with implicit cultural conventions (7). The transition to digital technology can even exacerbate these biases, via images, interactive metaphors or proposed scenarios (12). Successful adaptation goes far beyond simple translation. It requires a critical analysis of the relevance of each item, each instruction, and even the concepts assessed, within the target culture. This often involves revising, replacing or creating new items, as well as conducting validation and calibration studies on representative local samples(7). The Moroccan context, with its linguistic richness (standard Arabic, Darija, Amazigh, French) and socio-economic and numerical disparities (7,13), perfectly illustrates the complexity of this task. Digitization initiatives in the country offer fertile ground, but the development of locally validated digital neuropsychological tools is still in its infancy.

In conclusion, while paediatric digital cognitive assessment holds undeniable promise, its ethical and effective deployment requires rigorous cultural adaptation, careful ergonomic design and local psychometric validation. The Moroccan context, like many other non-Western environments, reminds us that technology is only a tool; its relevance and accuracy depend fundamentally on our ability to anchor it in the cultural, linguistic and social realities of the children we seek to assess. A collaborative approach, involving researchers, clinicians, developers, and the communities themselves, is essential to building digital tools that truly serve the equity and quality of neuropsychological care for all children.

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