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Convergent validity of the Autism Spectrum Disorder-Diagnostic for Children (ASD-DC) and Autism Diagnostic Interview-Revised (ADI-R)

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ABSTRACT

The purpose of this paper was to further establish the validity of the Autism Spectrum Disorder-Diagnostic for Children (ASD-DC). The methodology consisted of testing the similarity of findings between the ASD-DC and the Autism Diagnostic Interview-Revised (ADI-R), which proved to be statistically significant for subscale content scores on social, communication, and rituals/insistence on sameness/restrictive interest subfactors. Secondly, the ASD-DC and ADI-R were compared to clinically derived diagnoses based on diagnostic interviews, rating scales, a DSM-IV/ICD-10 symptom checklist, observations of the child, clinical judgment, and an in-depth parent interview. Twenty-six children in the study met criteria for ASD while six did not. The ASD-DC correctly identified 73% of the ASD group and 67% of the controls, while the ADI-R correctly identified 46% of the ASD group and 100% of the controls. The implications of these data are discussed.

Autism Spectrum Disorders (ASD) are neurodevelopmental in origin with symptoms appearing early in life (Fodstad, Matson, Hess, & Neal, 2009; Matson, Fodstad, & Mahan, 2009; Niklasson, Rasmussen, Oskarsdottir, & Gillberg, 2009). Core features include deficits in socialization, communication, and rituals and stereotypies (Cheung & Siu, 2009; Eikeseth, 2009; Johansson, Gillberg, & Rastam, 2009; Matson, Fodstad et al., 2009; Miniscalco & Gillberg, 2009; Njardvik, Matson, & Cherry, 1999). These deficits are very problematic in and of themselves, but are further compounded by high rates of comorbid disorders such as intellectual disability (Matson & Boisjoli, 2009; Matson & Shoemaker, 2009), seizures (Didden, deMoor, & Korzilius, 2009), a host of challenging behaviors (Duncan, Matson, Bamburg, Cherry, & Buckley, 1999; Farmer & Aman, 2009; Holden & Gitlesen, 2009; Matson, Cooper, Mayville, & González, 2006; Matson, Dixon, & Matson, 2005; Matson & Kuhn, 2001; Matson et al., 2005; Paclawskyj, Matson, Rush, Smalls, & Vollmer, 2000; Tenneij, Didden, Stolker, & Koot, 2009), various forms of psychopathology (LoVullo & Matson, 2009; Miniscalco & Gillberg, 2009; Sturmey, Matson, & Lott, 2004), deficits in independent living skills (Matson, Dempsey, & Fodstad, 2009; Matson, Rivet, Fodstad, Dempsey, & Boisjoli, 2009), and physical status (Xiong et al., 2009).

These high rates of comorbid problems further necessitate the development and use of measures that have been psychometrically established to identify symptoms of ASD. Thus, previous studies have examined the psychometric properties of the *Autism Spectrum Disorder-Diagnostic for Children* (*ASD-DC*; Matson, González, Wilkins, & Rivet, 2008; www.disabilityconsultants.org) (as outlined in Section 1.2). In addition, convergent validity of the *ASD-DC* has been established with the *Childhood Autism Rating Scale* (*CARS*; Schopler, Reichler, & Rochen-Renner, 1988). The aim of the current study was to compare the *ASD-DC* to the *ADI-R*. Since the *ASD-DC* and the *ADI-R* are diagnostic tools for ASD, the factors of

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Table 1
Demographic information for the participants.

Demographics										
Age			Gender (%)		Ethnicity (%)				Diagnosis (%)	
Range	Mean	*SD*	Male	Female	C	Af	L	Other	Non-ASD	ASD
3–14	6.84	3.12	81.2	18.8	71.9	9.4	0.0	18.8	18.8	81.3

Note: *SD*, standard deviation; C, Caucasian; Af, African American; and L, Latino.

ASD-DC should converge with the content areas (i.e., outlined in the diagnostic algorithm) of the *ADI-R*. Demonstrating convergence with the *Autism Diagnostic Interview-Revised* (*ADI-R*; Lord, Rutter, & LeCouteur, 1994), a diagnostic tool which has been well established for determining Autistic Disorder, would further establish the validity of the *ASD-DC*. It was hypothesized that the subscales of the *ASD-DC* would correspond to the content areas of the *ADI-R*.

1. Method

1.1. Participants

The participants in this study were 32 children and adolescents, ages 3 through 14 years ($M = 6.84$, $SD = 3.12$) with a diagnosis of ASD (i.e., Autistic Disorder [$n = 13$], Pervasive Developmental Disorder Not Otherwise Specified [PDD-NOS; $n = 8$], or Asperger's Syndrome [$n = 5$]), or typically developing (i.e., no Autism Spectrum Disorder Diagnosis [$n = 6$]). All 32 participants were assessed by doctoral clinical psychology students (supervised by a licensed psychologist with over 30 years of experience in assessing and treating developmental disorders) at a University Psychological Services Developmental Disorder Clinic, within the past 2 years. ASD clinical diagnoses were assigned at the clinic based on data from diagnostic interviews (i.e., *CARS*; Schopler et al., 1988), rating scales (e.g., *DSM-IV/ICD-10 Symptom Checklist*; American Psychiatric Association, 2000; Matson et al., 2008; World Health Organization, 1992), observations of the child, clinical judgment, and an in-depth parent interview. Refer Table 1 for demographic information.

Of the 32 children and adolescents, 26 (81.3%) met criteria for an ASD based on the clinical diagnoses. The remaining six participants (18.8%) did not meet criteria for an ASD. The majority of this sample was Caucasian (71.9%) and male (83.8%). In addition, there were individuals who identified themselves as being of African American (9.4%) or other ethnic origins (18.8%). Preliminary analyses indicated that there were no significant differences for gender, $\chi^2(1) = .31$, or age, $t(30) = -.73$, all *ns*, between the ASD and non-ASD groups. However, there was a significant difference between ASD and non-ASD groups for ethnicity, $\chi^2(2) = 8.04$, $p < .05$, with the ASD group having more Caucasian participants than the no ASD group (72.4% vs. 6.9%, respectively).

1.2. Measures

1.2.1. Autism Spectrum Disorders-Diagnostic for Children (ASD-DC; Matson & González, 2007)

The *ASD-DC* is part of a comprehensive battery of measures that assess symptoms of ASD (*ASD-DC*), comorbid psychopathology (*ASD-CC*), and challenging behaviors (*ASD-PBC*) among children and adolescents 2–16 years of age with AD, PDD-NOS, and Asperger's Syndrome (Matson et al., 2008). The *ASD-DC* is an informant based measure consisting of 40 items which takes approximately 15–20 min to complete. Each item is rated to the extent that it was ever a problem for the child: 0 (*not different*; *no impairment*), 1 (*somewhat different or mild impairment*), and 2 (*very different or severe impairment*). All items are then summed to yield a total score. A total score above 32 is indicative of an ASD. Factor analysis of these 40 items yielded a 4 factor solution: (1) nonverbal communication/socialization, (2) verbal communication, (3) social relationships, and (4) insistence of sameness/restricted interests (Matson, Boisjoli, & Dempsey, 2009). The internal consistency of the scale was $\alpha = .99$. Furthermore, inter-rater reliability and test–retest reliability were good with weighted kappa's of .67 and .77, respectively (Matson et al., 2008). The *ASD-DC* was found to have good sensitivity and specificity to diagnose ASD (Matson, González, & Wilkins, 2009). Using a cut-off of 33, the specificity was 98.2% and the sensitivity was 84.3%. The overall correct classification rate of the *ASD-DC* was 91.3%

1.2.2. Autism Diagnostic Interview-Revised (ADI-R; Lord et al., 1994)

The *ADI-R* is a semi-structured interview administered to a parent or guardian by a trained interviewer. There are a total of 93 items that comprised of four content areas: (1) impairments in social interaction, (2) impairments in communication, either verbal or nonverbal, (3) restricted and repetitive interests or behaviors, and (4) age of onset by 36 months of age. Of the 93 items, a total of 37 are included in the diagnostic algorithm. In order to meet criteria for Autistic Disorder an individual must meet (i.e., exceed) cut-off in all four areas. Cut-offs for the content areas are as follows: social impairment = 10, restricted and repetitive interests or behaviors = 3 and age of onset = 1. For the communication area, separate cut-offs have been established for verbal and nonverbal participants, which are 8 and 7, respectively. Initial psychometric analyses by Lord et al. (1994) indicated that the social, restricted and repetitive behaviors, and communication content areas of the *ADI-R* had internal consistencies of $\alpha = .95$ (social), .69 (restricted and repetitive behaviors), and .84 (communication). Furthermore,