



Validation of the Lebanese Childhood Autism Rating Scale-Second Edition-Standard Version



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ABSTRACT

The purpose of this study is to validate the *Childhood Autism Rating Scale-Second Edition-Standard Version (CARS2-ST)* to the Lebanese population. The participants consisted of 109 children among which 90 had autism spectrum disorder (ASD) and 19 had intellectual disability (ID). Forward and backward translation was ensured before administration. The *Wechsler Nonverbal Scale of Ability (WNV)* was used to estimate the level of intellectual functioning. The *Lebanese CARS2-ST* was found to have a good reliability as measured by internal consistency (.95), inter-rater reliability (.99), and test–retest reliability (.89). It classified individuals as having ASD versus ID based on a cutoff score of 26 or higher for children younger than 13 years old and a cutoff score of 28.5 or higher for adolescents (≥ 13 years). A similar level of psychometric properties was found with the original *CARS2-ST*. Therefore, the *Lebanese CARS2-ST* is a useful tool for assessing for ASD among the Lebanese population.

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Autism spectrum disorder (ASD) is defined in both the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000) and the *International Classification of Diseases*, 10th Edition (ICD-10, 2010) along three dimensions of behaviors: deficits in social reciprocity, deficits in communication, and the presence of restricted interests and repetitive behaviors. The DSM-IV-TR and ICD 10 group under Autistic Disorder distinctive diagnoses such as Asperger's disorder for those who do not present language delay and Pervasive Developmental Disorder – not otherwise specified for cases who do not fulfill complete criteria for autism (DSM-IV-TR, 2000; ICD-10, 2010).

In the absence of data on genetics and neurobiological markers, conceptualization based on clinical behavioral assessment remains the standard in diagnosing Autistic Disorder and in delineating the profile of a person with Autistic Disorder. Thus, several structured clinical instruments were developed to serve this purpose including the *Autism Diagnostic Observation Schedule (ADOS)*, *Childhood Autism Rating Scale (CARS)*, *Modified Checklist for Autism in Toddlers (M-CHAT)*, *Autism Behavior Checklist (ABC)*, and *Autism Diagnostic Interview-Revised (ADI-R)* (Lord & Jones, 2012).

The *Childhood Autism Rating Scale-original version (CARS)* is one of the most widely used and longstanding checklists in the comprehensive assessment for autism (Perry, Condillac, Freeman, Dunn-Geier, & Belair, 2005). It is an observation rating scale used by clinicians to support the diagnosis of autism. CARS has been translated and validated in many countries such as Japan (Kurita, Miyake, & Katsuno, 1989), India (Russell et al., 2010), Brazil (Pereira, Riesgo, & Wagner, 2008), and Sweden (Nordin, Gillberg, & Nyden, 1998). When using the CARS as a diagnostic instrument in a clinically referred sample, a cutoff score for ASD improves diagnostic agreement and overall diagnostic accuracy (Chlebowski, Green, Barton, & Fein, 2010). The CARS shows better sensitivity (98%) than the *Autism Behavior Checklist (ABC)* (88%) (Eaves & Milner, 1993). Based on a 30 point

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cutoff score, the CARS is able to classify more cases with autism than the ADI-R when compared (Pilowsky, Yirmiya, Shulman, & Dover, 1998; Saemundsen, Magnusson, Smari, & Sigurdardottir, 2003).

The Childhood Autism Rating Scale-Second Edition (CARS2) includes three forms: the Childhood Autism Rating Scale-Second Edition-Standard Version (CARS2-ST formerly called CARS2-ST), the Childhood Autism Rating Scale, Second Edition-High-Functioning Version (CARS2-HF) and the Questionnaire for Parents or Caregivers (CARS2-QPC) (Schopler, Van Bourgondien, Wellman, & Love, 2010). Both the original version and the second edition of the scale address 15 areas of behavior, help identify individuals with ASD and help differentiate them from individuals with other diagnoses. Yet, with the evolution of the field and the emergence of the PDD-NOS and Asperger syndrome diagnoses, the conceivers found it useful to have an instrument that captures high functioning autism and that formally takes into account parents observations in the assessment. Therefore, the CARS 1988 edition has been renamed the CARS2-ST and includes the same rating areas that comprised the original CARS. The CARS2-HF is a new form to be used with persons with high functioning autism. The CARS2-QPC is an unscored questionnaire used to obtain information from parents or caregivers about behaviors related to autism which is integrated into the CARS2-ST and CARS2-HF ratings (Schopler et al., 2010).

Compared to other tools, the CARS2 has better normative samples with good reliability and validity (Livanis & Mouzakitis, 2010). The psychometric properties of CARS2-ST indicate a high degree of internal consistency of .93 (Vaughan, 2011). Sensitivity and specificity for the CARS2-ST were .88 and .86 respectively indicating good validity with clinical assessment. The correlation with the *Autism Diagnostic Observation Schedule* (ADOS) was .79 for the CARS2-ST total score indicating that the CARS2-ST has strong concurrent validity (Vaughan, 2011).

In Lebanon, the diagnosis of autism is posed by clinical psychologists, psychiatrists, and pediatricians. Clinicians base their diagnosis on their clinical observations and the international classifications criteria. They do not systematically rely on scales and measurements. In a previous study describing the correlates of early assessment of neurodevelopmental disorders in Lebanon, the average age for diagnosing ASD was 4 years and 7 months (Akoury-Dirani & Alameddine, 2013). Factors like awareness and limited access to health care facilities and skilled professionals hinder early assessment and intervention (Akoury-Dirani & Salamoun, 2013).

In the absence of mental health policies ((WHO-AIMS, 2010) the initiative of raising awareness and promoting early detection of ASD is left to local Non-Governmental Organizations (NGOs). Within these conditions, national data about the prevalence of ASD is absent. These NGOs who are supported by a European fund, developed a comprehensive program to provide a better quality of care and education to children presenting with ASD. In the absence of a validated scale for autism assessment in Lebanon and the need to use an instrument that facilitates and supports the diagnosis of ASD, the CARS2 has been chosen to be one of the best known scales.

The purpose of this paper is to verify the relevance of using the CARS2-ST *Lebanese* version to assist in diagnosing ASD and to present its psychometric properties. Translating and validating the CARS2-ST to the Lebanese culture will assist mental health professionals in determining a profile of autism based on standard measures. This in turn will improve the educational and therapeutic services provided to children and adolescents with autism in Lebanon. By translating this tool into the formal Arabic language¹ and by validating it to the Lebanese population, we also propose an accurate tool to other professionals in other Arab countries.

1. Methods

1.1. Participants

Children aged 4–19 years were recruited from special education centers that provide education programs for children with autism spectrum disorders (ASD) and intellectual disability (ID) as well as from the American University of Beirut-Medical Center (AUB-MC) Psychiatry department, a private hospital that ensures assessment, psychological, and psychiatric follow up. The special education centers are members of the UNAPEI, the National Union of Associations of Parents and Friends of the Disabled. These associations are non-governmental and are supported by charity initiatives.

Only children with a clear *DSM-IV* diagnosis of ASD or ID, established by physicians, were included. The special education centers were informed to provide us with participants with a clear *DSM-IV* diagnosis of ASD or ID in their files. They were also asked to provide us with the estimate severity of the symptoms in those children diagnosed with ASD. Other potential participants who present a dual diagnosis, ASD and ID, were excluded. In addition, an external expert with a PhD in child psychology and 25 years of experience with children with neurodevelopmental developmental disorders, blinded to the original diagnosis, clinically assessed the severity of symptoms for the ASD participants.

The total number of individuals included in the CARS2-ST study was 109 (90 with ASD and 19 with ID) with none of the participants having comorbid ASD and ID. Children with ID composed the control group to better assess whether CARS2-ST is able to discriminate between children with ASD and children with ID. The sample was further divided into two age-group categories to determine the cutoff scores of the CARS2-ST by age: 84 children (73 with ASD and 11 with ID) below 13 years of age and 25 adolescents (17 with ASD and 8 with ID) aged 13 and above. All participants had their legal guardians sign an informed consent form on their behalf and children were asked to offer assent whenever they were able to do so. The study

¹ In the Arabic language, Lebanese language is a spoken language specific to the Lebanese population and the formal Arabic language which is used in all Arab countries.

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