AURA-T COMO UMA INTERFACE INFORMATIVA PARA A TRIAGEM PRECOCE DO AUTISMO: FUNDAMENTOS TEÓRICOS, PROJETO BASEADO EM EVIDÊNCIAS E VISÃO GERAL DO DESENVOLVIMENTO

AURA-T AS AN INFORMATIONAL INTERFACE FOR EARLY AUTISM SCREENING: THEORETICAL FOUNDATIONS, EVIDENCE-BASED DESIGN, AND DEVELOPMENT OVERVIEW

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**Resumo**

A identificação precoce do Transtorno do Espectro Autista (TEA) melhora o prognóstico de longo prazo e reduz os impactos psicossociais. No entanto, as ferramentas de triagem existentes frequentemente enfrentam barreiras linguísticas, altos custos e aplicabilidade limitada à faixa etária. Este artigo apresenta uma revisão crítica e integrativa da concepção e da implementação preliminar do **AURA-T (Autism Universal Rapid Assessment Tool)** - um questionário acessível, digital e adaptável criado pelo Braine (Brazilian AI for Neurodiversity) para ampliar o acesso à triagem do autismo em todas as faixas etárias e contextos culturais. Além de alinhar seus domínios com os principais sistemas de diagnóstico (DSM-5-TR e CID-11), o AURA-T incorpora métricas sintéticas de instrumentos bem estabelecidos - AQ-10, M-CHAT, ADOS-2, CARS, SRS-2 e ABC. Dados nacionais recentes (2,4 milhões de brasileiros diagnosticados, IBGE, 2025) e estimativas internacionais (1 em 31 crianças nos EUA; CDC, 2025) ressaltam a urgência de soluções ágeis, inclusivas e dimensionáveis.

**Palavras-chave:** Transtorno do espectro autista; ferramenta de triagem; identificação precoce; neurodiversidade; saúde digital; ciência da informação

**Abstract**

Early identification of Autism Spectrum Disorder (ASD) improves long-term prognoses and mitigates psychosocial impacts. Nevertheless, existing screening tools frequently face linguistic barriers, high costs, and limited age-range applicability. This article provides a critical, integrative review of the conception and preliminary deployment of **AURA-T (Autism Universal Rapid Assessment Tool)—** an acessible, digital, and adaptable questionnaire created by Braine (Brazilian AI for Neurodiversity) to broaden access to autism screening across age groups and cultural contexts. In addition to aligning its domains with the main diagnostic systems (DSM-5-TR and ICD-11), AURA-T incorporates synthetic metrics from well-established instruments—AQ-10, M-CHAT, ADOS-2, CARS, SRS-2, and ABC. Recent national data (2.4 million Brazilians diagnosed, IBGE, 2025) and international estimates (1 in 31 U.S. children; CDC, 2025) underscore the urgency of agile, inclusive, and scalable solutions.

**Keywords:** Autism Spectrum Disorder; Screening Tool; Early Identification; Neurodiversity; Digital Health; Information Science

# 1 FROM URGENCY TO INNOVATION: THE CASE FOR SCALABLE AUTISM SCREENING

Over the past two decades, research has consistently demonstrated that interventions initiated before the age of five substantially increase autonomy and quality of life for autistic individuals (Robins et al., 2001; Lord et al., 2012). Despite diagnostic advances, many countries continue to experience underreporting or delays in clinical confirmation, particularly in underserved regions. In Brazil, the 2022 Census estimated **2.4 million** people diagnosed with ASD (≈ 1.2 % of the population aged two +; IBGE, 2025). In the United States, the **Centers for Disease Control and Prevention** reports a prevalence of **1 in 31** eight-year-old children (CDC, 2025). These figures reveal a pressing gap between need and access to reliable screening tools, thereby motivating the development of **AURA-T**, an informational interface designed to be universal, rapid, and culturally adaptable.

# 2 Building on Foundations: Epistemology, Instruments, and Neurodiverse Ethics

Psychometric instruments function as knowledge-organizing systems that embed social, cultural, and epistemic values (Hjørland, 2008). Accordingly, the design of AURA-T was grounded in a triangulation of sources (Yin, 2014), integrating empirical evidence and conceptual rigor into a unified framework.

The first foundational layer involved multivariate modeling of the Autism Spectrum Quotient – 10 item version (AQ-10), which revealed distinct classification weights among the items, offering statistical insight into the detection of autistic traits (Allison et al., 2012). Complementing this, a second layer drew on benchmarks from established instruments such as the M-CHAT, ADOS-2, CARS, SRS-2, and ABC. These tools informed the tool’s structure through their proven construct validity, sensitivity, and specificity (Robins et al., 2001; Schopler et al., 1986; Constantino & Gruber, 2005; Volkmar et al., 1988; Lord et al., 2012).

A third and equally critical layer was the normative alignment with internationally recognized diagnostic manuals—namely, the DSM-5-TR (APA, 2022) and the ICD-11 (WHO, 2022). This ensured terminological coherence and categorical fidelity, allowing the tool to remain compatible with current clinical practices.

Guided by a neurodiversity paradigm, AURA-T intentionally avoids pathologizing language and instead embraces a descriptive and guiding approach to interpreting assessed traits. This conceptual stance is in line with contemporary discussions in information ethics (Steinerová, 2023) and reinforces concerns about algorithmic injustice in AI-mediated decision-making (Birhane & Cummins, 2019), ultimately strengthening the commitment to an inclusive, transparent, and epistemically responsible design process.

# 3 Designing with Care: Methodology, Language, and Generative Intelligence

The iterative development of AURA-T unfolded through four interconnected stages, each rooted in a balance between scientific rigor, cultural sensitivity, and ethical commitment.

It began with the careful selection of assessment domains, guided by the diagnostic criteria A and B of the DSM-5-TR (APA, 2022). Initially organized into six core areas—social communication, reciprocal interaction, cognitive flexibility, sensory patterns, emotional self-regulation, and repetitive behaviors—the framework remains flexible to accommodate up to twelve domains, as future validation and clinical insights refine the tool’s dimensional architecture.

Following this, the item generation phase emphasized accessible language and contextual relevance. Items were co-designed through participatory sessions with parents, educators, and autistic adults, allowing semantic validation grounded in lived experience. To further enrich linguistic inclusivity and intercultural adaptation, generative AI technologies were employed to assist in phrasing variations and broaden the tool’s applicability across diverse settings (Choudhury et al., 2021).

The third stage involved age segmentation. Recognizing the developmental variability in autism expression, AURA-T was structured into four tailored versions: 0–3 years, 4–11 years, 12–15 years, and 16 years and above. This structure enhances the instrument’s precision in capturing age-specific behavioral patterns and supports more nuanced interpretation (Schopler et al., 1986).

Finally, an individualized reporting prototype was developed—not merely to communicate scores, but to offer a supportive experience. Anchored in the understanding that affect is intrinsic to cognition (Duncan & Barrett, 2007), the report presents a visual domain-based summary, an empathetic narrative using non-pathologizing language, and actionable next steps. This approach ensures that caregivers and professionals receive results that are not only technically accurate but also emotionally attuned and accessible.

# 4 Early Adoption Insights: Use, Perception, and Ecosystem Integration

The **alpha version** (May 2024) engaged ~300 users in educational and home environments, indicating strong early reach. Qualitative feedback praised textual clarity and immediate utility, especially in municipalities with limited mental-health services. A clinical-control trial (n = 400; 200 ASD, 200 controls) is underway to establish psychometric metrics. Key strengths reported include: (a) a **seven-minute** completion time for child versions (five minutes for adults); (b) **instant, pictogram-based** reports; and (c) optional linkage to **Care360**, Braine’s tele-guidance ecosystem—collectively fostering a user-centered experience.

# 5 Dialogues Between Data, Ethics, and Inclusion: Challenges and Innovations

A multiplatform strategy leverages the 84 % internet penetration in Brazilian households—predominantly via smartphones (IBGE, 2025)—extending reach to areas with < 1 pediatric neurologist per 100 000 inhabitants. AQ-10-derived weighting grounds the tool in robust analytics while mitigating design bias. Yet addressing **algorithmic injustice** (Birhane & Cummins, 2019) remains pivotal; training datasets intentionally encompass diverse socioeconomic, ethnic, and gender profiles and are subject to regular audits. Additionally, Cirino’s emerging theory of the **computational informational unconscious** suggests AI can mediate subjective and cultural layers of diagnosis, positioning AURA-T as a bridge—not a replacement—between self-reported signals and clinical decision-making.

# 6 Toward Global Reach: Validation Pathways and Linguistic Expansion

Classical psychometric indicators—sensitivity, specificity, ROC curves—are forthcoming from multicenter trials (2025–2026), which will benchmark AURA-T against ADOS-2 and M-CHAT in university hospitals. Parallel efforts are piloting Spanish and English versions to expand linguistic accessibility.

# 7 AURA-T as an Ethical Interface for Early Screening and Inclusive Futures

With **2.4 million** diagnosed Brazilians (IBGE, 2025) and a **1 in 31** prevalence globally (CDC, 2025), scalable, evidence-based screening is imperative. AURA-T answers this call by synthesizing theoretical rigor, psychometric integrity, and ethical design. While validation is ongoing, preliminary evidence suggests the tool can broaden early-screening reach and strengthen care pathways for autistic individuals and their families.

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