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SPOTLIGHT:
NEUROCHECK PRO AND DIGITAL NEURODEVELOPMENTAL ASSESSMENT: OPPORTUNITIES AND PRIORITIES FOR ADAPTATION IN PAKISTAN.



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ABSTRACT
Digital technologies offer new possibilities for addressing gaps in the assessment of autism spectrum disorder and attention-deficit/hyperactivity disorder (ADHD), especially in settings with limited specialist resources. This perspective describes NeuroCheck Pro, a UK-developed digital pathway that integrates structured data collection, informant reports, computerised tasks and video consultations. Drawing on the UK service model and applicable global evidence, it identifies opportunities for adapting this model to Pakistan and sets out priorities for a locally led evaluation, with emphasis on clinical validity, cultural and linguistic considerations, digital accessibility, safeguarding and data governance. A phased framework is proposed for the cross-cultural adaptation and local evaluation of a digital neurodevelopmental assessment pathway in Pakistan.

KEYWORDS
Attention Deficit Disorder with Hyperactivity; Autism Spectrum Disorder; Digital Technology; Pakistan; Telemedicine; United Kingdom.

INTRODUCTION

Autism and attention deficit hyperactivity disorder (ADHD) assessment depend on developmental history, information from more than one setting where appropriate, and clinical judgement. Timely specialist access is uneven internationally, notably where specialised services are limited. Globally, the World Health Organisation describes substantial gaps in mental health care,[1] while a Pakistani commentary identifies constraints in child and adolescent specialist services.[2] These sources establish a service challenge, but they do not quantify the number of people in Pakistan who lack a neurodevelopmental diagnosis.

This perspective describes a UK digital service model, identifies opportunities for adapting it to Pakistan and proposes priorities for collaboration with Pakistani clinicians, researchers and families. The model is presented as a candidate for adaptation, not as an established way to improve diagnostic accuracy, access or cost in Pakistan. NICE guidance for autism in children and adults and for ADHD emphasises comprehensive clinical assessment; digital instruments may support, but cannot replace, that process.[3-5]

There is a distinction between collecting information remotely and making a diagnosis remotely. Questionnaires can identify concerns and inform an interview, yet answers may be affected by who completes them, the language used and the context in which a child or adult is observed. A clinical assessment must consider developmental and medical history, possible co-occurring conditions, differential diagnosis and the person's preferences. It should also identify when an in-person component is needed. In this article, "assessment" refers to that wider process, rather than implying that a digital score provides a diagnostic result.

The NeuroCheck Pro Service Model

This is a clinician-led digital pathway designed to organise self-report, informant information, computerised tasks, consultation and reporting. Patients and, where relevant, parents, teachers or partners may contribute structured information before a clinician reviews the record. Computerised attention and cognitive measures can supplement other evidence, but performance on a task is not itself a diagnosis.

A study of a computerised battery (QbTest) in UK adults found incremental validity over clinical rating scales,[6] but neither the instrument, age group, nor the Pakistani setting corresponds to the intended use. UK instrument translations and norms cannot be assumed valid in Urdu or regional languages; the Farsi validation of DIVA-5 illustrates the work required for a different language and setting, not a transferable validation result.[7]

The platform separates user-facing applications (mobile apps for patients and informants, browser portals for clinics) from a single scoring core. Instruments, thresholds and report templates are described as version-pinned on publication, so a completed report remains reproducible from the rules active at the time of assessment. Browser access also permits assisted completion on clinic workstations where patients or caregivers lack personal devices, and modular content is intended to allow language packs and report layouts to be adapted without changing the scoring engine.

The patient-facing application is organised into staged journeys with visible progress, a daily check-in and domain-grouped screeners covering attention, social communication and mood. Its purpose is to sustain completion of multi-informant instruments before clinical contact; whether it does so, and for whom, is untested. A crisis-contact route is displayed within the application; local crisis and emergency routes would require verification for Pakistan before deployment.

The proposed workflow brings information together for a video consultation, clinician formulation and a clinician-reviewed report. Figure 1 is a synthetic demonstration of the instrument summary interface. Its colour bands depict configured score thresholds; they are neither patient data nor evidence of clinical performance. The service design also allows referral for in-person assessment when observation, physical examination, risk or communication needs make remote assessment insufficient. The suitability and safety of each step would require evaluation in the population and service using it.

Figure 1
Synthetic Demonstration of an Instrument Summary Interface.



Intake

INSTRUMENT	RATER	SCORE	PERCENTILE	THRESHOLD	INTERPRETATION	ACTION
Medical History (Adult)	Self	Qualitative	-	-	See Raw Data	Review

Core

INSTRUMENT	RATER	SCORE	PERCENTILE	THRESHOLD	INTERPRETATION	ACTION
BRIEF-A	Self	163/225	86th	High	Raw score elevated (168/225). T-scores require BRIEF-A normative tables and are not part of the app's output.	View responses
WFIRS-S	Self	156/267	84th	High	Moderate functional impairment (grand mean 1.7 across 7 domains; band Moderate 1.5 to 1.99).	View responses
RAADS-R	Self	174/240	87th	High	High autistic trait endorsement.	View responses
RBQ-2A	Self	64/80	88th	High	Elevated repetitive behaviours and insistence on sameness (52/80).	View responses
SRS-2 (Adult)	Self	203/256	94th	Very High	Raw total elevated (168/260, range 65 to 260). T-scores require SRS-2 norms and are not part of the app's output.	View responses
Glasgow Sensory Questionnaire	Self	133/168	85th	High	Elevated sensory sensitivity across modalities (96/168).	View responses

Comorbidity

INSTRUMENT	RATER	SCORE	PERCENTILE	THRESHOLD	INTERPRETATION	ACTION
PHQ-9	Self	15/27	85th	High	Moderately severe depressive symptoms; active treatment warranted.	View responses
GAD-7	Self	13/21	74th	Moderate	Moderate anxiety symptoms consistent with reported severity.	View responses
OCI-R	Self	13/18	87th	High	High range (87th percentile).	View responses
DES-II	Self	13/18	34th	Normal	Dissociative experiences below clinical threshold.	View responses

Characterisation

INSTRUMENT	RATER	SCORE	PERCENTILE	THRESHOLD	INTERPRETATION	ACTION
AAQoL-29	Self	34/145	24th	Normal	Reduced quality of life: normalised 33/100 where higher is better (raw 67/145).	View responses
MAIA-2	Self	32/185	16th	Normal	Reduced interoceptive awareness (grand mean 2.4 across 8 scales, 0 to 5).	View responses
TAS-20	Self	84/100	78th	Alexithymia	Alexithymia present.	View responses
ABAS-3 (Adult)	Self	444/717	12th	Normal	Raw adaptive-behaviour total (436/717). Standardisation requires ABAS-3 norms and is not part of the app's output.	View responses

Note: All values are synthetic and illustrative. Scores and colour bands are illustrative. The figure reports no participant results and does not validate the thresholds, instruments or platform.

Structured capture and audit trails could make service evaluation easier by recording measures used, informants, language, clinician review and report status. Whether this reduces workload or improves consistency has not been measured for NeuroCheck Pro. Data collected for care must not be repurposed for research without a lawful basis, appropriate consent or other authorisation, and local oversight.

The distinction matters particularly where a service uses thresholds or automated summaries. A score may help a clinician decide what to explore, but a threshold developed in one population can misclassify people in another. Informant disagreement is potentially informative rather than an error to be averaged away. The responsible clinician should be able to inspect the underlying responses, consider

missing or contradictory data, and document why a formulation differs from a screening signal. These are proposed requirements for a safe adaptation; they are not reported results from a validation study.

Platform Features

The five features of NeuroCheck Pro are summarised in Table 1, with the question each raises for local evaluation in Pakistan.

Table 1

Platform features and the questions they raise for local evaluation in Pakistan.

Feature	Function	Question for local evaluation
Structured multi-informant capture	Collects structured information from patients and, where relevant, parents, teachers or partners before clinical review	Is multi-informant capture feasible and acceptable in Pakistani households and schools, and which informants can realistically contribute?
Computerised cognitive measures	Adds attention and cognitive task data to supplement other evidence	How do these tasks perform on the low-cost devices and in the conditions in which Pakistani patients would complete them?
Automated administration, collation and scoring	Automates instrument administration, collation and scoring to reserve specialist time	Does it reduce clinician workload, by how much, and does the time saved go to clinical work?
Version-pinned scoring and audit trails	Keeps instruments, thresholds and report templates version-pinned, so completed reports remain reproducible from the rules active at assessment	Is the audit trail adequate for local governance, and who would have authority to inspect it? The audit trail has not been independently audited.
Blended care with an in-person fallback	Allows referral for in-person assessment when remote assessment is insufficient	How reliably is the fallback triggered, and could Pakistani services absorb the referrals it generates?

Note: All rows are proposals for evaluation. None describes a validated use of the platform in Pakistan.

Evidence and transferability

A scoping review of remote autism diagnostic assessment found promising agreement and acceptability in small, early studies, while calling for larger, stronger evaluations.[8] NICE guidance continues to require assessment based on clinical history and professional judgement. [3-5] Evidence about remote autism assessment and a separate study of a computerised battery in adults with ADHD[6] cannot establish the accuracy of a combined NeuroCheck Pro pathway.

Furthermore, existing Pakistani tele-mental health studies concern different populations and conditions, such as telepsychiatry after disasters,[9] remote screening for depression and anxiety,[10] and patient experiences of tele-mental health.[11] These support the feasibility of some remote mental health contacts in particular settings, but do not test remote autism or ADHD diagnosis, NeuroCheck Pro, or the proposed task-sharing pathway. Whether a pathway designed around UK services can be adapted for Pakistani schools, clinics and households therefore remains a hypothesis to be tested with local clinicians and service users.

Digital exclusion is a practical and ethical constraint. Connectivity, device sharing, data costs, language, literacy, disability and privacy at home may affect who can complete an assessment and what can be

disclosed safely. Asad et al. specifically identified technical literacy and cost as major barriers to tele-mental health in Pakistan.[11] Therefore, a pilot study should offer assisted and in-person routes, document failed or interrupted contacts, and compare access across relevant groups. Potential reductions in travel or clinician administration cannot be claimed as savings until resource use and patient costs are measured.

Cross-cultural adaptation also extends beyond translation. Examples, concepts of impairment, family expectations and the availability of school informants may differ across communities. Translation, back-translation and cognitive interviewing should be followed by empirical testing of reliability and measurement properties in the intended population. The Farsi DIVA-5 study is useful as an example of evaluating a translated interview,[7] while it cannot supply Urdu norms or establish diagnostic validity for Pakistan. Until local psychometric data are available, NeuroCheck Pro's existing English and Urdu versions, its thresholds, and its UK norms cannot be interpreted clinically in Pakistan. A locally led study should report which language versions were used and how people unable to complete digital forms were included.

Ethics, Safeguarding and Governance

Any locally adapted pathway would need accessible digital consent for assessment, separate choices for data sharing and research, age-appropriate assent where relevant, and a route to withdraw or use an offline alternative. For children and young people, assent should be sought alongside caregiver consent, with attention to developmental level and to the child's own preferences about what is shared. Confidentiality requires role-based access, secure authentication and transmission, retention limits, breach response and clear agreements between the organisations handling records.

Safeguarding protocols must specify how clinicians respond to immediate risk, when to interrupt a remote assessment, and how to arrange local emergency or in-person care. For any cross-border assessment involving UK-based clinicians and individuals in Pakistan, local emergency referral pathways, safeguarding arrangements and the capacity to respond to urgent clinical concerns must be clearly established before implementation. Pakistani legal and institutional requirements, including any data residency conditions, must be settled before deployment, rather than inferred from UK compliance arrangements. Pakistan's data protection framework is in development and requires specific legal review. Decisions on data residency, retention and cross-border transfer should be made by Pakistani institutions.

For multi-clinic deployment, the platform proposes three safeguards: clinic records are kept separate, staff see only the records their role permits, and clinical information is removed from system logs. These safeguards are proposals, not descriptions of the current system.

The governance plan should distinguish routine care from a research pilot. A pilot needs the relevant ethics and institutional approvals, a data management plan, a process for reporting harms, and an independent route for participants to raise concerns. For routine care, staff need training on private remote consultations, verifying the identity of participants and informants, documenting consent, and escalating safeguarding concerns. Any cross-border processing or transfer needs explicit legal review.

These steps are requirements to establish before use; the present perspective does not assert that they are already in place for a Pakistani deployment. All governance measures described in this section would require verification by a party nominated by the Pakistani partners, rather than self-certification.

Local Validation and Evaluation Priorities

The collaboration sequence would be co-design with Pakistani clinicians and families, licensed translation and cultural adaptation of instruments, psychometric testing and locally appropriate norms, and a small supervised feasibility pilot. Pakistani partners would lead this work and shall determine where it must be altered. The pilot should record data completion and missingness, referral-to-report time, adverse events, clinician workload, acceptability, and differences by language, geography and device access. A comparative and economic evaluation would follow and be needed before claims about effectiveness, cost-effectiveness or scale-up. Local clinicians must retain diagnostic authority throughout.

The pilot should define eligibility, referral sources, an in-person fallback, and pre-specified stopping criteria for safety or unacceptable missing data. It should report denominators: who was invited, who declined, who could not connect, who completed assessment and who required another modality. Independent or blinded review of a sample, where feasible, should test diagnostic agreement without assuming that either pathway is a perfect reference standard. Patient, caregiver and clinician interviews would clarify burden and acceptability. These measures would guide a later comparative study.

Limitations

No Pakistani pilot, platform-specific validation, diagnostic accuracy study, comparative effectiveness study or economic evaluation is reported here. The cited Pakistani tele-mental health studies concern different populations or conditions, and evidence from remote autism research has limited generalisability to this platform. Selection into a digital pathway may exclude people with poor connectivity or complex assessment needs. Figure 1 uses synthetic data. These limits prevent conclusions that the proposed service improves outcomes or is transferable without adaptation.

This is a descriptive account from authors involved in the service. It does not include a systematic review, a pre-specified search strategy, primary outcomes or independent platform audit. The synthesis may therefore omit relevant evidence.

CONCLUSION

Digital pathways can enable more structured neurodevelopmental assessment, but their clinical application requires local validation and adaptation. NeuroCheck Pro offers a UK service model for exploring its potential applicability in Pakistan. Its potential implementation should be guided by evidence of local clinical validation, cultural and linguistic relevance, equitable accessibility and effective safeguards for patient safety.

CONFLICT OF INTEREST

Tanha Tabassum is Chief Executive Officer of NeuroCheck Pro; Arshad Ahmed is its Co-founder; Dinesh Kannan is Clinical Director of Apis Clinic and Founding Clinician of NeuroCheck Pro. These professional roles are declared as potential competing interests in this perspective about the platform.

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1.	Tanha Tabassum	NeuroCheck Pro Ltd., United Kingdom.	Conception, description of the service model, and manuscript drafting and revision.
2.	Arshad Ahmed	NeuroCheck Pro Ltd, United Kingdom.	Conception of the perspective, description of the service model, and manuscript drafting and revision.
3.	Dinesh Kannan	NeuroCheck Pro Ltd.; Apis Clinic, London, United Kingdom.	Clinical review and critical revision.