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### **Predictors of Standardized Administration of the Autism Diagnostic Observation Schedule, Second Edition Across Treatment Settings**

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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

PREDICTORS OF STANDARDIZED ADMINISTRATION  
OF THE AUTISM DIAGNOSTIC OBSERVATION  
SCHEDULE, SECOND EDITION ACROSS  
TREATMENT SETTINGS

A Dissertation Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Philosophy

Stephanie Susanne Luallin

College of Education and Behavioral Sciences  
Department of School Psychology

August 2020

This Dissertation by: Stephanie Susanne Luallin

Entitled: *Predictors of Standardized Administration of the Autism Diagnostic Observation Schedule, Second Edition Across Treatment Settings*

has been approved as meeting the requirement for the Degree of Doctor of Philosophy in College of Education and Behavioral Sciences in Department of School Psychology

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## ABSTRACT

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The present study explored patterns of use of the ADOS-2 across treatment settings. With an increase in prevalence rates of Autism Spectrum Disorder (ASD), there is a greater need for clinicians across many settings to offer ASD assessment. The Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) is a standardized assessment tool that, when administered with fidelity, has high specificity and sensitivity in research settings and is therefore recommended for use in comprehensive ASD evaluations. However, practitioners do not always follow the protocol recommended by assessment developers and research focused on adaptation and accuracy of the ADOS-2 in non-research, community settings have demonstrated improper use and patterns of varying reliability. Participants included 268 community practitioners working in schools, non-ASD specialty clinics, and ASD specialty clinics involved in ASD assessment who reported their use of the ADOS-2 as well as the extent of their ADOS-2 specific training. Participant characteristics were compared with standardized administration of the ADOS-2. Results revealed that practitioner work setting was a significant predictor of ADOS-2 use. Additionally, those working in clinic settings received a higher level of training on the ADOS-2 compared to school-based evaluators. Neither setting nor level of ADOS-2 training impacted administration standardization of the measure. Implications for school-

based evaluators are discussed. Specifically, there may be barriers to ADOS-2 use and ADOS-2 specific training for school-based evaluators involved in ASD evaluations. Lastly, limitations of the current study and implications for future research are considered.

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that I can achieve my goals kept me from disbelieving in myself more than you can ever know. I love you all so dearly.

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## **CHAPTER I**

### **INTRODUCTION**

The number of children identified with Autism Spectrum Disorder (ASD) is growing at a concerning rate. The most recent prevalence statistics from the Centers for Disease Control and Prevention (CDC) estimates that as of 2014, as many as 1 in 59 individuals met criteria for ASD (Baio et al., 2018). This number has increased from previous years (Rice, 2007) and has yielded a great need for practitioners who are qualified to provide ASD assessments in school, community, and additional settings (Kamp-Becker et al., 2018). Part of the difficulty in identifying ASD is the complexity of the symptoms. This disorder is characterized by impairments in social interaction and non-verbal/verbal communication, as well as repetitive/stereotyped behaviors and restricted interests (RBRI) (American Psychiatric Association, 2013). Because ASD tends to be identified at such a young age, and some of the symptoms are not well-defined, it can be extremely difficult to identify this disorder unless a practitioner is very well-trained.

Standardized assessments with strong psychometric properties are important for evaluating ASD to enhance accurate diagnosis across service systems. Although evidence-based assessments (EBAs) have been established for diagnosing ASD, the use of these measures, and even the diagnostic criteria, may differ across settings. For example, clinic settings tend to use the Diagnostic and Statistical Manual, 5<sup>th</sup> Edition

(DSM-5; (American Psychiatric Association, 2013) which articulates a specific set of symptoms while school-based practitioners classify students in schools using special education disability criteria. As a result, there continues to be disparities in ASD prevalence rates and those receiving accurate diagnoses and services (Volker, 2012; Wilkinson, 2010; Yeargin-Allsopp et al., 2003). Some of these discrepancies may be due to improper training in the use of EBA which in turn, contributes to false ASD diagnoses (Corsello, Akshoomoff, & Stahmer, 2013) and inappropriate educational classifications (Dufek, 2013; Rosenberg, Daniels, Law, Law, & Kaufmann, 2009).

A false diagnosis can be either false negative or positive meaning that an ASD diagnosis or classification is not given when an ASD diagnosis is accurate, or conversely, an ASD diagnosis or classification occurs when a child does not have ASD (Risi et al., 2006). Several reasons for false positive ASD diagnoses have been suggested including the significant decrease in intellectual and other developmental disability diagnosis rates paired with a significant increase in ASD diagnosis rates; termed diagnostic substitution (King & Bearman, 2009) and pressure for early identification (Rogers, Goddard, Hill, Henry, & Crane, 2016; Skellern, Schluter, & McDowell, 2005; Taylor et al., 2016).

As a result, rates of clinically diagnosed ASD have increased from a rate of 1 in 150 in the year 2000 (Rice, 2007) to 1 in 59 in 2014 (Baio et al., 2018). One study examining ASD symptom patterns and diagnoses rates over a decade reported a stable ASD symptom phenotype prevalence in children with a simultaneous, significant increase in clinical diagnoses (Lundström et al., 2012). This finding suggests that the increase in ASD diagnoses may not be entirely due to an actual increase in incidence of ASD (Arvidsson, Gillberg, Lichtenstein, & Lundstrom, 2018), instead, this acceleration

may be due to a decrease in symptoms needed to identify ASD. In their study of symptom changes over time, Arvidsson et al. (2018) found that children (over age 13) diagnosed with ASD in 1992 compared to those diagnosed in 2002 had a 30% decrease in symptoms, and those diagnosed in 2004 compared to those diagnosed in 2014 (aged 7-12) had a 50% decrease in symptoms (Arvidsson et al., 2018). Over time, evaluators may be requiring fewer symptoms to establish a clinical diagnosis of ASD in children after the preschool years. Similarly, those with an ASD diagnosis may not be meeting the DSM-5 ASD diagnostic criteria (Arvidsson et al., 2018). Together, these findings suggest that increasing rates of ASD diagnoses may be attributable to practitioner and/or diagnostic process factors rather than an actual increase in children with ASD. Therefore, further examination regarding the contributors to incorrect ASD diagnoses is warranted.

Diagnosing ASD can be difficult for many reasons. For one, there are no current physiological or biological determinants, and assessment is largely based on behavioral observations (Esteves, 2018). Assessing for ASD can be particularly challenging for less experienced practitioners. When assessing an individual for ASD, examiners must evaluate the child's communicative functioning and consider their developmental level as relevant to their manifestation of ASD symptoms (Kamp-Becker et al., 2018). Therefore, it is important to have extensive experience working with those with and without ASD at differing developmental and intellectual levels. Additionally, cognitive, language, and developmental delays, comorbid diagnosis, and experiences of trauma are common among individuals with ASD and can further complicate an individual's clinical presentation (Zwaigenbaum & Penner, 2018). Difficult behaviors (e.g., self-injurious behavior, sensitivity to sensory stimuli) are also common in children with ASD and add

to the complexity of the assessment process (Bitsika, 2008). For example, children may refuse to complete tasks because of the type of material, have difficulty transitioning between tasks, or some other internal or environmental factor that disrupts an examiner's ability to conduct the assessment may be present. Furthermore, children evaluated in general clinics may be especially complex as they tend to present with more comorbid disorders than children evaluated at clinics that specialize in ASD (Molloy, Murray, Akers, Mitchell, & Manning-Courtney, 2011; Montes & Halterman, 2006).

As noted, the diagnosis of ASD is complex, as there are many other psychological disorders that may manifest in symptoms that are similar to those that are consistent with an ASD diagnosis (Kamp-Becker et al., 2018). ASD symptoms are also sometimes seen in typically developing individuals (Constantino & Todd, 2003; McDonnell et al., 2018). Inexperienced practitioners may therefore struggle to accurately identify ASD. As such, less experienced practitioners may be diagnosing ASD more readily due to insufficient training and high client volume—and these diagnoses are likely to be incorrect (Dufek, 2013).

Accurate diagnosis at the youngest ages is critical because early intervention is imperative to increasing the functioning of individuals with ASD (Blacklock, Perry, & Geier, 2014; Corsello et al., 2013; Taylor et al., 2016). As a result, clinicians are now facing increased pressure to diagnose ASD at a young age in order to facilitate intervention (Braiden, Bothwell, & Duffy, 2010). This may be problematic as pressure to give an early ASD diagnosis may yield a false positive diagnosis of ASD. For instance, in one study of 26 psychiatrists and 79 pediatricians, 58% reported giving a positive ASD diagnosis when uncertain about whether or not their client met criteria for an ASD

(Skellern et al., 2005). In two recent studies of clinicians active in diagnosing ASD, 76% ( $n = 116$ ) (Rogers et al., 2016) and 48% ( $n = 97$ ) (Taylor et al., 2016) of participants endorsed giving a positive ASD diagnosis in cases of uncertainty. Although these studies had relatively small sample sizes and relied on self-report, these findings seem to suggest that at least half of the time, clinicians reported themselves as unsure of their ASD diagnosis. While positively diagnosing ASD in instances of uncertainty may allow early access to ASD-specific intervention for the individual, a false positive diagnosis of ASD may have negative outcomes for those who may be struggling from symptoms not associated with an ASD such as inappropriate focus of the intervention and delays in successful intervention (Falkmer, Anderson, Falkmer, & Horlin, 2013; Maddox et al., 2019; Taylor et al., 2016).

There are also a variety of reasons as to why practitioners arrive at false negatives when attempting to diagnose ASD such as lack of resources, use of ASD screeners which sometimes miss individuals with mild ASD symptoms (Corsello et al., 2007), and limited training in ASD assessment (Dufek, 2013; Mandell & Palmer, 2005; Rasmussen, 2009; Williams, Atkins, & Soles, 2009). Professionals who are involved in early, primary care examinations often do not have the training to identify ASD in children (Filipek et al., 1999) though they are likely to be the first to recognize delays associated with an ASD diagnosis. Clinicians may also be hesitant to diagnose young children who have some symptoms of ASD in order to be sensitive to familial stress and the aversive effects of labeling as well as the possibility of being incorrect or that symptoms may diminish with development (Dawson, Johnson, Tuchman, & Volkmar, 2013). This may be problematic for individuals who would benefit from a referral for a more in-depth evaluation (Sikora,

Hall, Hartley, Gerrard-Morris, & Cagle, 2008) and delayed identification create delays in accessing early intervention (Harris et al., 2019)

ASD evaluations occur in a number of settings. In the school setting, school-based practitioners (e.g., school psychologists, special education teachers, speech language pathologists) may work individually or as part of a team to provide an educational identification of ASD for the purpose of qualifying a student for eligibility to receive special education services. ASD classification and services are outlined under the “Autism” eligibility criteria set by state and federal law (Harris et al., 2019). Among school psychologists in Pennsylvania, 92% reported directly participating in ASD assessment (Pearson, 2008). Data related to school personnel involvement in ASD identification in other states was not readily available, but it is likely that state practices are fairly similar given the guidance in federal special education law. Given the increasing demand for ASD evaluations, practitioners in community settings are under greater pressure to deliver ASD assessment as well. Of 100 therapist participants working in a non-ASD specialty, community setting, 76% reported working with individuals with ASD with 20.7% of their current caseloads having or suspected to have ASD (Brookman-Fraze, Drahota, Stadnick, & Palinkas, 2012). Thus, the use of EBA within these settings is an important consideration as limited resources, less access to training, and feasibility of allotted time necessary for various EBAs may be hindering their use (Wilkinson, 2010; Williams et al., 2009).

Training in EBA is often not available for practitioners working in community settings (Dufek, 2013; Montes, Halterman, & Magyar, 2009). For example, focus group participants indicated being interested in specialized ASD training because of the



increased number of ASD referrals, but only 5% of participants considered themselves ‘ASD experts’ (Brookman-Frazee et al., 2012). Similarly, 35% of therapists reported providing services to children suspected of having ASD, but did not feel confident in their training to assess for ASD (Brookman-Frazee et al., 2012).

This trend is problematic as limited training in the assessment of ASD may impair the proper use of EBA. For instance, in Tennessee, administrators and teachers reported not feeling confident in their school’s ability to use EBA to identify students with ASD or provide services for these students despite the number of students with this disorder in their schools and classrooms (Brock, Huber, Carter, Juarez, & Warren, 2014). Within community settings, only 19% of pediatricians and child psychologists ( $n = 105$ ) in Australia reported using ASD-specific assessments when diagnosing children suspected of having ASD (Skellern et al., 2005) and 70% of Australian pediatricians ( $n = 124$ ) reported never using a standardized, ASD-specific observational tool in their evaluations (Randall et al., 2016).

Improper use of EBA can negatively impact the ability of school- and community-based practitioners to correctly identify students with ASD. For instance, rates of individuals with an ASD diagnosis are inconsistent with the number of students receiving special education services under an Autism classification within school settings (Harris et al., 2019; Pinborough-Zimmerman et al., 2012; Rubenstein et al., 2018; Yeargin-Allsopp et al., 2003). Approximately 20% of students with a medical diagnosis of ASD were not identified with an educational Autism classification with their district (Yeargin-Allsopp et al., 2003). While there are different criteria for an ASD diagnosis given in a clinic setting compared to criteria for classifying students in the school setting

(evaluators must consider educational impact), students with ASD are often identified under other disability classifications than as a student with an ASD (Rubenstein et al., 2018; Volker, 2012; Wilkinson, 2010). Of 100 school psychologists surveyed, 80.9% indicated that they worked with a student who they suspected to be on the autism spectrum, but were classified under a different disability category (Small, 2012). These findings have important implications, as a student's special education classification drives the types of services they receive and improper identification may impair access to appropriate educational services and be confusing for children and their caregivers (Rosenberg et al., 2009).

Improper use of EBA for ASD may also contribute to false positive diagnoses in school and community settings. Findings indicate that less experienced participants reported diagnosing ASD without proper training because no other clinicians provided this service (Rutherford, McKenzie, Forsyth, et al., 2016). In their study using vignettes of individuals with differing levels of ASD symptoms, Kamp-Becker et al. (2018) found that on a case with an individual showing low levels of ASD symptoms, 14% of the moderately trained evaluators rated this individual as having a moderate to high ASD symptom level while none of the expert evaluators did (Kamp-Becker et al., 2018). These findings suggest a tendency for non-ASD specializing practitioners to false-positively diagnose ASD. Receiving a false diagnosis of ASD may result in children receiving services that are not relevant to or effective in meeting their needs (Maddox et al., 2019; Taylor et al., 2016). Not only are resources wasted but delay of appropriate services can negatively impact the child. To limit incorrect diagnoses of ASD, EBAs have been

developed and are recommended to help standardize the process used in ASD evaluations.

### **Evidence-Based Assessment for Autism Spectrum Disorder Evaluations**

Because ASD cannot be identified through concrete physiological or biological measures (Esteves, 2018), behavioral assessment is the only available diagnostic approach (Falkmer et al., 2013). The Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) (Lord et al., 2012) is considered the “gold standard” behavioral observation measure when conducting a comprehensive evaluation of individuals suspected of having ASD (Esteves, 2018; Kamp-Becker et al., 2018; Zander et al., 2016; Zwaigenbaum & Penner, 2018). However, across treatment settings, some practitioners use ASD specific screeners based on parent or teacher reports rather than administering the ADOS-2 (Allen, Robins, & Decker, 2008; Bitsika, 2008; Pearson, 2008; Wiggins, Baio, & Rice, 2006; Williams et al., 2009). Although use of screeners may be efficient in identifying potential ASD in a timely manner, use of screeners alone were not found to be as accurate in identifying ASD as direct assessment practices (Duvekot, van der Ende, Verhulst, & Greaves-Lord, 2015).

It is recommended that the ADOS-2 be one of many standardized measures administered during an ASD evaluation. However, it is not currently being utilized in some settings for proper ASD assessment (Aiello, Ruble, & Esler, 2017; Allen et al., 2008; Dufek, 2013; Pearson, 2008; Stadnick, Brookman-Frazee, Williams, Cerda, & Akshoomoff, 2015; Wiggins et al., 2006; Williams et al., 2009). For example, in their study comparing the use of the ADOS-2 during a previous evaluation conducted in

community settings, only 27% of 87 children (mean age 7.4 years) who were diagnosed with ASD as a result of the evaluation were evaluated using the ADOS-2 (Hausman-Kedem et al., 2018). Following a re-evaluation including the ADOS-2 and diagnostic decision of at least two expert clinicians, 23% of participants who received an ASD diagnosis in the community were classified as non-spectrum by the researchers.

Within such settings, there are multiple barriers to the use of the ADOS-2 as well as feasibility of standardized administration. For instance, the ADOS-2 is a complex assessment measure that includes a variety of activities, toys, and other materials and requires more time to administer and extensive training in administration and scoring to ensure accuracy (Hausman-Kedem et al., 2018). Thus, it is less often used in community settings compared to use for research. In comparison, screeners, diagnostic interviews, and other indirect assessment measures require much less of the evaluator's time and may be employed instead (Duvekot et al., 2015). There are also other concerns noted by those in community settings. For example, in one study with clinical ( $n = 44$ ) and school psychologists ( $n = 44$ ) who used the ADOS-2, the most common reported disadvantages involved diagnostic discrimination and lack of resources (Akshoomoff, Corsello, & Schmidt, 2006). In fact, 59% of the sample indicated that they believed the ADOS-2 tended to result in over-classification of ASD and 96% reported time for administration as a major disadvantage (Akshoomoff et al., 2006).

More recently, a survey of a small number ( $n = 6$ ) of school psychologists yielded similar results. Prior to receiving training in the ADOS-2, half of participants reported that they expected the instrument would be too time consuming to include in their comprehensive ASD evaluations (Dufek, 2013). However, following training on the

ADOS-2, participants believed that the greatest disadvantage to use of this instrument would be that they might not get the results that they expected when using the ADOS-2 and results may be confusing (Dufek, 2013).

Other barriers to the use of the ADOS-2 among practitioners in different settings is the possibility of limited access to training. It is recommended that ADOS-2 users have prior training and experience conducting test batteries and have experience in ASD, specifically (Center for Autism and the Developing Brain, 2019). These practitioners can be psychologists, occupational therapist, psychiatrists, and speech pathologists, among others. Before using the ADOS-2, evaluators are strongly encouraged to attend the ADOS-2 Introductory/Clinical Training Workshop (Center for Autism and the Developing Brain, 2019). However, this may not be feasible for all practitioners. The Clinical Training Workshop is a two-day training costing \$500 per person (Weill Cornell Medicine, 2019). Ongoing training is recommended and equally expensive and time consuming.

Additionally, the ADOS-2 materials cost approximately \$2,200 (Dufek, 2013). Although ADOS-2 training and materials may be costly, without adequate training, improper administration or interpretation of the ADOS-2 is likely to occur (Molloy et al., 2011) and it is more accurate at identifying ASD compared to other measures such as screeners (Corsello et al., 2013; Duvokot et al., 2015; Taylor, Vehorn, Noble, Weitlauf, & Warren, 2014).

The ADOS-2 is considered important to a comprehensive evaluation for ASD, but over-emphasizing or only relying on ADOS-2 scores in clinical practice is likely to cause inaccurate diagnoses of ASD as well (Zander, 2015). For instance, within a community

setting, findings indicated that false positive errors were common among ADOS-2 scores and clinical judgements (Mazefsky & Oswald, 2006). That is, although the scores on the ADOS-2 indicated “Autism” or “ASD”, clinicians did not agree with this diagnosis when considering other information. The reverse has also been found, such that scores on the ADOS-2 did not indicate ASD but practitioners gave an ASD diagnosis when considering other information (Taylor et al., 2014). Therefore, examiners should not over-emphasize ADOS-2 scores in relation to the quality of the interactions taking place during the administration (Molloy et al., 2011; Zwaigenbaum & Penner, 2018). Those with less training who use the measure may rely more heavily on the ADOS-2 scores compared to other relevant information when making diagnostic decisions because it is considered the “gold standard” in ASD assessment and they may have less experience with the large variability of symptoms in individuals diagnosed with ASD.

Non-adherence to the standardized use of the ADOS-2 is also problematic (Kamp-Becker et al., 2018; Molloy et al., 2011; Risi et al., 2006). To study adequate administration of the ADOS-2 among school practitioners evaluating for ASD, participants were trained on the ADOS-2 and their evaluation practices following training were reviewed by the experienced research team (Dufek, 2013). Although adequately trained, school-based practitioners still struggled to meet correct administration criteria with some activities on the ADOS-2. In fact, the most common error made on the ADOS-2 was to omit activities during their ASD evaluations (Dufek, 2013). Not adhering to the standardized protocol for ADOS-2 administration and omitting items is problematic because the instrument was meant to be scored by considering information gathered from the entire administration (Kamp-Becker et al., 2018; Molloy et al., 2011).

Similarly, ADOS-2 coding agreement between the coding of variably trained participants in community settings compared to the coding recommendations listed in the ADOS-2 manual were lowest when there were higher rates of deviations to standardized administration in the ADOS-2 administration videos reviewed by the participants (Kamp-Becker et al., 2018). Non-adherence to the standardized administration of the ADOS-2 may also increase the likelihood of inaccurate scoring and, ultimately, diagnoses.

### **Problem Statement**

Improper use of EBA in ASD evaluations may have significant negative effects on accurate ASD diagnosis, appropriate interventions, and child prognosis. To avoid inaccurate diagnoses surrounding ASD, use of standardized instrumentation and continued training is needed for those making diagnostic and classification decisions (Merten, Cwik, Margraf, & Schneider, 2017). The ADOS-2 is recommended for comprehensive ASD evaluations and recent findings suggests that scores are highly regarded in ASD diagnostic decision making among practitioners (Zander, 2015). However, erring on the side of caution and positively diagnosing ASD when uncertain and lack of training and experience in EBA of ASD may contribute to false diagnoses of ASD in schools and other community settings. Additionally, not adhering to standardized use of recommended EBA, and/or not including the ADOS-2 in comprehensive ASD evaluations can also be problematic.

An incorrect diagnosis of ASD can have negative outcomes for the individual (Falkmer et al., 2013; Taylor et al., 2016). Additionally, inaccurate ASD diagnoses can have negative economic impacts as the prevalence of different diagnoses often informs intervention program funding (Hausman-Kedem et al., 2018). Thus, it is important that

practitioners are extensively trained and supervised on standardized use of the ADOS-2 in ASD evaluations (Kamp-Becker et al., 2018). Specifically, experienced practitioners should be experts at using observations from all activities of the ADOS-2 and in assigning scores to items to inform their diagnostic decisions (Molloy et al., 2011). Clinical judgement is also crucial, as sensitivity and specificity errors are inherent in standardized assessments (Dufek, 2013).

Currently, accuracy, utility, and reliability of the ADOS-2 administration in schools and other community clinic settings has not been widely researched (Charman & Gotham, 2013; Dufek, 2013; Hausman-Kedem et al., 2018; Kamp-Becker et al., 2018; Rutherford, McKenzie, McClure, et al., 2016; Zander et al., 2016). Of those investigating ADOS-2 administration in these settings, some suggested that lack of training was a contributor to not using or misusing the ADOS-2 (Corsello et al., 2013). Among community evaluators who were adequately trained in the ADOS-2, some still did not follow standardized administration (Dufek, 2013). Similarly, even if trained on the ADOS-2, some practitioners with extensive experience may not administer this instrument during their ASD evaluations. For example, the majority of participants from 16 different institutions offering ASD evaluations viewed the ADOS-2 positively and reported that familiarity with this assessment was helpful in informing their evaluation even when they did not use it (Rutherford, McKenzie, McClure, et al., 2016). Participants in this study with more experience believed that their clinical judgement alone was more accurate in diagnosing ASD compared to standardized measures (Rutherford, McKenzie, Forsyth, et al., 2016). This suggests that those extensively trained in ASD and the ADOS-2 may use their experiences and what they know regarding what the ADOS-2 measures to



evaluate for ASD rather than actually administering it. This can be problematic if these practitioners supervise or train others who are not as experienced.

The ability for practitioners in schools or other community clinic settings to use and maintain standardization when administering the ADOS-2 while continuing to practice efficiently and with limited resources is unclear and merits further examination (Matson et al., 2012). There is also limited research investigating standardized administration of the ADOS-2 in these settings. Understanding the practices of those who administer the ADOS-2 is important, as findings from this measure significantly influence diagnostic decisions and treatment. Furthermore, the majority of ADOS-2 administrations take place in community clinical settings (Zander et al., 2016). Although research is emerging regarding the inter-rater reliability of the ADOS-2 among practitioners in community settings, the *techniques* used by practitioners in these settings and potential effects of non-adherence to standardized protocol are largely unknown (Dufek, 2013; Molloy et al., 2011). As lack of training may be a contributor to improper use of EBAs such as the ADOS-2, practitioner level of training and its effects on adherence to standardized administration of the ADOS-2 warrants further examination. Therefore, the purpose of this study was to examine how practitioner work setting relates to use of the ADOS-2 in ASD evaluations, how practitioner level of ADOS-2 training relates across differing settings, and how practitioner work setting and ADOS-2 training relates to adherence to standardized administration of the ADOS-2.

### **Purpose Statement**

The reported level of use, level of training on the ADOS-2, and administration fidelity among practitioners in school-based settings, non-ASD specializing, and ASD

specializing clinics were explored. It was expected that the majority of those involved in ASD evaluations in schools use ASD screeners in their evaluations rather than the recommended administration of the ADOS-2. Practitioners in the school setting likely have less training on the ADOS-2. It was hypothesized that within non-ASD specializing clinics, the ADOS-2 was typically used as part of a comprehensive ASD evaluation. In clinics that consider their site an ASD specializing clinic or where 75-100% of individuals evaluated in the clinic are suspected to have an ASD, it was believed that the ADOS-2 is used less frequently than in non-ASD specialty clinics. Practitioners in non-ASD specialty clinics may have a higher level of ADOS-2 training compared to school-based practitioners, but less training compared to practitioners who consider themselves to work in a clinic specializing in ASD.

Of those administering the ADOS-2 in the school setting, it was hypothesized that not all activities are administered as intended. It may be that these practitioners did not receive adequate training in these activities or do not have the time and/or resources thus, do not adhere to standardized administration of the ADOS-2. Providers who work in non-ASD specialty clinics adhere to standardized administration of the ADOS-2. Evaluators in these settings may have had more training in use of the ADOS-2 and be exposed to more complex individuals compared to those working in ASD specialty clinics or schools, thus adhere to its standardized administration. It was hypothesized that practitioners in clinics specializing in ASD tend to not administer or not adhere to standardized administration of the ADOS-2. It may be that referrals to an ASD specialty clinic are less complex compared to those seen in non-ASD specialty clinics. These extensively trained practitioners may also feel as though their clinical judgement is

sufficient to adequately diagnose ASD without the use of lengthy, standardized assessments such as the ADOS-2.

### **Research Questions and Hypotheses**

This study aimed to test the hypotheses that recommended evidence-based practices for evaluating individuals with suspected ASD are being utilized at different rates across school, non-ASD specializing, and ASD specialty clinic settings. It was expected that fewer school practitioners, than those in other settings, administer the ADOS-2 in their comprehensive evaluations of ASD. Since the ADOS-2 is such a specialized instrument, specific training on the ADOS-2 was examined.

Focusing on training, this study also aimed to test the hypothesis that, of those using the ADOS-2 across various settings, there is likely to be a difference in the type of training evaluators received on the use of the ADOS-2.

Given previous research, it is also likely that self-report of administration fidelity of the ADOS-2 varies across practitioners in these different settings. Therefore, this study aimed to test the hypothesis that use and adherence to the standardized administration of the ADOS-2 are not equal across settings. Intensive or limited training in ADOS-2 use and ASD evaluation may contribute to nonuse or nonadherence to standardized use.

- Q1 Does use of the ADOS-2 differ across different treatment settings (e.g., schools, non-ASD specialty clinics, ASD specialty clinics)?
- H1 School-based practitioners are least likely to use the ADOS-2 for ASD evaluations compared to clinic-based practitioners (i.e., non-ASD or ASD specializing clinics).
- H2 Practitioners working in non-ASD specializing clinics use the ADOS-2 more than those working in school and ASD specialty clinics.

- Q2 Does ADOS-2 training level differ based on practitioner setting?
- H3 School-based practitioners are more likely to be informally trained on the ADOS-2.
- H4 Practitioners working in non-ASD specialty clinics are more likely to be clinically trained on the ADOS-2.
- H5 Practitioners working in ASD specialized clinics are more likely to be research trained on the ADOS-2.
- Q3 Does ADOS-2 administration standardization differ based on treatment setting?
- H6 School-based practitioners will have lower ADOS-2 administration completeness percentage scores compared to clinic-based practitioners.
- H7 Non-ASD specializing clinic-based practitioners will have higher ADOS-2 administrations completeness percentage scores compared to school- and ASD specialty clinic-based practitioners.
- Q4 Does ADOS-2 administration standardization differ based on practitioner training on the ADOS-2?
- H8 Evaluators informally trained on the ADOS-2 will have lower ADOS-2 administration completeness percentage scores compared to clinic or research trained evaluators.
- H9 Evaluators who are clinically trained on the ADOS-2 will have the highest ADOS-2 administration completeness percentage scores.

It is hoped that exploring current practices in the evaluation of individuals suspected to have an ASD among those who are responsible for identifying such persons will highlight any inconsistencies across the settings wherein these evaluations occur. Additionally, the scope of this study could aid in identifying any variances in practitioner level of training on the evaluative process of identifying ASD. Taken together, highlighting these differences may began an initiative to recognize and strengthen the

very best practice in identifying individuals with ASD, thus supporting early access to care.

### **Definition of Terms**

Autism Spectrum Disorder: A group of neurodevelopmental disorders identified by a single diagnosis based on a spectrum of symptoms in two domains: social communication and restrictive, repetitive, or sensory and/or motor behaviors (American Psychiatric Association, 2013; Lord, Elsabbagh, Baird, & Veenstra-Vanderweele, 2018). Includes Autism, Asperger's disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS) (Kogan et al., 2009).

Clinical Training: A practitioner is clinically trained if they attend the Introductory/Clinical Training Workshop or if they contract or train with an ADOS-2 Certified Independent Trainer (Center for Autism and the Developing Brain, 2019).

Research Training: A practitioner is research trained if they attend both the ADOS-2 Introductory/Clinical Training Workshop and the Advanced/Research Training Workshop in-person or if they are considered research reliable on the ADOS-2. To become research reliable a practitioner must obtain at least 80% agreement on the ADOS-2 coding and diagnostic algorithm with a Center for Autism and the Developing Brain (CADB) or independent trainer (Weill Cornell Medicine, 2019). They must also demonstrate standardized administration procedures by bringing video recordings to the advanced training, being evaluated at the advanced training workshop, or submitting post-course videos of their administrations on three separate administrations per module (Center for Autism and the Developing Brain, 2019). A practitioner seeking research reliability may also be trained on-site with a research reliable, ADOS-2 Certified

Independent Trainer and met at least 80% agreement on the ADOS-2 coding and diagnostic algorithm (Center for Autism and the Developing Brain, 2019).

Informal Training: For the purpose of this study, informal training is defined as ADOS-2 training that does not include becoming clinically trained through attending the Introductory/Clinical training workshop or being trained by an individual who is an ADOS-2 Certified Independent Trainer or research reliable. These individuals are also those who did not meet training criteria to be considered research trained.

Screeners: Measures intended to identify individuals with a high probability of exhibiting abnormal or delayed development wherein diagnostic assessment is a reasonable next step (Meisels & Provence, 1989).

Specificity: A measure's ability to accurately identify an individual as not having a disability; decreases false positives (Risi et al., 2006).

Sensitivity: A measure's ability to accurately identify an individual as having a disability; decreases false negatives (Risi et al., 2006).

## **CHAPTER II**

### **LITERATURE REVIEW**

ASD is a highly heritable disorder, although genetic determinants are still unknown (Pinto et al., 2010), that can severely disable an individual's ability to gain language and social capabilities. The Centers for Disease Control and Prevention (CDC) estimates that 1 in every 59 children fall on the autism spectrum (Baio et al., 2018). A diagnosis of ASD sometimes results in the individual never gaining language and often does not allow for emotional contact—even with their closest caregivers (Auger, 2013). Adding to the challenges these individuals face is the high co-occurrence of psychiatric diagnoses, low cognitive, and poor adaptive functioning (Worley & Matson, 2011). Conversely, some individuals diagnosed with ASD can function at home and in general education classrooms and perform well on academic tasks—only deviating in their social functioning among their same-aged peers. Although some individuals with ASD are better able to function in the community than others, accurate diagnosis and classification of ASD for children of all capabilities is necessary for accessing adequate resources.

#### **Evidence Based Assessment**

EBAs are those instruments or processes that have been validated through extensive research trials to be valid, reliable, and show acceptable sensitivity and specificity levels when detecting, confirming, and establishing severity symptoms to aid in adequate psychological diagnoses and classifications (Youngstrom & Van Meter, 2016). In turn, they can be used to identify evidence-based interventions that may be

appropriate for the individual's presenting problems (Stichter, Riley-Tillman, & Jimerson, 2016). EBA follow best practice guidelines when administration is followed by practitioner training and when administration is standardized based on the test's manual (Gross, Farmer, & Ochs, 2018). However, some practitioners may not utilize EBA in their comprehensive evaluations or may present variability in their standardized administration of them due to lack training (Connors, Arora, Curtis, & Stephan, 2015) or practitioner preference (Jensen-Doss & Hawley, 2010).

### **Evidence Based Assessment in Autism Spectrum Disorders**

Utilizing standardized measures for ASD evaluations is important, as conflicting diagnoses or classifications may occur without the use of standardized assessments and contribute to family burden and delay of intervention (Harris et al., 2019; Rutherford et al., 2018; Wiggins et al., 2006; Williams et al., 2009). Recommended EBA practices suggest that ASD evaluations should include behavioral observations, a parent interview to obtain information regarding child developmental history and current functioning, and clinical judgement of a diagnosis by a provider who is experienced in evaluating individuals with ASD (Dufek, 2013; Zwaigenbaum & Penner, 2018). It is recommended that observational data be collected from measures such as the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; (Lord et al., 2012), as it has the most evidence-base and has shown to have high specificity (discriminating type of ASD) and sensitivity (discriminating ASD vs. non-ASD) (Corsello et al., 2013; Falkmer et al., 2013).



## **Autism Spectrum Disorder Screening Instruments**

Screeners can be used as a starting point when considering providing in-depth assessments to individuals (Gross et al., 2018). However, screeners are not to be used as a replacement for direct assessment of ASD (Ries, 2011). It is suggested that the ADOS-2 is the only direct assessment for such evaluations (Bradley-Johnson, Johnson, & Vladescu, 2008). ASD specific screeners are not as adequate in accurately identifying ASD, as they have been shown to miss ASD in individuals with mild symptoms (Corsello et al., 2007) and overidentify individuals with challenging behaviors not attributable to ASD (Cholemkery, Kitzerow, Rohrmann, & Freitag, 2014). For instance, using the widely used, parent reported screener, the Modified Checklist for Autism in Toddlers (M-CHAT) (Robins, Fein, Barton, & Green, 1999) resulted in false ASD diagnoses in approximately 30% of their sample ( $n = 127$ ) (Taylor et al., 2014). Such that 12 children with ASD did not meet diagnostic criteria on the screener and 26 children without ASD did (Taylor et al., 2014).

Similarly, the diagnostic accuracy of the parent reported Social Responsiveness Scale (SRS) (Constantino, 2002) (a screener for ASD showing usefulness in accurately identifying ASD for further assessment (Hirota, So, Kim, Leventhal, & Epstein, 2018)) compared to the ADOS-2 was moderate to poor (Duvekot et al., 2015). Such that the SRS did not identify 55% of individuals who met diagnostic criteria for ASD on the ADOS-2 (Duvekot et al., 2015). The ADOS-2 alone yielded strong diagnostic agreement between those working in community clinics and extensively trained practitioners in differentiating Autism from non-Autism and ASD (includes Autism and pervasive

developmental disorder not otherwise specified [PDD-NOS]) from Non-spectrum diagnoses (Corsello et al., 2013).

Diagnostic accuracy of the Social Communication Questionnaire (SCQ) (Rutter, Bailey, & Lord, 2003) compared to the ADOS-2 was strong in differentiating Autism from non-Autism, but not ASD from Non-spectrum (Corsello et al., 2013). This may mean that the SCQ (which has showed usefulness in accurately identifying ASD for further assessment (Hirota et al., 2018)) is better able to identify ASD or non-ASD in severe cases, but not mild ASD from non-ASD. In this study, 80% of the individuals with a PDD-NOS diagnosis (considered on the autism spectrum) were missed by the SCQ and were inaccurately identified as not falling on the spectrum (Corsello et al., 2013). These findings indicate that the ADOS-2 can be used adequately in community settings and that it is more accurate at diagnosing mild cases of ASD compared to this ASD specific screener.

### **The Autism Diagnostic Observation Schedule, Second Edition**

The ADOS-2 was derived from the Diagnostic Statistical Manual (DSM-5)'s (American Psychiatric Association, 2013) ASD criteria and includes activities used to identify abnormal behaviors common in ASD as well as neurotypical behaviors absent in those with ASD (Molloy et al., 2011). The ADOS-2 was designed to measure ASD symptom severity in individuals compared to already ASD diagnosed same age and language level peers (Handen et al., 2018). It has a sensitivity that ranges from .8 to 1 (Gotham et al., 2008; Gotham, Risi, Pickles, & Lord, 2007; Kamp-Becker et al., 2018; Lord et al., 2012; Molloy et al., 2011) and specificity ranging from .68 to 1 (de Bildt et

al., 2009; Gotham et al., 2008; Gotham et al., 2007; Kamp-Becker et al., 2018; Lord et al., 2012; Molloy et al., 2011; Oosterling et al., 2010).

The ADOS-2 is a rating scale of structured and semi-structured activities on the basis of social interaction, restricted and repetitive behaviors, and communication (Hartley & Sikora, 2009). Administration includes an observational assessment with which an evaluator rates the participant's behaviors in the domains of repetitive behaviors and stereotyped interests, reciprocal social behavior, and communication on a scale of 0-3 where 0 represents no evidence of impairment, 1 indicates mild impairment, and 2-3 represent significant impairment. To meet criteria for an ASD diagnosis according to the ADOS-2, subjects must meet empirically derived cutoff scores indicating "Autism" for more severe symptoms or "ASD" for milder symptomatology (Siegel et al., 2015).

There are four modules that the evaluator chooses based on the participant's age and current language ability. Module 1 is recommended for children 31 months and older who do not use phrase speech (Lord et al., 2012). A label of "Autism" is given if the child has few to no words and their score is or surpasses 16 and a label of "ASD" is given if the child's cut-off score is or surpasses 11 (Lord et al., 2012). If the child being administered Module 1 has some words, they are given the label "Autism" if their score is or surpasses 12 and given the label "ASD" if their score is or surpasses 8 (Lord et al., 2012).

Module 2 is recommended for children who may use phrase speech but are not verbally fluent (Lord et al., 2012). If the child is younger than five years, they are given a label of "Autism" if their score is or surpasses 10 and given the label "ASD" if their score is or surpasses 7 (Lord et al., 2012). If the child is older than five years, they are given the

label “Autism” if their score is or surpasses 9 and given the label “ASD” if their score is or surpasses 8 (Lord et al., 2012).

Module 3 is recommended for children and adolescents that are verbally fluent (Lord et al., 2012). A label of “Autism” is given if their score is or surpasses 9 and given the label “ASD” if their score is or surpasses 7 (Lord et al., 2012). Module 4 has a cut-off score of 8 and is recommended for older adolescents and adults who are verbally fluent (Lord et al., 2012).

**Scoring.** Within the ADOS-2, each of the four modules consists of 29-34 items but only 14 items for Modules 1-3 and 15 items for Module 4 are considered diagnostically informative and therefore combined to form the ADOS-2 diagnostic algorithms (Zander et al., 2016). While all items are coded, the selected items contribute to a determination of ASD symptom severity (“Autism” versus “ASD” label) based on interactions during the administration. In ASD diagnostic practices, the intended use of the ADOS-2 scores contribute valuable information used for decision making and ADOS-2 activities not directly included in the scoring algorithm contribute equally valuable information in determining ASD identification (Molloy et al., 2011). For instance, while some scores depend on one observation from one activity, many more qualitative scores (e.g., “Overall Quality of Rapport,” “Quality of Social Overtures,” “Quality of Social Response”) require consideration of all behaviors observed throughout the entire ADOS-2 administration (Kamp-Becker et al., 2018).

For each module, summed scores in the Social Affect, RBRI, Overall Total and Combined components correspond to cut-off scores and classification categories of “Autism” (indicating high likelihood of an ASD), “ASD” (indicating moderate likelihood

of an ASD), or “Non-Spectrum” (indicating minimal to low likelihood of an ASD) (Lord et al., 2012). The individual’s behaviors are to be observed and considered throughout the entire administration to score the ADOS-2 and make clinical judgements (Kamp-Becker et al., 2018). While use of the ADOS-2 in EBA of ASD is widely accepted, feasibility and standardized use in some settings is somewhat unknown (Dufek, 2013).

### **Current use of Evidence-Based Assessments**

The increasing demand for ASD evaluations in schools and other community settings highlights the importance of using standardized measures to gain a robust understanding of the child’s individual needs to better inform intervention and therefore outcomes. Although students receiving services for an ASD may be underrepresented in special education (Harris et al., 2019), there is an increase in children in public school settings identified under this classification (Dufek, 2013; Pinborough-Zimmerman et al., 2012; Rubenstein et al., 2018). An increase in individuals identified with ASD in the school setting also highlights an increased need for specialized services (Stichter et al., 2016). In the United States, the number of students receiving ASD services in the school setting increased from a total of 5,413 students in 1991-1992 and a total of 370,011 students in 2010-2011 (Volker, 2012). An autism classification now ranks as the fourth most prevalent disability category in schools (Wilkinson, 2016). Additionally, the majority of children identified with an ASD ( $n = 722$ ) most frequently used school-based therapy as their health care service (Zuckerman, Lindly, & Chavez, 2016). The increasing prevalence of students in need of ASD identification and support services in schools also highlight the need for training in and use of EBA across settings (Dufek, 2013; McPherson, 2018; Stichter et al., 2016; Zuckerman et al., 2016), as utilizing standardized

assessments in evaluating a child's needs may be a way to link them to the most effective intervention practices (Dufek, 2013).

Using measures that have not been standardized or have sensitivity issues or not administering standardized measures as they were intended may contribute to ASD classification and diagnostic errors and therefore limit access to accurate services (Corsello et al., 2013; Dufek, 2013). Evidence-based ASD assessment is limited to behavioral observations (as well as developmental and other information collected via parent interview) during the ADOS-2's brief, interactive session, so considering information from each unique activity is essential for diagnostic decision making. However, adherence to standardized use of the ADOS-2 within community settings has not been extensively studied (Charman & Gotham, 2013; Dufek, 2013; Kamp-Becker et al., 2018; Rutherford, McKenzie, McClure, et al., 2016; Zander et al., 2016). Further, there is limited research regarding the training and barriers to providing ASD assessment within these settings (Harris et al., 2019).

Due to the subjective nature of the ADOS-2 administration, there is significant risk for bias and unreliability in scoring and interpretation. Albeit, some studies have found strong consistency, reliability, and sensitivity in ASD identification among "research reliable" practitioners using the ADOS-2 in community settings (Mazefsky & Oswald, 2006; Molloy et al., 2011; Zander et al., 2016). Evaluators are considered research reliable if they are trained by a research reliable, ADOS-2 Certified Independent Trainer and met at least 80% exact agreement with the trainer in the scoring of all assessment items for each module (Zander et al., 2016). To become an ADOS-2 trainer, an individual must be considered research reliable, attend the Advanced/Research

Training *again* as a Trainer in Training, and reconfirm reliability with the CADB using another set of administration tapes (Center for Autism and the Developing Brain, 2019).

The ADOS-2 has also been shown to have excellent test-retest and interrater reliability on individual activities, interrater reliability on the broader domains, and internal consistency within research settings (Lord et al., 2000). These findings may not be generalizable to community settings, as research samples tend to exclude participants with comorbid disorders—who are often seen in such settings (Dufek, 2013).

Additionally, those working in schools and community centers are typically not administering the ADOS-2 for the purpose of research and may therefore not be considered research reliable (Hausman-Kedem et al., 2018; Molloy et al., 2011; Zander et al., 2016). For instance, almost all school psychologists who reported using the ADOS-2 indicated they had attended a clinical training (81.8%) or had watched training video tapes (90.9%), but very few attended research training (6.8%) (Akshoomoff et al., 2006). Within this study of 44 school psychologists and 44 clinical psychologists who used the ADOS-2, four of the 13 who attended a research training indicated that they trained student clinicians (Akshoomoff et al., 2006).

Findings regarding ADOS-2 diagnostic accuracy among less extensively trained community- and school-based practitioners are limited, but have shown that proper training on the ADOS-2 increased diagnostic accuracy (Kamp-Becker et al., 2018; Rasmussen, 2009). Therefore, those working in these settings may need additional training to increase their accuracy in diagnosing or classifying ASD.

### **Level of Training in Differing Settings**

Although school-based identification of ASD commonly occurs, it appears that the majority of children in the United States are identified in community settings. For example, in Utah, health agencies (i.e. hospitals, private clinics, mental health centers, etc.) were the source of ASD diagnosis at a rate of almost two-times more frequently than school identifications of students under the autism classification (Pinborough-Zimmerman et al., 2012). This finding may suggest that schools are not as equipped in the early identification of ASD compared to non-school sources. Similarly, 76% of 114 children diagnosed with ASD received their diagnosis in a hospital, by a private practitioner, or at an ASD specialty clinic while only 24% received their initial ASD diagnosis in the school setting (Wiggins et al., 2006). There were also significant differences in age of first diagnosis based on diagnostic source, such that those diagnosed in the school setting were diagnosed later (mean age = 74 months) compared to those diagnosed by non-school sources (mean age = 56 months) (Wiggins et al., 2006). However, it may be that very young children are not in school and would therefore not receive an ASD evaluation there or some individuals diagnosed in clinics outside of schools do not have significant educational impacts to qualify as a student with ASD.

Some researchers suggest that lack of training and improper use of EBA may be contributing to school practitioners abilities to identify ASD in students (Dufek, 2013; Mandell & Palmer, 2005). Prevalence rates of students under the ASD educational identification were lower in school districts across the United States with lower education-related spending compared to districts with higher spending (Mandell & Palmer, 2005). This may suggest that school districts with low numbers of ASD students



are not spending money on staff training in EBA for ASD which may impact their ability to identify ASD in students.

While the majority of school psychologists ( $n = 662$ ) correctly identified true/false statements regarding ASD and diagnostic symptoms, rating scales were most often used to evaluate ASD rather than lengthier evidence-based instruments which were the least often utilized (Rasmussen, 2009). This suggests that school psychologists may have understood how to identify ASD, but that they lacked training, time, or resources to use recommended EBA to do so (Rasmussen, 2009). In a similar study, 100 school psychologists who indicated having brief ASD training during graduate coursework, practicum, and internship (76%), no training (20%), or extensive training (4.2%) averaged a score of 90.3% on 13 true/false questions regarding ASD (Small, 2012). Only 25.3% of those indicated always using an ASD specific measure in their ASD evaluations (Small, 2012). The school psychologist participants in this study who received brief training appeared to be knowledgeable regarding ASD but indicated that they did not use recommended standardized measures in their evaluations.

School psychologists ( $n = 402$ ) with more reported training and experience with individuals with ASD were more likely to engage in EBA of ASD (Aiello et al., 2017). Only 52% of those reported using the ADOS-2 (Aiello et al., 2017). Additionally, those with more ASD specific training indicated feeling more comfortable working with students with ASD (Corona, Christodulu, & Rinaldi, 2017). The majority of school psychologists (75.5%) indicated that they did not receive training and do not use the ADOS-2 to evaluate for ASD (Pearson, 2008). Of these, 73.1% indicated use of screening instruments to classify students with ASD.

School psychologists ( $n = 88$ ) indicated conducting an average of 27.8 ASD evaluations per year (Akshoomoff et al., 2006). Of the 44 who used the ADOS-2 for these evaluations, 63.6% considered themselves ASD experts compared to only 11.4% of non ADOS-2 users. This means that approximately 89% of the school psychologists did not consider themselves ASD experts *and* did not administer the ADOS-2, yet they participated in ASD evaluations. Years working in a setting where ASD evaluations were conducted and number of evaluations per year did not significantly impact ADOS-2 use. Additionally, the 44 school psychologists using the ADOS-2 reported that it helped them capture more ASD symptoms that would not be otherwise observed (Akshoomoff et al., 2006).

In examining school psychologist's ( $n = 6$ ) ASD evaluation practices prior to and following ADOS-2 training, none of the practitioners used the ADOS-2 prior to training but 100% used it after training and 93% continued to use it at three month follow-up (Dufek, 2013). This may indicate that school psychologists are willing to administer the ADOS-2 if properly trained. Following training, these participants showed to be mostly accurate in their administration. For instance, for the majority of ADOS-2 individual tasks, overall average percent of correct administration across Modules 1-3 was above 80% when administration videos were examined for fidelity (Dufek, 2013).

Omitting activities on the ADOS-2 most often lowered percent correct administration. Activities most often omitted from Module 1 include Responsive Social Smile (43%), Birthday Party (29%), and Response to Joint Attention (29%) (Dufek, 2013). Activities most often omitted from Module 2 include Response to Joint Attention (36%), Snack (18%), and Response to Name (18%). Interestingly, the tasks with the

lowest percent correct administration were activities typically omitted: Response to Joint Attention which had an overall average percent correct of 68% and Responsive Social Smile which had an overall average percent correct of 74% (Dufek, 2013). Within this study, the ADOS-2 activities in which the school psychologists most struggled with were more likely to be omitted. In examining code reliability, none of the ADOS-2 items across all measures reached 80% average percent agreement between school psychologists and the research team. ADOS-2 classifications of “Autism,” “ASD,” and “Non-Spectrum” reached average percent agreement of 74%, but when “ASD” and “Autism” were combined, average percent agreement reached 97% (Dufek, 2013).

The school psychologist’s ASD evaluation reports prior to and after training were also examined by the research team to examine change in their abilities to identify ASD-specific symptoms following ADOS-2 training. At baseline, the school psychologists identified an average of five ASD-specific behaviors (Dufek, 2013). After being trained on the ADOS-2, the school psychologists identified an average of 24 ASD-specific behaviors in their evaluation reports. Prior to ADOS-2 training, only 17% of children evaluated for ASD ( $n = 36$ ) by the school psychologists were qualified under the educational classification for ASD (Dufek, 2013). Following training, 55% of children evaluated for ASD ( $n = 40$ ) were qualified under this category. These findings are important because after brief training on the ADOS-2, school psychologists adhered to EBA for ASD evaluations and were able to accurately identify more ASD-specific behaviors.

Those working in non-ASD specializing clinics are also not likely to be vigorously trained on ASD assessment and the ADOS-2 (Molloy et al., 2011). Of 44

clinical psychologists using the ADOS-2, only 22.7% attended a research training workshop compared to 6.8% of 44 school psychologists (Akshoomoff et al., 2006). Of these, only seven of the 13 who attended a research training workshop indicated that they met research reliable criteria. Use of EBA such as the ADOS-2 should be consistent across settings to streamline diagnosis (Rosenberg et al., 2009) and promote early access to services for this population (Dufek, 2013).

When the ADOS-2 is included in ASD evaluations, findings are mixed regarding inter-rater reliability among scores and diagnostic decisions among evaluators at differing level of training (Dufek, 2013; Kamp-Becker et al., 2018; Stadnick et al., 2015). In comparing ADOS-2 classifications and ASD diagnosis differences given by licensed clinical psychologist and predoctoral psychology trainees, 20% of children assessed by a licensed psychologist ( $n = 15$ ) and 68% of children assessed by psychology trainees ( $n = 47$ ) were given a diagnosis of ASD (Stadnick et al., 2015). This discrepancy indicates that it may be helpful for community practitioners to take on a team approach to ASD evaluations wherein one member has more experience with ASD evaluations and can supervise less-experienced trainees.

To study inter-rater reliability of the ADOS-2 among 15 practitioners with varying levels of experience (three were research reliable; 13 endorsed one to eight ADOS-2 administrations) from 13 different unspecialized clinical centers, researchers examined ratings on videotaped administrations of the ADOS-2 (Zander et al., 2016). Ten videos were rated for each module by five clinicians—one being the administrator and four unfamiliar with the client. Based on cut-off scores, a diagnosis of “Autism” was agreed on for all modules in ten of the 13 cases (Zander et al., 2016). Module 1 scored in

the good objectivity range, Module 3 and 4 scored in the fair objectivity range, and Module 2 in the poor range. Overall, researchers conclude that objectivity on the ADOS-2 classification among less extensively trained and research reliable clinicians (falling within the fair range) is similar to objectivity as reported in previous studies with these characteristics (Zander et al., 2016). Adherence to standardized administration of the ADOS-2 within this study was not reported.

Within a clinic specializing in ASD, agreement of overall team diagnosis of ASD and classification of ASD on the Autism Diagnostic Observation Schedule-Generic (ADOS-G) (Lord et al., 2000) (the previous version of the ADOS-2) was present in 58 of the 75 ASD evaluations of children ( $n = 78$ ) aged 22 months to eight years (Mazefsky & Oswald, 2006). Such that, in 77% of cases, classification scores indicating “Autism” or “ASD” obtained from the ADOS-G alone corresponded to a multidisciplinary team diagnosis (ASD experiences of evaluators ranged from five to over 20 years) of ASD following a comprehensive evaluation including parent clinical interviews, observations, ASD specific assessments, and informal speech, occupational, and educational evaluations. Non-agreement was most often due to false positive diagnostic discrimination, wherein scores on the ADOS-G indicated “Autism” or “ASD” but the team did not agree when considering all the information collected throughout the evaluation (Mazefsky & Oswald, 2006). While this study suggests similar agreement of the ADOS-G scores and clinical judgement within a clinical sample compared to agreement among its original research intended sample, the ADOS-G examiners in this study were all research reliable and certified ADOS-2 trainers. It may be that agreement was high due to practitioner expertise in ASD and administration of standardized ASD

assessments. Further research is needed to examine standardized use of assessments and agreement of scores among evaluators who do not specialize in ASD. Additionally, the authors did not comment on the practitioner's adherence to the standardized administration of the ADOS-G and further research should consider if each activity was administered with fidelity.

Practitioners experienced in standardized assessment of ASD still exhibit uncertainty in ASD diagnosis. In their sample of 478 toddler and preschool-aged individuals evaluated in an clinic specializing in ASD, research reliable clinicians were only completely certain about their diagnostic decision 60% of the time (McDonnell et al., 2018). Additionally, specialty practitioners were more certain in diagnosing ASD (70.3% certainty) than in their non-ASD diagnoses (31.5% certainty). In exploring diagnostic certainty and ADOS-2 classifications, research reliable evaluators were 69.5% certain in their decision if the child met the "Autism" cut-off score, 45.9% certain for those who met the "Non-Spectrum" classification, and 22.2% certain in their diagnostic decision if the child met the "ASD" classification (McDonnell et al., 2018). These findings suggest that expert level practitioners are less certain in their diagnostic decisions when children met the "ASD" classification on the ADOS-2 indicating moderate evidence of an ASD.

To study inter-rater agreement of coding of the ADOS-2 among practitioners within non-ASD specialty and ASD specialty community settings, researchers had approximately five highly trained and experienced ("expert") level practitioners from at least two ASD specializing outpatient clinics and a group ( $n = 235$ ) of less extensively ADOS-2 trained practitioners ("clinicians") examine seven videos of ASD evaluations

from three ASD specialty outpatient clinics (Kamp-Becker et al., 2018). High variance was found among the accuracy of ADOS-2 coding which depended on case-specific characteristics, experience of the coder, and the quality of ADOS-2 administration. For instance, variability in codes were smaller within the expert group, and the expert group had higher instances of code agreement per item as compared to the gold standard coding listed in the ADOS-2 manual compared to the clinician group (Kamp-Becker et al., 2018). These findings have important implications as the ADOS-2 is highly considered when diagnosing ASD, and it is expected that evaluators be consistent and accurate in their clinical judgements.

Within this study, in 70% of Module 3 and 37% of Module 2 cases, the ADOS-2 algorithms scores met the cut-off for an “ASD” diagnosis, but the child was not diagnosed by practitioners when other information was considered—indicating that the ADOS-2 scores appeared to false positively signify ASD for those cases (Kamp-Becker et al., 2018). False negative diagnoses (ADOS-2 did not indicate “ASD” but ASD was present) only occurred with evaluations using the previous version of the ADOS-2.

Across participants, coder agreement when compared to the gold standard codes was higher if the client had very low or very high symptom presentations (Kamp-Becker et al., 2018). This is consistent with other findings indicating practitioner difficulty in coding and scoring the ADOS-2 for individuals with moderate ASD symptoms (Corsello et al., 2013; Hausman-Kedem et al., 2018; McDonnell et al., 2018). Items with the most coding variability across modules and participants included those that pertained to gestures, social cognition (i.e., “Insights in own emotions”), and qualitative estimates (“Quality of Social Overtures,” “Quality of Social Response”)

(Kamp-Becker et al., 2018). Some of the items with the most variability were those that consider observations during the entire administration of the ADOS-2, so standardized administration and administering each activity is pertinent. Additionally, deviations in standardized administration were most common for Module 1, which had the lowest code agreement when comparing gold standard to participant reported codes. While level of training in EBA of ASD vary by setting, it is clear that more training increases the likelihood of utilizing EBA and ADOS-2 agreement.

### **Setting as a Predictor of Evidence-Based Assessment Adherence**

Currently, the utilization of standardized ASD assessments in schools and community clinics is variable and somewhat unknown (Harris et al., 2019). While in one study 100% of school psychologists ( $n = 44$ ) endorsed quite often using standardized measures in their ASD evaluations (Akshoomoff et al., 2006), typically EBA measures for ASD evaluation are not often used in the school setting (Aiello et al., 2017). In the United States, only eight states' education websites reported that standardized ASD assessments should be used to classify ASD among their students (Barton et al., 2016). This finding may not be an accurate estimate of rates of implementation of EBA in schools, as researchers gathered their information from state websites and actual utilization of EBA for ASD classification was not directly observed or reported. Although Colorado was one of the above eight states, a survey among Colorado early childhood practitioners indicated differing use of procedures and tools to classify students with ASD across school districts (Barton et al., 2016). These findings are consistent with previous literature identifying six states that recommended specific diagnostic tools in



ASD evaluations and only four that specifically recommended the ADOS-2 (Stahmer & Mandell, 2007).

Of 1,317 school psychologists participating in ASD assessment, 82% reported using instruments designed to identify ASD symptoms (Benson et al., 2019). However, the majority used less sufficient (Mandell & Mandy, 2015) rating scales as their primary instrument. These findings are consistent with previous literature reporting practitioner use of ASD-specific rating scales (Allen et al., 2008; Wiggins et al., 2006; Wilkinson, 2010) which tend to have poorer sensitivity and specificity.

The use of standardized assessments are also sometimes not utilized by practitioners in community settings (Hausman-Kedem et al., 2018; Skellern et al., 2005; Stadnick et al., 2015; Taylor et al., 2016). In examining use of the ADOS-2 in ASD evaluations across settings (e.g., a public school, a program designed to evaluate eligibility for developmental disabilities services, and a hospital-based mental health clinic) wherein the individual was evaluated by more than one provider, Williams et al. (2009) found that schools were least likely to use this standardized measure. Specifically, none of the school evaluations included the ADOS-2, while 25% of the eligibility programs and 96% of the hospital-based clinics included the measure. In these community settings, not using standardized assessments in ASD evaluations yielded lower diagnostic agreement, as only 45% of cases had agreement in ASD diagnosis across settings (Williams et al., 2009). When there was diagnostic disagreement between sites, the hospital-based clinic was less likely to give an ASD diagnosis compared to schools and the program designed to evaluate eligibility for developmental disabilities services. It may be that practitioners who did not use the ADOS-2 lacked the training to

administer it for comprehensive ASD evaluations and the measures that were used tended to false positively diagnose ASD.

ASD specific assessment measures were only used in 30% of initial evaluations and the ADOS-2 was only used in 7% of those when exploring diagnostic pathways of cases involving eight-year-old children diagnosed with ASD (Wiggins et al., 2006). The use of clinical judgements alone in diagnosing ASD were not compared to standardized assessment in terms of diagnostic accuracy. However, of 116 practitioners in the United Kingdom, 75% endorsed the use of standardized ASD measurements as helpful in ASD evaluations with 63% reporting the use of the ADOS-2 (Rogers et al., 2016). Similarly, 82% of Canadian physicians ( $n = 14$ ) and 83% of Canadian psychologists ( $n = 30$ ) endorsed using the ADOS-2 in 60% or more of their ASD evaluations (Esteves, 2018).

The majority, 87%, of psychologists ( $n = 27$ ) indicated that the ADOS-2 results strongly influenced their diagnosis of ASD (Esteves, 2018). Therefore, training and correct administration of the ADOS-2 is important for accurate diagnosis. However, the ADOS-2, though included in a comprehensive ASD evaluation, may not be administered as it was intended in some community settings (Allen et al., 2008; Kamp-Becker et al., 2018; Molloy et al., 2011; Risi et al., 2006). In some cases, the ADOS-2 administration may not be performed by the diagnosing clinician (Molloy et al., 2011). For example, in clinics that supervise students and/or implement a team approach to evaluations, students in training or other evaluators may administer the ADOS-2, while the diagnostic decision is the responsibility of a different individual. In ASD specialty clinics, the predictive validity of the ADOS-2 is significantly lower when the diagnosing clinician is not the

ADOS-2 examiner (Molloy et al., 2011; Risi et al., 2006). In the example where the diagnosing clinician was not the ADOS-2 examiner, the diagnosing clinician may solely consider scores derived from the ADOS-2 when making their decision rather than taking into account qualitative information gained within the administration which may put the evaluation at risk for a false ASD diagnoses.

In some instances, while the ADOS-2 has shown to have good sensitivity, specificity has proven to be more of a challenge (Risi et al., 2006). A sensitivity level above 80% is recommended (Lord et al., 2000). In a community sample ( $n = 584$ ) investigating ADOS-2 sensitivity and specificity, researchers found relatively high sensitivity (75-94%) and inconsistent and sometimes poor specificity (29-81%) (Molloy et al., 2011). The authors suggest that misuse of the assessment measures and a sample of individuals with diverse other behavioral and developmental disorders may have contributed to a high number of false positives and inconsistent diagnostic determinations among ASD expert practitioners.

False diagnoses of ASD are common and problematic (Falkmer et al., 2013; Harris et al., 2019; Rosenberg et al., 2009; Taylor et al., 2016). With the use of training in and standardized adherence to EBA, false diagnoses of ASD may be less frequent. A number of studies indicate practitioner need for ASD-specific training (Brookman-Frazee et al., 2012; Rogers et al., 2016) due to increased rates of ASD clients and referrals (Corsello et al., 2013; Molloy et al., 2011; Rutherford et al., 2018; Ward, Sullivan, & Gilmore, 2016).

Use of the ADOS-2 in ASD evaluations is more accurate at correctly identifying ASD compared to screeners (Corsello et al., 2013). Therefore, the ADOS-2 is

recommended in the EBA of ASD (Esteves, 2018; Kamp-Becker et al., 2018; Zander et al., 2016; Zwaigenbaum & Penner, 2018). However, in some settings such as schools and community clinics, the ADOS-2 is currently not included in comprehensive ASD evaluations or is not administered as it was intended (Aiello et al., 2017; Allen et al., 2008; Benson et al., 2019; Dufek, 2013; Kamp-Becker et al., 2018; Molloy et al., 2011; Pearson, 2008; Rasmussen, 2009; Risi et al., 2006; Skellern et al., 2005; Stadnick et al., 2015; Taylor et al., 2016; Wiggins et al., 2006; Williams et al., 2009).

Although highly trained practitioners still experience uncertainty in ASD diagnosis (McDonnell et al., 2018), those with more experience agree with the scoring and interpretation of the ADOS-2 in ASD evaluations compared to less experienced practitioners (Kamp-Becker et al., 2018). Therefore, those involved in ASD evaluations should be extensively trained on the ADOS-2 (Dufek, 2013; McPherson, 2018; Stichter et al., 2016; Zuckerman et al., 2016). Further examination into the training and use of the ADOS-2 in schools and other community clinic settings is needed to aid in the increased accuracy of ASD classification and diagnosis.

In terms of adherence to standardized administration, research is limited (Dufek, 2013). In observing inter-rater reliability in scores among evaluators, researchers either do not comment on the quality of administration of each ADOS-2 activity (Corsello et al., 2013; Duvokot et al., 2015; Mazefsky & Oswald, 2006; Stadnick et al., 2015; Zander et al., 2016) or some activities are omitted (Dufek, 2013). Also, deviations from standardized administration of the ADOS-2 has shown to result in score variability among raters (Kamp-Becker et al., 2018; Molloy et al., 2011). Because scoring the ADOS-2 is difficult (Bitsika, 2008; Esteves, 2018; Zwaigenbaum & Penner, 2018) and

has proven variable agreement among practitioners evaluating for ASD, adhering to standardized administration is essential. Further research is needed to explore the use of the ADOS-2 within community settings as well as the adherence to standardized administration of each ADOS-2 activity.

Findings indicate that school psychologists who received brief training on the ADOS-2 omitted some of the items that they previously struggled to meet high administration agreement with during their more recent evaluations (Dufek, 2013). Because those in the school setting are least likely to be formally trained on the ADOS-2 (Akshoomoff et al., 2006; Pearson, 2008), these practitioners may be more likely to omit items during ADOS-2 administration compared to those with more training.

In examining perceptions of the ADOS-2 among its users, it was noted that practitioners believed being familiar with the ADOS-2 helped them reach ASD diagnostic decisions even if they did not actually administer it (Rutherford, McKenzie, Forsyth, et al., 2016). They also felt that their clinical judgement was more beneficial when evaluating for ASD compared to standardized assessment measures (Rutherford, McKenzie, Forsyth, et al., 2016). Practitioners working in ASD specialty clinics are more likely to be extensively trained in ASD and on the ADOS-2 (Molloy et al., 2011). In a reported instance of a high number of false positive ASD diagnoses among expert practitioners, researchers suggest misuse of the assessment measures and a sample of individuals with diverse other behavioral and developmental disorders as the contributor. Those working in ASD specialty clinics may omit more items from the ADOS-2 or not administer it at all due to their extensive knowledge of what the ADOS-2 measures or because their referrals are likely to be straightforward ASD cases. Additionally, those

working in non-ASD specialty clinics typically have referrals for ASD evaluations that may be more complex (Molloy et al., 2011; Montes & Halterman, 2006). Because these practitioners are likely more trained on the ADOS-2 compared to school-based practitioners (Akshoomoff et al., 2006), and their referrals may not be as straightforward as those received in a clinic specializing in ASD, these practitioners may be least likely to omit items on the ADOS-2.

## **CHAPTER III**

### **METHOD**

The purpose of this study was to examine ADOS-2 use and standardized administration across various settings using a between-participants, correlational design.

#### **Participants**

The target population of this study included school-based practitioners and practitioners working in non-ASD specialty and ASD specialty clinics and who are actively involved in providing ASD identification or diagnoses within their settings. School-based participants were recruited from states representing differing geographic areas (e.g., West, South, North-east, Mid-west) of the United States. School districts in California and Colorado represented the West, school districts in Texas and Florida represented the South, school districts in New York and Pennsylvania represented the North-East, and school districts in Missouri and Minnesota represented the Mid-West. Pseudo-random sampling was utilized by Googling school districts in each of those states and choosing every five or so district websites to find contact information for school psychologists, educational diagnosticians, licensed specialists in school psychology, and special education coordinators and directors (as indicated on district websites).

These individuals were emailed a copy of the recruitment letter with a link to the survey. If they agreed to participate, these individuals were asked to forward the hyperlink to school-based practitioners who were involved in ASD assessment to obtain a broader sample of other school practitioners.

Clinic participants from non-specialized or general assessment clinics were recruited from the website [autismspeaks.org](http://autismspeaks.org) based on their recommendation for clinics that provide ASD evaluations in Texas, Florida, New York, Pennsylvania, Missouri, and Minnesota (Autism Speaks). The identified clinics in each specified state were contacted and emailed a link to the survey. They were also asked to forward the recruitment email to clinic staff to encourage participation in the study. [Autismspeaks.org](http://Autismspeaks.org) also provides recommendations for “Specialized Autism Centers” by state (Autism Speaks). The specialty clinics from the same states were also contacted and asked to forward the email to staff to participate in the study. Additionally, individuals identified through snow-ball sampling and target participants known to the researcher were also invited to participate, even if they were not located in one of the specified states. Therefore, a broad sample of school psychologists, school-based practitioners, community practitioners, and interns currently involved in ASD evaluations had the opportunity to participate in the study.

Participants were sent a recruitment email with a hyperlink to the survey inquiring about their demographics, work setting, ASD assessment practices, highest degree level, and training specific to the ADOS-2. Exclusion criteria included those that did not participate in ASD evaluations and graduate students not participating in an internship placement (e.g., practicum students). There were no incentives provided for participation.

A power analysis for a one-way analysis of variance (ANOVA) using three predictors indicated the need for a sample size of 159 as necessary to detect medium effect size (Cohen, 2013). The current study resulted in 268 participants; thus, a



sufficient sample size was obtained to analyze the primary research questions utilizing a one-way ANOVA.

Table 1

*Sample Demographics by Research Question*

	Demographic Sample		Q2 Sample		Q3 and Q4 Sample	
	n	%	n	%	n	%
	268		223		211	
Gender						
Female	231	86.6	191	85.6	185	87.6
Male	34	12.7	24	10.7	24	11.3
Prefer not to answer	2	.7	1	.4	1	.4
Race/Ethnicity						
Asian	4	1.5	3	1.3	3	1.4
Caucasian, not Latino	232	86.6	186	83.4	180	85.3
Hispanic or Latino	17	6.3	15	6.7	15	7.1
Black or African American	6	2.2	5	2.2	5	2.3
Native Hawaiian or other Pacific Islander	1	.4	1	.4	1	.4
Other	8	3.0	6	2.6	6	2.8
Position						
Clinical Psychologist	72	26.9	68	30.4	66	31.2
School Psychologist	102	38.1	82	36.7	77	36.4
Psychologist-Research	3	1.1	3	1.3	2	.9
Speech and Language Pathologist	29	10.8	18	8.0	17	8.0
Social Worker	5	1.9	4	1.7	3	1.4
Post-Doc	10	3.7	10	4.4	10	4.7
Graduate Student Intern	4	1.5	4	1.7	4	1.8
Post-Bachelor's degree Research Assistant	1	.4	1	.4	1	.4
Other	42	15.7	33	14.7	31	14.6
Degree Level						
Bachelor's Degree	6	2.2	4	1.7	4	1.8
Master's Degree	97	36.2	70	31.3	69	32.7
Ph.D.	90	33.6	81	36.3	77	36.4
Ed.D.	7	2.6	5	2.2	5	2.3
Psy.D.	25	9.3	20	8.9	20	9.4
Other	43	16.0	36	16.1	35	16.5
Region						
Northeast (ME, NH, VT, MA, RI, CT, NY, PA, NJ)	41	15.3	23	10.3	22	10.4
Midwest (WI, MI, IL, IN, OH, ND, SD, NE, KS, MN, IA, MO)	25	9.3	24	10.7	23	10.9
South (DE, MD, DC, VA, WV, NC, SC, GA, FL, KY, TN, MS, AL, OK, TX, AR, LA)	99	36.9	82	36.7	80	37.9
West (ID, MT, WY, NV, UT, CO, AZ, NM, AK, WA, OR, CA, HI)	103	38.4	87	39.0	85	40.2

## Demographic Characteristics

Demographics of the sample were analyzed using descriptive statistics. Variables included: race/ethnicity, gender, highest level of education, current position, geographic region of their work setting, assessment tools utilized in ASD evaluations, training in ASD evaluation, module of the ADOS-2 most often used, and status of having trained someone else on the ADOS-2.

**Profession.** The sample consisted of 102 school psychologists (38.06% of the sample), 72 clinical psychologists (26.87% of the sample), and 29 (10.82%) speech-language pathologists. Forty-two (15.67%) participants indicated “other” as their position with the most indicated positions being as an educational diagnostician or licensed specialist in school psychology.

**Race/Ethnicity.** The majority of participants ( $n = 232$ ; 86.67%) identified as Caucasian, non-Latinx. A very small percentage of the sample identified as non-majority with 17 (6.34%) participants identifying as Latinx, 8 (2.99%) chose “Other” as their race/ethnicity, 6 (2.24%) identified as Black or African American, 4 (1.49%) as Asian, and 1 (0.37%) participant identified as Native Hawaiian or other Pacific Islander. No participants identified as American Indian or Alaska Native which was not unexpected given the very small number of practitioners who identify as Native American.

**Gender.** The majority of participants ( $n = 232$ ; 86.57%) identified their gender as female, 34 (12.69%) participants chose male as their gender, and two (0.75%) participants chose the option “Prefer not to answer.”

**Degree level.** The majority of participants ( $n = 122$ ; 45.52%) obtained doctoral degrees. Ninety-seven (36.19%) indicated their highest degree level to be a master’s

degree. Six (2.24%) participants attained a bachelor's degree, and 43 (16.04%) indicated "other" as their highest degree level with most indicating their degrees as education specialists (Ed.S.) and specialists in school psychology (SSP).

**Geographic Region.** The majority of participants ( $n = 103$ ; 38.43%) indicated that they currently work in the West region of the United States. Other participants ( $n = 99$ ; 36.94%) work in the South region, 41 (15.3%) work in the Northeast region, and 25 (9.33%) work in the Midwest region.

### **Instrumentation**

Variables were measured using the self-report Modified Autism Diagnostic and Assessment Services Project survey (Appendix B). Nine items were derived from the Autism Diagnostic and Assessment Services Project (ADAPT) (Akshoomoff et al., 2006) (see Appendix D for the ADAPT survey). Questions included demographic information such as participant's gender, race/ethnicity, highest degree level, position, if they received training in working with those with ASD and by what means, frequency ("never", "sometimes", "most of the time", or "always) of use of assessments in ASD evaluations, if they received clinical training or reached research reliability on the ADOS-2, and if they have trained someone on the ADOS-2. Authors of the ADAPT survey granted permission of its modification and use via email in January 2019 (Appendix C).

Ten questions were added to the ADAPT survey that inquire about the setting in which participants spend most of their time evaluating for ASD (clinic, school, clinic specializing in ASD assessment, hospital clinic, university clinic, other), region of the United States where they currently work, how many clients come into their work setting

needing evaluation where there is a possibility of an ASD (0-25%, 25-50%, 50-75%, 75-100%), participant's ADOS-2 module most utilized (1-4), frequency of administration of each of the ADOS-2 activities per that module on a scale ranging from “never”, “sometimes”, “most of the time”, to “always”, and their most often reason for not “always” or “most of the time” administering that activity (client refusal, gathered information from a different item, time consuming, administration difficulty, lack of materials, it is an optional item [Module 4 only], inappropriate for client level of functioning, other). An exclusionary question, “do you participate in ASD evaluations in your current work setting” was also added. Additionally, the ADAPT survey was modified by changing questions regarding the ADOS to the updated ADOS-2 and updating the assessment measures list to the most recent versions of those assessments. It is estimated that the modified ADAPT survey takes five to ten minutes to complete.

### **Research Design**

To examine these variables, the current study utilized a between-participants, correlational design. The Modified ADAPT Survey was used to determine differences between type of setting, level of ADOS-2 training and use of the ADOS-2—expanding on administration completeness of each ADOS-2 activity.

Independent variables included the setting in which participants provided their ASD evaluations and level of training on ADOS-2 administration. Participants were asked to report the setting which they spend most of their time completing ASD evaluations (psychological evaluation clinic, school, clinic specializing in ASD

assessment, hospital clinic, university clinic, other). Settings were collapsed into three variables including school, non-ASD specialized and ASD-specialized.

Participants were asked how they received training on the ADOS-2 including taking a graduate course, attending seminars focused on the ADOS-2, practicum/field work/internship, watching ADOS-2 administration videos, completing ADOS-Introductory/Clinic or Advanced/Research workshops, training by an ADOS-2 Independent Certified Trainer, training from a colleague (also asked to identify if the colleague was an ADOS-2 Independent Certified Trainer or if they were considered research reliable), and whether or not they received a certificate as a result of their training. Those who attended the ADOS-2 Advanced/Research training workshop were asked if they reached research reliability. These variables were collapsed into three categories of level of training including research trained, clinically trained, and informally trained.

Dependent variables included use of the ADOS-2 (as indicated by a yes or no question on the Modified ADAPT Survey), ADOS-2 administration completeness (as indicated by a completeness score derived from the number of activities “never”, “sometimes”, “most of the time”, or “always” administered per module, and level of training on the ADOS-2).

Participants were asked if they use the ADOS-2 in their ASD evaluations. If they do not, they were directed to question number 15 asking if they had ever trained someone on the ADOS-2. Participants were asked the degree to which they use the ADOS-2 in their ASD evaluations as well as the frequency of use of other assessment measures. To inquire about ADOS-2 administration practices, participants were told for the following

questions to consider their last few ADOS-2 administrations that reflect their typical administration process. Participants were then asked which module of the ADOS-2 they most often administer. Following this question, participants were electronically directed to their chosen module and asked the degree to which they administer each activity on the ADOS-2 module they chose using the same scale. If participants answered “never” or “sometimes”, they were then asked the most often reason for not always administering this item.

### **Procedures**

Prior to data collection, the study was approved by the University of Northern Colorado’s Institutional Review Board (see Appendix A). Then, school-based practitioners as indicated by district websites, community practitioners as indicated by autismspeaks.org, and a selection of individuals known by the researcher to conduct ASD assessments or possibly know others who do were contacted directly. After agreeing to participate, they were directed to the modified version of the ADAPT survey. Participants were asked to recruit other volunteer practitioners involved in ASD assessments by forwarding the recruitment email. Samples were directly sent the survey which included the consent via email.

Qualtrics was used as the platform for delivering the survey. The link to the consent form and survey informed participants that the study was about use of and training in the ADOS-2 across settings for comprehensive ASD evaluations. It indicated that participation is confidential, no identifying information would be collected, and those completing the survey have the option to participate in a drawing for a \$25 Amazon gift card. Those who wished to participate were able to click on an internet hyperlink which

routed them to the study on the Qualtrics website. Informed consent was provided electronically by checking a box indicating understanding of consent and agreement to participate in the study. If participants wished to enter the drawing, they followed a link provided at the end of the survey to collect contact information separately from survey responses.

### **Data Analysis**

After data collection, the set of responses were downloaded from the Qualtrics website. Analysis of survey data were conducted using descriptive statistics, comparisons of means, frequency reports, Chi-Square test of independence, one-way ANOVAs, nonparametric tests, Pearson correlations, and Tukey's adjustments. All inferential analyses were conducted at a .05 significance level. Effect sizes were calculated using Cohen's *d*. To ensure that appropriate assumptions were met, multiple resources were reviewed (Becker, 2008; McHugh, 2013). Analysis procedures were conducted using the Statistical Package for the Social Sciences, 25 Version (SPSS). Results are discussed in Chapter IV.

## CHAPTER IV

### RESULTS

This chapter discusses the descriptive statistics of the study sample and the results regarding predictive characteristics of use of the ADOS-2 among individuals evaluating for ASD. Based on the primary research questions, use of the ADOS-2 and ADOS-2 administration practices are discussed as it pertains to one of three settings in which participants conduct ASD evaluations (non-ASD specialized, school, and ASD specialized clinics) and their level of training on the ADOS-2 (informal, clinical, or research). As previously noted, participants were grouped into one of the three work settings based on where they conduct their ASD evaluations. Participants were grouped into one of the three ADOS-2 training levels based on their reported training experiences with this measure.

#### Sample

The target population for the current study was school- and clinic-based practitioners involved in ASD assessment. A total of 352 participants agreed to the informed consent to participate in the study. However, only 344 participants began taking the Modified Adapt Survey through the Qualtrics website. Some participants ( $n = 40$ ) indicated they did not conduct ASD evaluations in their current work setting and 16 of the participants indicated they were graduate students not on internship placement—all of which were excluded from the study. A total of 268 participants completed the survey. Incomplete surveys were excluded using listwise deletion. This method was chosen based



on the limitations of the analysis software utilized and because the sample size exceeded the minimum  $N$  needed to detect a medium effect as indicated by G\*Power analysis.

Demographic information is reported on the 268 participants who completed the survey and who met inclusion criteria for the study (Table 1).

### **Demographic Characteristics**

**Work setting.** The majority of participants ( $n = 150$ ) indicated that they currently practice ASD evaluations in a school setting. Six participants who indicated “other” on the question regarding their work setting were included in the school setting variable based on their written-in answers (i.e., “child find for a school district,” “private school,” “agency that pushes-in schools,” “teaching,” “autism teacher specialist,” and “district level autism specialist”). Thus, individuals working in the school setting made up 58.21% of the sample ( $n = 156$ ).

Thirty-five participants indicated that they worked in a clinic specializing in ASD assessment, however, those who indicated “other,” “clinic,” “hospital clinic,” or “university clinic” who also indicated that 75-100% of referrals were for suspected ASD were included in the ASD specializing clinic work setting variable. These individuals were included within the ASD specializing sample ( $n = 61$ ; 22.76%). Although these participants did not consider themselves as working in a clinic specializing in ASD, the majority of the clients they reported seeing were suspected to have an ASD. For the purpose of this study, the remaining participants ( $n = 50$ ; 18.66%) were identified as the non-specialty clinic group as they identified themselves as working in a clinic setting (e.g., university, hospital), but evaluated for ASD less than 75% of the time.

**Level of Training.** As there were a differing number of participants who provided information regarding the setting in which they work and training level, the sample size for level of training is 223. For the purpose of this study and to create more balanced sample sizes, those who attended the Advanced/Research Training Workshop or who indicated that they met research reliability criteria with an ADOS-2 Certified Independent Trainer are considered in the research trained variable ( $n = 110$ ; 49.33% of the sample). Those trained by an ADOS-2 Certified Independent Trainer, those trained by a colleague and indicated that their colleague was a Certified Independent ADOS-2 Trainer or was considered “research reliable” on the ADOS-2, and those indicating they attended the ADOS-2 Introductory/Clinical Training Research Workshop are grouped into the clinically trained variable ( $n = 58$ ; 26.01% of the sample). Those not meeting the above criteria (i.e., only trained on the ADOS-2 by attending seminars, learning about the ADOS-2 in graduate coursework, trained through practicum/fieldwork/internship, or trained by a colleague who was not considered an ADOS-2 Independent Certified Trainer or research reliable) are considered informally trained ( $n = 49$ ; 21.97% of the sample).

### **Statistical Analysis of Research Questions**

Frequency analyses, chi-square tests of independence, one-way ANOVA, and nonparametric tests were used to answer the research questions. Assumptions for each statistical analysis and the results are discussed with respect to each question.

### **Assumptions of Research Questions 1 and 2**

An assumption of the chi-square is that there are two categorical variables to be analyzed (McHugh, 2013). As research question 1 utilizes the categorical variables ADOS-2 use (yes or no) and work setting, and question 2 utilizes the categorical

variables work setting and training level, this assumption was met. Another assumption is that the categories must be mutually exclusive, and each subject can only contribute to one cell (McHugh, 2013). Because participants were only categorized into one of the aforementioned groups (e.g., one participant cannot be categorized as working in the school as well as in the ASD specialty clinic setting) and data on participants were taken only once (e.g., one participant cannot be categorized as working in the school setting for one analysis and within the ASD specialty setting for another analysis), these assumptions were also met. For chi-square analysis, it is assumed that data in cells are frequencies or counts (McHugh, 2013). This assumption was met because the data are not described as percentages. Lastly, it is assumed that the value of 80% of the cells be five or more (McHugh, 2013). This assumption was tested by reviewing the crosstabulation table when running a chi-square test for independence and met for both questions 1 and 2.

### **Research Question 1**

Q1. Does use of the ADOS-2 differ across different treatment settings?

For this question, a total of 268 participants were utilized. Demographic information on this sample is included in Table 1.

It was hypothesized that school-based practitioners would be least likely to use the ADOS-2 for ASD evaluations compared to clinic-based practitioners (i.e., non-ASD or ASD specialty clinics). Also hypothesized was that more practitioners working in non-ASD specializing clinics use the ADOS-2 than those working in school and ASD specialty settings.

A chi-square test of independence analysis revealed that use of the ADOS-2 significantly differs based on the setting in which the practitioner works,  $X^2(2, N = 268)$

= 21.162,  $p < .01$  (Table 2). The effect size for this finding using Cramer's V was .281 which is considered small (Cohen, 2013).

Only 51(19.03%) participants indicated that they did not use the ADOS-2 for their comprehensive ASD evaluations. The majority ( $n = 44$ ; 86.27%) of those participants were classified as working in a school setting, five worked within a non-ASD specialty clinic, (9.8%) and two (3.92%) worked in a clinic specializing in the assessment of individuals with ASD.

Table 2

*Autism Diagnostic Observation Schedule, Second Edition use by Setting*

ADOS-2 use	Work Setting (%)			Total
	School	Non-ASD Specialty	ASD Specialty	
Yes	112 (71.79)	46 (90.2)	59 (96.72)	217 (80.97)
No	44 (28.21)	5 (9.8)	2 (3.28)	51 (19.03)
Total	156 (58.21)	51(19.03)	61 (22.76)	268

$X^2(2, N = 268) = 21.162, p < .01$

### Research Question 2

Q2. Does ADOS-2 training level differ based on practitioner setting?

Fifty-one participants indicated that they did not use the ADOS-2 for their comprehensive ASD evaluations. Therefore, these participants were not asked questions regarding their ADOS-2 training experiences. The remaining participants ( $n = 223$ ) were included in the analysis of question 2.

For training on the ADOS-2 specifically, participants were asked how they were trained and could indicate multiple experiences. The majority of participants ( $n = 152$ ; 68.16%) received training through videotapes of the ADOS-2, including those that were part of a training or from WPS publishers. Other participants ( $n = 120$ ; 53.81%) were trained via an ADOS-2 Certified Independent Trainer, 111 (49.78%) received training through practicum/fieldwork/internship, 97 (43.5%) were trained by a colleague, 95 (42.6%) attended the ADOS-2 Advanced/Research Training Workshop, 83 (37.22%) attended ADOS-2 focused seminars, 54 (24.22%) attended the ADOS-2 Introductory/Clinical Training Workshop, and 36 (16.14%) learned about the ADOS-2 in graduate classes.

It was hypothesized that school-based practitioners were more likely to be informally trained on the ADOS-2 compared to practitioners in other settings. Specifically, practitioners working in non-ASD specialized clinics would most likely be clinically trained on the ADOS-2, and practitioners working in ASD-specialized clinics are more likely to be research trained on the ADOS-2. Contrary to the first hypothesis, of those in the school setting ( $n = 118$ ), the majority ( $n = 41$ ; 34.75%) were identified as being research trained, 39 (33.05%) as being clinically trained, and 38 (32.2%) as being informally trained. Those working in non-ASD specializing clinics ( $n = 46$ ) were also more likely to be identified as research trained ( $n = 23$ ; 50%) compared to clinically ( $n = 16$ ; 34.78%) or informally ( $n = 7$ ; 15.22%) trained. As hypothesized, those working in ASD specialty clinics ( $n = 59$ ) were more likely to be research trained ( $n = 48$ ; 81.36%) compared to clinically ( $n = 5$ ; 8.47%) or informally ( $n = 6$ ; 10.17%) trained.

A chi-square test of independence analysis revealed that level of ADOS-2 training significantly differs based on the setting in which the practitioner works,  $X^2(4, N = 223) = 37.0, p < .01$  (Table 3). The effect size for this finding using Cramer's V was .288 which is considered small (Cohen, 2013).

Table 3

*Autism Diagnostic Observation Schedule, Second Edition Training Level by Setting*

Level of Training	Work Setting (%)			Total
	School	Non-ASD Specialty	ASD Specialty	
Informal	38 (32.2)	7 (15.22)	6 (10.17)	51 (22.87)
Clinical	39 (33.05)	16 (34.78)	5 (8.47)	60 (26.91)
Research	41 (34.75)	23 (50)	48 (81.36)	112 (50.22)
Total	118 (52.91)	46 (20.63)	59 (26.46)	223

$X^2(4, N = 223) = 37.0, p < .01$

### **Assumptions of Research Questions 3 and 4**

Questions 3 and 4 were answered using one-way ANOVA. Assumptions of a one-way ANOVA are that each sample is an independent random sample, the distribution of responses follow a normal distribution, and population variances are equal. Assumptions were analyzed using probability plots, histograms, and a test for homogeneity of variance. Results from the test of homogeneity of variance (Levene statistic) indicated there is no evidence that the data have unequal variances. The observed cumulative probability plot (P-P plot) of the regression residuals revealed an unequal spread—

indicating that the data were not normally distributed, thus failing the normality assumption. This may be because the majority of the sample had assessment completeness percentages close to 100. To account for this, a nonparametric test was utilized in the analysis. By using a Kruskal-Wallis H test, there was no assumption that data were normally distributed (MacFarland & Yates, 2016). Therefore, the Kruskal-Wallis H test was used to analyze relationships for research questions 3 and 4 by comparing mean ranks.

### **Research Question 3**

Q3. Does ADOS-2 administration completeness differ based on treatment setting?

A total of 211 participants provided information regarding their likelihood of administering various activities on their chosen module of the ADOS-2. Consequently, for research questions 3 and 4, a sample size of 211 was used. The majority of participants ( $n = 113$ ; 53.55%) reported that they most often administer ADOS-2 Module 3. The remaining participants most often administer Module 2 ( $n = 51$ ; 24.17%), Module 1 ( $n = 41$ ; 19.43%), and Module 4 ( $n = 10$ ; 4.74%).

Overall, participant's ADOS-2 administration completeness percentages were high. School-based participants had an average ADOS-2 administration completeness percentage of 95.47%, participants working in a non-ASD specialty clinic had an average score of 95.93%, and participants who worked in an ASD specialty clinic had an average completeness score of 96.78%.

Responses on likeliness of administering each activity per module were rated and each participant was given an administration completeness percentage based on the total number of activities required per the ADOS-2 module and the likeliness that the

participant administered that activity. It was hypothesized that school-based practitioners would have lower ADOS-2 administration completeness scores compared to those working in the non-ASD and ASD specializing clinic settings. Also hypothesized was that those working in non-ASD specialty clinics would have greater ADOS-2 administration completeness percentages compared to practitioners evaluating for ASD in school and non-ASD specialty clinics.

Research question 3 was analyzed using a one-way ANOVA, followed by the Kruskal-Wallis H test due to the failed normality assumption of the data. Administration completeness percentages were subjected to a one-way ANOVA having three levels of treatment settings (school, non-ASD specialty clinic, and ASD specializing clinic) to compare the effect of the setting in which the administrator conducts the evaluation on standardized ADOS-2 administration. Results from the analysis indicate no significant effect at the 0.5 significance level for the three conditions  $F(2, 208) = .405, p = .668$  (Table 4). There was not a significant effect of treatment setting on participant administration completeness percentage.

Table 4

*Mean Administration Completeness Percentages by Setting*

Setting	<i>N</i>	Mean	<i>SD</i>
School	110	95.47	9.66
Non-ASD	43	95.93	8.54
ASD	58	96.78	7.87

*Note.* *SD* = Standard Deviation



To account for the non-normality of the sample, a nonparametric analysis (Kruskal-Wallis H test) was used to compare the same effect (setting of ADOS-2 evaluation on standardized administration of the ADOS-2). Results from the analysis indicate no significant effect at the 0.5 significant level of school, non-ASD specializing, and ASD specializing clinic settings on administration completeness percentage scores  $X^2(2) = 1.8, p = .406$ .

#### **Research Question 4**

Q4. Does ADOS-2 administration completeness differ based on practitioner training on the ADOS-2?

It was hypothesized that evaluators informally trained on the ADOS-2 would have lower ADOS-2 administration completeness percentages compared to clinic or research trained evaluators. Also hypothesized was that participants who are clinically trained on the ADOS-2 would have the highest ADOS-2 administration completeness scores compared to those grouped in the informal and research trained categories.

Question 4 was analyzed using a one-way ANOVA, followed by the Kruskal-Wallis H test due to the failed normality assumption of the data. Results from the test of homogeneity of variance (Levene statistic) indicate there is evidence that the data also have unequal variances. Administration completeness percentages were subjected to a one-way ANOVA having three levels of training (informal, clinically trained, and research trained) to compare the effect of practitioner level of ADOS-2 training on standardized ADOS-2 administration. Results from the analysis indicate a significant effect at the 0.5 significance level for the three conditions  $F(2, 208) = 3.67, p = .027$ . Administration completeness percentages are significantly different across the three levels of training.

Results of the post hoc comparisons using Tukey HSD test (Table 5) indicate the mean administration completeness percentage for those in the informally trained group ( $M = 93.01$ ,  $SD = 13.76$ ) is significantly different than the mean administration completeness percentage of those in the clinically trained group ( $M = 97.42$ ,  $SD = 6.19$ ). The research group ( $M = 96.50$ ,  $SD = 6.93$ ) did not significantly differ from the clinically or informally trained groups. The Cohen's  $f$  is commonly used to determine effect size of ANOVA designs with two or more groups (Grove & CIPHER, 2016). Cohen's  $f$  was determined using G\*Power analysis. The reported effect size (.19) suggests that the effect size is small (Cohen, 2013). However, implications based on results of the one-way ANOVA are limited as the normality and equal variance assumptions were violated so results should be considered with caution.

Table 5

*Analysis of Variance Comparisons of Administration Percentages on Training Level*

Training Level	N	Mean	SD	Tukey's HSD Comparisons		
				Informal	Clinic	Research
Informal	49	93.01	12.76			.059
Clinic	54	97.42	6.19	.032*		
Research	108	96.50	6.93		.806	

Note. SD = Standard Deviation

\* $p < 0.5$

To account for the non-normality of the sample, a nonparametric analysis (Kruskal-Wallis H test) was used to compare the same effect (training level of the

evaluator on standardized administration of the ADOS-2). Results from the analysis indicate no significant effect at the 0.5 significant level of participant's level of ADOS-2 training on administration completeness percentage  $X^2(2) = 1.36, p = .506$  (Table 6).

Table 6

*Kruskal-Wallis Comparisons of Administration Percentages of Three Training Levels*

Training	<i>N</i>	Mean Rank	Mean	<i>SD</i>	$X^2$	<i>p</i>
Informal	49	102.17				
Clinically	54	112.89	95.92	8.95	1.363	.506
Research	108	104.29				

When considering question 1, a significant difference in ADOS-2 use or nonuse based on practitioner work setting was found. Such that, including the ADOS-2 in comprehensive ASD evaluations significantly differed across treatment settings. Most of the participants who indicated they did not use the ADOS-2 for comprehensive ASD evaluations reported working in the school setting. This finding supported the hypothesis that school-based practitioners would be least likely to use the ADOS-2 compared to those working in non-ASD specializing and ASD specialty clinics.

There was a higher percentage of participants who work in an ASD specialty clinic that use the ADOS-2 compared to participants using the ADOS-2 in non-ASD specializing clinics. Thus, the hypothesis that more participants working in non-ASD specialty clinics use the ADOS-2 compared to those working in clinics specializing in ASD was not supported in the current study.

Results of question 2 indicate significant differences in the level of ADOS-2 training of practitioners and the setting in which they conduct their ASD evaluations. Based on the findings, commensurate with the hypothesis, there was a higher percentage of school-based practitioners who were informally trained on the ADOS-2 compared to participants working in ASD and non-ASD specializing clinics.

There was also a higher percentage of participants working in non-ASD specialty clinics compared to school and ASD specialty clinics that are clinically trained on the ADOS-2—which is in line with the author’s hypothesis that practitioners in non-ASD clinics are more likely to be clinically trained. Lastly, there was a higher percentage of participants considered research trained working in clinics specializing in ASD evaluation compared to those working in schools or non-ASD specializing clinics. This is commensurate with the hypothesis that those in schools and non-ASD specializing clinics are less likely to be researched trained compared to those who work in ASD specialty clinics.

Findings of question 3 did not suggest a significant effect of practitioner treatment setting on ADOS-2 administration completeness percentage scores. Such that, of those working in school, non-ASD specialty, and ASD specializing clinics, most participants scored high in their standardized administration of the ADOS-2 and no mean administration completeness percentage group score was significantly higher compared to mean scores in other setting groups. These findings go against the hypothesis that school-based practitioners would have lower ADOS-2 administration completeness percentages compared to those in other settings. Also not supported was the hypothesis that non-ASD specializing participants are more likely to adhere to ADOS-2

administration standardization (i.e., have a higher mean administration completeness percentage) compared to ASD specialty and school-based participants.

Findings regarding question 4 also did not indicate a significant effect of the level of participant's ADOS-2 training on their administration completeness percentage. Standardized administration of the ADOS-2 was not significantly impacted by the participant's level of ADOS-2 training. These findings disprove the hypothesis that evaluators who are informally trained on the ADOS-2 would have lower administration completeness percentages compared to those with higher levels of training (i.e., clinical and research). Also not supported in the findings is the hypothesis that participants who are clinically trained on the ADOS-2 would be the most likely to adhere to standardized administration of this measure compared to research or informally trained participants. The mean administration completeness percentage across training levels did not significantly differ.

Participants were asked the likelihood of giving each of the required activities per the ADOS-2 module in which they most often administer. Participants indicating "sometimes" or "never" administering various activities of their selected ADOS-2 module were then asked the most often reason for not administering this activity. Of the 40 participants who mostly administer Module 1, 75% ( $n = 30$ ) reported administering all activities thus were given an administration completeness percentage of 100. One participant reported "never" administering Birthday Party due to lack of materials. One other participant indicated they never administer Snack due to possible presence of food allergies.

For those using Module 2 ( $n = 50$ ), 30 (60%) completely administered the measure. Six participants indicated “sometimes” administering Conversation and Description of a picture. All of these participants chose “other” as their reason for not administering with one indicating “limited language” as the specific reason. Five participants sometimes administer Telling a Story from a Book. Only one of these identified the reason for not always administering which was that they gathered the information from a different item. Four participants indicated sometimes administering Snack as well as the Construction and Demonstration tasks. “Other” was the only reason given for both the Construction and Demonstration tasks. Two participants indicated they only “sometimes” administer Snack due to gathering information from a different item and two identified lack of materials as their reason.

Module 3 users ( $n = 110$ ) appear to have the most variability in their administration completeness. Most 75 (68.18%) received an administration completeness percentage of 100. Two participants indicated “never” administering the Cartoons task due to lack of time and client refusal. Five only “sometimes” administer with the majority ( $n = 4$ ; 80%) indicating they “Gathered information from a different item.” For the tasks: Description of a Picture, Telling a Story from a Book, Break, and Creating a Story, one participant indicated “never” administering with the most often reasons being that they gathered information from a different item and that the item was time consuming. The activities most often “sometimes” administered included Break (five) and Creating a Story (four).

Practitioners who mostly administer ADOS-2 Module 4 ( $n = 11$ ) are unique in that several of the activities are considered optional by the test creators. These activities

include Cartoons, Construction Task, Description of a Picture, Current Work or School, and Daily Living. Participants were still asked their likelihood of administering these activities; however, these activities were not included in their administration completeness percentage score. While only five (45.45%) received an administration completeness percentage of 100 for this module, the majority ( $n = 9$ ; 81.82%) received a percentage score of 90 or above. Of the required activities, the only activity wherein a participant ( $n = 1$ ) indicated “never” administering was Break—reason unknown. Five participants “sometimes” administer Break with the majority ( $n = 3$ ; 60%) indicating they gathered information from a different item.

Across modules, the activity wherein the most participants indicated “never” administering was Cartoons (four never administer). It should be noted that Cartoons is an optional item for participants who mostly administer ADOS-2 Module 4. Of the required activities, Break (required by Modules 3 and 4) was indicated as “never” being administered by the highest number of participants (two never administer). Across modules, although only included in Modules 3 and 4, the activity most often “sometimes” administered was also Break (ten sometimes administer).

Overall, participant’s most indicated reason for only “sometimes” or “never” administering an activity was that they gathered the information intended to be gathered by that activity from another activity included in the ADOS-2 module (39 indicated “Gathered information from a different item”).

### **Post Hoc Analysis**

Participants were asked what assessment measures they typically use for their comprehensive ASD evaluations, as it is recommended to include a variety of

instruments and information to inform diagnostic decisions. To evaluate differences of use in various test instruments across settings, chi square analysis was utilized for a post hoc examination. Results indicate that across settings, the majority of participants conduct a parent interview including the individual's developmental history, a cognitive measure, and review of records. However, when comparing more ASD specific measures, there were some significant differences across settings.

There was a significant difference in the use of teacher interviews and teacher questionnaires across settings. Within the school setting, 60% always administer a teacher interview. Within ASD specialty clinics, only 1.67% and 10.2% of non-ASD specializing practitioners indicated that they always interview teachers. Significantly more school-based practitioners indicated that they observe the individual in the home or school setting compared to the other settings. This is not surprising as the school-based evaluators may have easier access to the individual's teachers and classrooms. Use of the ADI-R was also significantly impacted by setting. Only 2.7% of school-based evaluators indicated always administering the ADI-R, while 13.73% of non-specialty and 9.84% of those working in specialty clinics always do. Popular screening tools such as the Childhood Autism Rating Scale, Second Edition (CARS-2) (Schopler, Van Bourgondien, Wellman, & Love, 2010), Gilliam Autism Rating Scale, Second Edition (GARS-2) (Gilliam, 2006), M-CHAT, SCQ, and Autism Spectrum Rating Scale (ASRS) (Goldstein & Naglieri, 2009) also significantly differed across settings. Differences for the M-CHAT may be explained by the fact that school-based practitioners are not likely evaluating toddler age children. For the ASRS, 27.81% of school-based practitioners indicated always administering compared to 10% of both clinic setting participants. Findings



suggest that depending on where the child is evaluated, there could be three different ways in which an ASD identification is made.

## **CHAPTER V**

### **DISCUSSION**

The current study expanded on literature surrounding use of the ADOS-2 in comprehensive ASD evaluations and the training received on this measure across differing treatment settings. This study is unique in that it is the first to explore standardized use of the ADOS-2 by required module activity. This standardization was then compared to evaluator characteristics. Additionally, reasons for not adhering to standardization administration were explored. This chapter includes a review of the current study as well as a review of the procedures and a discussion of the results and implications. Also discussed are the limitations of this study and implications for future research.

#### **Question 1**

Use of the ADOS-2 and treatment setting was measured using a modified version of the Autism Diagnostic and Assessment Services Project (ADAPT) Survey (Akshoomoff et al., 2006) created by the author. A chi-square analysis revealed a significant difference in ADOS-2 use across treatment settings, such that those working in the school setting use the ADOS-2 significantly less than those working in clinic settings.

Descriptive statistics indicate that of the 51 participants who do not use the ADOS-2 for comprehensive ASD evaluations, the majority ( $n = 44$ ; 86.27%) were identified as working in the school setting. This is a higher percentage of those not using

the ADOS-2 who work in non-ASD specialty ( $n = 5$ ; 9.8%) and ASD specializing ( $n = 2$ ; 3.92%) clinics. This finding is commensurate with previous literature (Williams et al., 2009) indicating that those working in schools are least likely to use the ADOS-2. Individuals working in school settings may be less likely to have the resources from their institutions to purchase the ADOS-2 or fund the two-day ADOS-2 training workshop. The workshop costs \$500 per person (Weill Cornell Medicine, 2019) and ADOS-2 materials cost approximately \$2,200 (Dufek, 2013). Still, a large percentage (71.79%) of school-based practitioners within this study indicated using the ADOS-2 for their evaluations.

These findings are important when considering the ability of school-based practitioners to accurately identify ASD within their settings. As previously noted, while ASD specific screening tools typically utilized in school settings over the ADOS-2 (Wiggins et al., 2006; Wilkinson, 2010; Williams et al., 2009) may, in some cases, accurately identify ASD symptomatology in individuals, a standardized observation tool such as the ADOS-2 is highly suggested (Esteves, 2018; Kamp-Becker et al., 2018; Zander, 2015; Zwaigenbaum & Penner, 2018) and better at distinguishing a diagnosis of ASD versus non-ASD compared to such screeners (Corsello et al., 2013; Duvokot et al., 2015; Taylor et al., 2014). School based practitioners are knowledgeable regarding ASD symptomatology (Rasmussen, 2009; Small, 2012) and may be the first to encounter individuals who may need a comprehensive ASD evaluation (Aiello et al., 2017; Brookman-Frazer et al., 2012; Dufek, 2013; Harris, McClain, Schwartz, & Haverkamp, 2020; Kamp-Becker et al., 2018; Pinborough-Zimmerman et al., 2012; Rubenstein et al., 2018; Rutherford, McKenzie, Forsyth, et al., 2016; Small, 2012; Stichter et al., 2016). As

such, it is important that they have the resources to accurately evaluate for ASD using the ADOS-2. However, as demonstrated in previous literature and this study's findings, they are not as likely to use the ADOS-2 compared to those in other settings.

Of participants who use the ADOS-2, there was a higher percentage of those working in ASD specialty clinics (96.72%) compared to those working in schools (71.79%) or non-ASD specializing clinics (90.2%). Previous literature suggests that clinicians may use what they know regarding the ADOS-2 during their ASD evaluations even when not using the measure (Rutherford, McKenzie, McClure, et al., 2016) and evaluations presented to clinics specializing in ASD may be more straightforward compared to evaluations taking place in general clinics (Molloy et al., 2011; Montes & Halterman, 2006). Thus, it was hypothesized that more practitioners in non-ASD specializing clinics would use the ADOS-2 due to less experience with ASD and more difficult cases. Findings were not commensurate with this hypothesis.

## **Question 2**

When examining ADOS-2 level of training and practitioner work setting, there was a significant difference found in training level on the ADOS-2 across the three identified treatment settings. However, this finding effect was small.

Overall, the findings that school-based practitioners are more likely to be informally trained compared to clinic practitioners, those in non-ASD specialty clinics are more likely to be clinically trained compared to other treatment settings, and those in ASD specializing clinics are more likely to be research trained compared to those working in schools or non-ASD specialty clinics are commensurate with hypotheses

generated from this question. In the current sample, a higher percentage of school-based practitioners are informally trained on the ADOS-2 (32.2%) compared to informally trained practitioners in non-ASD (15.21%) and ASD specializing (10.17%) clinics. A higher percentage of those clinically trained on the ADOS-2 work in a non-ASD specialty clinic (34.78%) compared to school (33.05%) and ASD specialty (8.47%) settings. Lastly, there was a higher percentage of participants who received research training on the ADOS-2 working in ASD specialty clinics (81.36%) compared to school (34.75%) and non-ASD specialty clinics (50%).

The findings support previous literature suggesting that community-based practitioners may not be administering the ADOS-2 with the intention of conducting research (Hausman-Kedem et al., 2018; Molloy et al., 2011; Zander et al., 2016) thus are not research trained. Similarly, school-based practitioners may lack the time and resources to seek out additional training (Pearson, 2008; Rasmussen, 2009) and are more likely informally trained on the ADOS-2 (Akshoomoff et al., 2006) compared to those in other settings.

Although results were significant, they should be carefully considered as participants in the study likely have a heightened interest in the ADOS-2 and might be more likely to seek out more advanced training. Within all settings, there was a higher number of participants who were research trained compared to clinically or informally trained. This may be because this study's sample may have also had a larger than expected interest in ASD and the ADOS-2. Participants were made aware that this study would examine ADOS-2 use thus, participants might simply have more interest in expanding their knowledgeability on the ADOS-2 and seek out higher training.

Still, the finding that school-based practitioners in this sample had a higher percentage of participants informally trained on the ADOS-2 compared to other settings is important to consider. This is commensurate with previous literature suggesting some school-based practitioners (Pearson, 2008) and other community-based clinicians (Molloy et al., 2011; Wiggins et al., 2006) are not trained on the ADOS-2 and do not feel confident in their abilities to evaluate for ASD (Brookman-Frazee et al., 2012). More informal means of training may impact the ability of evaluators to adequately administer the ADOS-2, further limiting their ability to correctly identify ASD, and ultimately contributing to a delay in appropriate services for the individuals they serve.

Additionally, findings from this study further indicate a large variation in training experiences among practitioners who are expected to evaluate for ASD. It may be important for examiners to have similar training in the evaluation of ASD and use of the ADOS-2 so that identification is more accurate and consistent across treatment settings to reduce inaccurate diagnosis.

Overall, results from questions 1 and 2 indicate that school-based practitioners use the ADOS-2 less and have the least amount of training on the measure. Although not examined for this study, there may be barriers to ADOS-2 use and training experienced by those working in school settings. One barrier suggested by researchers is the lack of focus on ASD assessment in articles published in school psychology journals (McClain, Otero, Haverkamp, & Molsberry, 2018). In reviewing ten school psychology journal's publications from 2007 to 2017, researchers identified 117 articles that broadly focused on ASD which was only 3% of the total number of articles. Less than 30% of those focused on ASD evaluation specifically. As publications in such journals directly impact

practices of school-based evaluators as well as those who train them, it may be contributing to the gap between use of empirically supported measurement tools in research and their use in schools.

### **Question 3**

Effect of practitioner work setting on ADOS-2 administration completeness percentage scores indicated no significant relationship. For this study practitioners in all settings self-reported very high percentages of administration standardization when using the ADOS-2. It was hypothesized that school-based practitioners would have a lower administration completeness percentages compared to the other treatment settings and those working in non-ASD specialty clinics would have the highest administration completeness percentage across treatment settings. Although not significantly different, administration complete percentages indicate higher scores for participants working in ASD specialty clinics (96.78%) compared to those working in school (95.47%) and non-ASD specialty clinics (95.93%). Overall, regardless of setting, participants for this study report administering the ADOS-2 completely.

### **Question 4**

Preliminary analysis using one-way ANOVA to determine the effect of participant level of training on the ADOS-2 on ADOS-2 standardized administration indicated a significant difference between the mean administration completeness percentages of those informally trained (93.01%) and those considered clinically trained (97.42%). Consistent with the hypothesis that those informally trained on the ADOS-2 will have a lower administration completeness percentage compared to those with higher

levels of training, mean percentages of informally trained participants (93.01%) in this study were the lowest compared to clinically trained (97.42%) and research trained (96.50%) trained participants. Additionally, these findings are commensurate with the hypothesis that clinically trained participants will have the highest administration completeness percentage compared to the other levels of training.

These findings however should be considered with caution, as two assumptions of one-way ANOVA (normality and equal variances) were failed for this sample. Further, nonparametric analysis using the Kruskal Wallis H test indicated no significant differences in administration completeness between groups. As mentioned previously, all participants rated themselves high on their standardized administration of the ADOS-2. This may have impacted the findings across the two groups examined (work setting and ADOS-2 level of training).

In terms of relating findings from questions 3 and 4 to previous literature, this study is the first to examine the standardized use of the ADOS-2 across treatment settings and level of training received on the measure. While researchers have reported instances of misuse (Allen et al., 2008; Kamp-Becker et al., 2018; Molloy et al., 2011; Risi et al., 2006) of the ADOS-2 (i.e. not adhering to the standardized administration intended by the publishers), relationships among practitioner characteristics (work setting and ADOS-2 training level) and the standardized administration of the ADOS-2 have not yet been explored. The finding that those informally trained had a lower mean administration completeness percentage compared to the mean administration completeness percentage of those with more advanced training may be important. Not adhering to the standardized administration of the ADOS-2 has yielded variability in diagnostic decision making



(Dufek, 2013; Kamp-Becker et al., 2018; Molloy et al., 2011; Risi et al., 2006). Thus, informal training and the possible, consequent nonadherence to standardization may contribute to inaccurate diagnosis of ASD. Because results from the ADOS-2 strongly influence diagnostic decisions (Esteves, 2018) and the majority of ADOS-2 administrations take place in community settings (Zander et al., 2016), practitioners within these settings should be highly trained on the standardized use of the ADOS-2.

No significant relationship was found between the setting in which the evaluator is conducting the ADOS-2 and their standardized administration of the measure. There is also not a significant relationship between ADOS-2 training and standardized administration. However, it should be recognized that an increased level of training may aid in the ability of practitioners to appropriately administer the ADOS-2. Future research should explore the types of ADOS-2 trainings that may be the most beneficial for practitioner's standardized use of the measure.

While there were no significant findings regarding administration completeness percentages of this study's participants, there *were* participants who indicated "never" and/or only "sometimes" administering various activities on the ADOS-2 which are meant to be utilized with each administration. Multiple reasons for not administering such activities were identified, including that the participants felt that they gathered the information intended to be gathered by the activity from a different activity, the client's level of functioning was not appropriate for the activity, lack of materials and time, administration difficulty, and client refusal. These findings, although not significantly related to practitioner work setting or level of training on the ADOS-2, have important implications.

For instance, it appears that some participants feel as though various required activities from the ADOS-2 are not feasible or necessary to administer during their ASD evaluations—even though scores on the measure should be derived based on the entire administration (Kamp-Becker et al., 2018). While “not appropriate for client level of functioning” may be an acceptable response for “never” and/or only “sometimes” administering an ADOS-2 activity due to the potential significant impact an ASD diagnosis may have on a client’s functioning; participants were asked to report their likeliness of administration per activity based on their last few evaluations using the ADOS-2. It may be that these participant’s last few evaluations required flexibility in standardized administration of the ADOS-2 due to significant client symptomatology. Alternatively, it may be that these participants feel as though some activities from the ADOS-2 are too difficult or too childish for the clients they evaluate for ASD. Further information regarding this response may be important for future studies and for ADOS-2 publishers.

When asked about their experience training other practitioners on use of the ADOS-2, 68 (32.23%) of the participants who had an ADOS-2 administration completeness score ( $n = 211$ ) indicated that they had trained another person to use the ADOS-2—with the majority having trained a student clinician at least once. Of these, 27 (39.71%) had ADOS-2 administration completeness scores less than 100%. This may mean that trainees may have observed their trainer evaluating an individual using incomplete administrations of the ADOS-2, as observing supervisors administer a test is typically involved in a trainee’s experience.

Training and standardized use of the ADOS-2 may aid in the prognosis of children evaluated for ASD in school and community clinic settings. The current sample indicated overall high instances of use of the ADOS-2 for comprehensive ASD evaluations across settings, with variability in the levels of training on the measure. Those informally trained tended to have the most incomplete administrations. Although not a significant finding, this may suggest that informal training may not be the best way to learn the ADOS-2 because it may relate to less fidelity of administration. Higher levels of training in this measure may not only allow for increased abilities in standardized administration of it but also the ability to more accurately identify those with ASD (McClure, Mackay, Mamdani, & McCaughey, 2010; Ries, 2011) and lead to earlier diagnosis and access to appropriate treatment.

### **Limitations**

This sample may have a higher than expected number of participants who use the ADOS-2 or have a special interest in ASD and/or the ADOS-2, as the recruitment email indicated the purpose of the study was regarding these topics. This may impact the generalizability of the findings to all practitioners who evaluate for ASD. For this study, all but 51 participants indicated use of the ADOS-2 for their comprehensive ASD evaluations which indicates a higher percentage of ADOS-2 use compared to previous studies. For instance, only 27% of their sample of individuals diagnosed with an ASD in a community setting ( $n = 87$ ) were administered an ADOS (either the ADOS or ADOS-2) (Hausman-Kedem et al., 2018). Because one aim of this study was to examine in what settings wherein the ADOS-2 is *not* being used in ASD evaluations, it may have been helpful to include more participants who do not utilize the ADOS-2. There may be higher

incidences in the general population of practitioners who evaluate for ASD but do not use the ADOS-2 for those evaluations. Further research should explore the various approaches to comprehensive ASD evaluations across treatment settings and implications for use or nonuse.

The present study also utilized a self-reported questionnaire regarding ASD and ADOS-2 specific training and administration practices. While psychologists are encouraged to continuously self-assess to inform their need for additional training (Fisher, 2016), individuals tend to struggle with self-assessment and information collected for this study regarding these constructs may be inaccurate (Chan, 2009).

Additionally, there are a number of ways in which practitioners can receive training on the ADOS-2 and there are no specific mandates regarding what level of training is required for use. For example, one may receive a certificate for attending an ADOS-2 Clinical/Introductory Workshop and reaching reliability, while an individual who is trained by an ADOS-2 Certified Independent and research reliable trainer at their work site may not. For this study, some participants indicated receiving a Certificate of Completion for the training they had on the ADOS-2 ( $n = 127$ ; 56.95%). After collapsing participants into the three levels of ADOS-2 training utilized in the analysis, 77.13% of the sample indicated that they were clinically or research trained. As such, some participants who received a higher level of training did not receive a certificate and might not have a way to document their training. Without specific definitions and documentation regarding ADOS-2 training, it is likely difficult for individuals to categorize their level of training and/or fully understand the extent of training. For this reason, participants may have struggled to define their level of training and the grouping

of participants into level of training utilized by the author is not done in a standardized way. Future research should explore the need for more standardized approaches to defining and categorizing ADOS-2 specific training. This is important to explore, as ethical professionals in psychology need to be aware of their level of competencies.

### **Suggestions for Future Research**

Findings from this study suggest that standardized administration of the ADOS-2 does not significantly differ based on evaluator level of training. However, due to the limitations related to grouping participants into differing levels of training, more research should explore how practitioners were trained on the ADOS-2 and how they classify themselves in terms of training. Additionally, mandates regarding certification following ADOS-2 trainings and requirements for use should be examined and determined. It may be useful to determine how much time spent in training and how many administrations with an observer yield a practitioner who is ready for accurate administration. Mechanisms regarding why practitioners do or do not have specific ADOS-2 training may also be important. Some practitioners expected to identify ASD may not have access to training on the ADOS-2 or ADOS-2 materials. Future research should explore these mechanisms to inform the dissemination of ADOS-2 training.

As mentioned previously, the majority of participants in the current study use the ADOS-2 for their comprehensive ASD evaluations. Future research should explore the training and work settings of individuals who do not use the ADOS-2 and what techniques they are using to identify ASD. Previous studies indicate that very well-trained practitioners may use their knowledge of the ADOS-2 but not use the measure in practice (Rutherford, McKenzie, McClure, et al., 2016). It would be interesting to explore

how extensive training and confidence in their abilities to identify ASD may impact the use of suggested measures.

Previous research found that school psychologists who completed the ADOS-2 Introductory/Clinical training workshop still had trouble meeting correct administration criteria and tended to omit the activities in which they struggled to administer correctly (Dufek, 2013). Future studies regarding training and ADOS-2 administration practices should aim to directly observe practitioners, as there are limitations to self-reported measures. Additionally, it may be helpful to examine the standardization of administration of the ADOS-2 and training as it pertains to how long ago it was that training occurred as well as how much additional, follow-up training the individual received. It is recommended that practitioners receive ongoing training on the ADOS-2 (Weill Cornell Medicine, 2019). It may be helpful to understand how much training effects accurate administration.

In studies examining ADOS-2 inter-rater reliability, administrations with more deviations in standardization had the lowest coder agreement (Kamp-Becker et al., 2018). Predictive validity of the ADOS-2 was also significantly lower when the diagnosing clinician was not the ADOS-2 examiner (Molloy et al., 2011; Risi et al., 2006). The scope of this study did not allow for an examination of how standardized use of the ADOS-2 and training levels or treatment setting impact diagnostic agreement. It is possible that in settings where the ADOS-2 is not used, diagnostic agreement is high compared to evaluations where the ADOS-2 is used. It may be helpful for future studies to explore how training and setting impact standardized administration of the ADOS-2 and a possible relationship between those variables and diagnostic reliability. Additionally,

examining who is responsible for identifying ASD and who participated in the evaluation and administration of the ADOS-2 may be an important factor. In some settings, evaluators take a team approach which may be helpful for individuals with less experience because they may be supervised by someone with more training and experience. However, results of the ADOS-2 greatly impact diagnostic decisions and those making a diagnosis or classification may be more accurate if they are the administrator of the ADOS-2.

### **Conclusion**

Recent literature has highlighted a need for accurate diagnoses of ASDs. Rising prevalence rates and the importance of quicker access to adequate care specifically demand a call to action for school-based practitioners and those in community clinics to be prepared to evaluate for ASD.

Comprehensive ASD evaluations should include an examination of all areas of development (i.e., adaptive functioning, developmental history, language and communication, intellectual, physical, behavioral, and social/emotional functioning) (Wilkinson, 2016) as well as an ASD specific direct assessment and ASD specific interviews and rating scales (Bradley-Johnson et al., 2008; Dufek, 2013; Zwaigenbaum & Penner, 2018). At this time, the ADOS-2 is considered the only direct instrument used to identify autism symptomatology (Bradley-Johnson et al., 2008) thus, is recommended for use for comprehensive ASD evaluations (Esteves, 2018; Kamp-Becker et al., 2018; Zander, 2015; Zwaigenbaum & Penner, 2018).

While practitioners are likely seeing an increased number of individuals who may need a comprehensive ASD evaluation, researchers question the ability of these

practitioners to adequately assess and accurately identify the disorder (Brock et al., 2014; Dufek, 2013; Kamp-Becker et al., 2018; Randall et al., 2016; Skellern et al., 2005).

Barriers to evaluation practices include limited resources to and training on the suggested 'gold standard' instruments used to identify ASD (Aiello et al., 2017; Brookman-Frazee et al., 2012; Dufek, 2013; Pearson, 2008; Pinborough-Zimmerman et al., 2012; Rasmussen, 2009; Rutherford, McKenzie, McClure, et al., 2016; Small, 2012) such as the ADOS-2. Unfortunately, researchers have documented large variability in the training of practitioners evaluating for ASD (Kamp-Becker et al., 2018; Molloy et al., 2011; Rutherford, McKenzie, McClure, et al., 2016) as well as their chosen instruments used to identify ASD (Aiello et al., 2017; Akshoomoff et al., 2006; Allen et al., 2008; Barton et al., 2016; Dufek, 2013; Pearson, 2008; Skellern et al., 2005; Stahmer & Mandell, 2007; Taylor et al., 2016; Wiggins et al., 2006; Williams et al., 2009) and scores and diagnostic findings resulting from these tests across settings (Dufek, 2013; Kamp-Becker et al., 2018; Stadnick et al., 2015). Findings from this study further support the variability among practitioners in their use of and training surrounding the ADOS-2. While scores and diagnostic agreement derived from the ADOS-2 among practitioners were not examined for the scope of this study, it was found that practitioners also vary in their standardized administration of the measure (although not significantly when comparing participant work setting and ADOS-2 level of training). Effects of non-adherence to the standardized administration of the ADOS-2, such as its relation to inaccurate diagnosis, should be further explored.



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**APPENDIX A**  
**INSTITUTIONAL REVIEW BOARD APPROVAL**



*Institutional Review Board*

DATE: September 18, 2019

TO: Stephanie Lualin, M.A.  
FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [1445267-3] Predictors of Standardized Administration of the Autism Diagnostic Observation Schedule, Second Edition Across Treatment Settings

SUBMISSION TYPE: Amendment/Modification

ACTION: MODIFICATION APPROVED/VERIFICATION OF EXEMPT STATUS

DECISION DATE: September 18, 2019

EXPIRATION DATE: September 17, 2023

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB approves this project modification and verifies its continued status as EXEMPT according to federal IRB regulations.

*Approving modification request to add additional survey question.*

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Nicole Morse at 970-351-1910 or [nicole.morse@unco.edu](mailto:nicole.morse@unco.edu). Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

**APPENDIX B**

**MODIFIED AUTISM DIAGNOSTIC AND  
ASSESSMENT SERVICES PROJECT**

# Modified ADAPT Survey

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Start of Block: Default Question Block

Consent Form

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH

Project Title: Predictors of Standardized Administration of the Autism Diagnostic Observation Schedule, Second Edition Across Treatment Settings

Researchers:

Stephanie Luallin, M.A., Ph.D. Student in School Psychology

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David Hulac, Ph.D.

Phone: 970-351-1640

Email: [David.hulac@unco.edu](mailto:David.hulac@unco.edu)

Purpose and Description: The purpose of this quantitative study is to explore use of the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) for comprehensive Autism Spectrum Disorder (ASD) evaluations. ADOS-2 practices, ADOS-2 training sources, work setting, and other demographic information will be explored to understand how training level and work setting influence use of the ADOS-2.

If you consent, you will be asked to participate in a 5-10-minute survey related to your use of the ADOS-2 for comprehensive ASD evaluations via Qualtrics. No identifying information will be linked to your survey responses in an effort to protect your confidentiality. Your survey responses will be analyzed to develop associations between your use of the ADOS-2 and the setting in which you work and ADOS-2 training in which you received. This information may be applied to develop a more thorough understanding of how training and work setting impacts ADOS-2 use. Although you may not directly benefit from this study, the information gathered will help institutions understand the strengths and challenges practitioners involved in ASD evaluations face in adequately identifying ASD in individuals. Clinical and school institutions may use this information to develop more appropriate opportunities for evaluating ASD using the ADOS-2.

The cost for participating in this study is the time invested in participating in the survey. Participants will have the opportunity to be entered to win a \$25 Amazon.com gift card to compensate participation. After anonymous completion of the survey, you will be asked if you would like to be entered to win a \$25 Amazon.com gift card. If you choose to participate in the drawing, you will be redirected to a separate "incentive" survey and asked to provide only your email address where a gift card code can be awarded. Because the separate surveys contribute data to differing survey pools, survey responses and contact information cannot be linked to each other, thus ensuring your confidentiality. Potential risks for participating in this study are no greater than what might be experienced in a survey regarding your experiences using the ADOS-2 for comprehensive ASD evaluations.

Participation is voluntary. You may wish to decide not to participate in the study. If once you have entered the study, you can still decide to stop and withdraw at any time. Please take your time to read and thoroughly review this document and decide whether you would like to participate in this research study. If you decide to participate, your completion of the research procedures indicates your consent. Please keep or print this form for your records. If you have any concerns about your selection or treatment as a research participant, please contact Nicole Morse, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

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Consent By agreeing to participate you are indicating that; you are at least 18 years of age; that you have read and agree to the informed consent.

Yes, I have read and agree to the informed consent (1)

---

Page Break

Q1 Do you participate in Autism Spectrum Disorder (ASD) evaluations in your current work setting?

Yes (1)

No (2)

Q2 Please indicate your position:

- Clinical Psychologist (1)
  - School Psychologist (2)
  - Psychologist - Research (3)
  - Pediatrician (4)
  - Neurologist (5)
  - Speech and Language Pathologist (6)
  - Social Worker (7)
  - Post-Doc (8)
  - Graduate Student Intern (9)
  - Post-Bachelor's degree Research Assistant (10)
  - Graduate Student (11)
  - Other (12) \_\_\_\_\_
-



Q3 Did you receive any training on the diagnosis of Autistic Spectrum Disorders (ASD) through your graduate school coursework or field/job placement?

Yes (1)

No (2)

---

Q4 What kind of training did you receive?

Seminars (1)

Practicum/Field Work/Internship (2)

Graduate classes (3)

Videotapes of the ADOS-2, including those that were part of a training or from Western Psychological Services (WPS) publishers (4)

Q5 In what setting do you spend most of your time working?

- Clinic (1)
- School (2)
- Clinic specializing in ASD assessment (3)
- Hospital clinic (4)
- University clinic (5)
- Other (6) \_\_\_\_\_

Q6 Approximately how many of your clients come in for a comprehensive evaluation or re-evaluation when there is a possibility of an ASD?

- 0-25% (1)
- 25-50% (2)
- 50-75% (3)
- 75-100% (4)

Q7 Instruments Administered in an ASD Assessment- For each tool, please check the appropriate box that corresponds to how often you administer the instrument: Never, Sometimes, Most of the Time, or Always.

	Never (1)	Sometimes (2)	Most of the Time (3)	Always (4)
Parent Interview (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developmental History of the Child (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teacher Interview (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teacher Questionnaires (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measure of Cognition (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
School or Home Observation (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autism Diagnostic Interview- Revised (ADI-R) (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Childhood Autism Rating Scale, Second Edition (CARS-2) (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Modified Checklist for Autism in Toddlers (M-CHAT) (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autism Behavior Checklist (ABC) (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Screening Tool for Autism in Toddlers and Young Children (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PDD Screening Test (PDDST) (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Gilliam Autism Rating Scale-Second Edition (GARS-2) (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Psychoeducational Profile- Revised (PEP-R) (21)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social Responsiveness Scale (SRS) (22)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social Communication Questionnaire (SCQ) (23)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication and Symbolic Behavior Scales (CSBS) (24)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scales of Independent Behavior (26)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Child Development Inventory (CDI) (27)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ages and Stages Questionnaires (28)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autism Spectrum Rating Scales (ASRS) (30)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vineland Adaptive Behavior Scales, Third Edition (Vineland-3) (25)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Review of Records (29)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8 Do you use the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2)?

Yes (1)

No (2)

---

Q9 What type of training did you receive on the ADOS-2?

Seminars (1)

Graduate classes (2)

Practicum/Field Work/Internship (3)

Training from a colleague (8)

Videotapes of the ADOS-2, including those that were part of a training or from Western Psychological Services (WPS) publishers (5)

Training from an ADOS-2 Certified Independent Trainer (4)

ADOS-2 Introductory/Clinical Training Workshop (6)

ADOS-2 Advanced/Research Training Workshop (7)

Certificate In completing ADOS-2 training, did you receive a Certificate of Completion?

Yes (1)

No (2)

Reliability Have you achieved Research Reliability on the ADOS-2?

\*Note: Attaining research reliability includes attending (in person) the ADOS-2

Introductory/Clinical and Advanced/Research training workshops and achieving at least 80% agreement on the protocol and the algorithm with the STAR Center or an independent trainer.

Research reliability can also be met without attending the workshops by achieving 80%

agreement in coding with an ADOS-2 reliable examiner on both the protocol and the algorithm across three consecutive administrations of Modules 1/2 and three consecutive administrations of Modules 3/4

Yes (1)

No (2)

---

Colleague Was the colleague an ADOS-2 Certified Independent Trainer or considered 'Research Reliable' on the ADOS-2

\*Note: Attaining research reliability includes attending (in person) the ADOS-2

Introductory/Clinical and Advanced/Research training workshops and achieving at least 80% agreement on the protocol and the algorithm with the STAR Center or an independent trainer. Research reliability can also be met without attending the workshops by achieving 80% agreement in coding with an ADOS-2 reliable examiner on both the protocol and the algorithm across three consecutive administrations of Modules 1/2 and three consecutive administrations of Modules 3/4

Yes (1)

No (2)

---

When responding to the following questions, consider your last few ADOS-2 administrations that reflect your typical process.

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Q10 Which module of the ADOS-2 do you most often administer?

- Module 1 (children 31 months and older who do not use phrase speech) (1)
  - Module 2 (children who may use phrase speech but are not verbally fluent) (2)
  - Module 3 (children and adolescents that are verbally fluent) (3)
  - Module 4 (older adolescents and adults who are verbally fluent) (4)
-

Q11 When administering the ADOS-2 Module 1, how often do you give this subtest?

	Never (1)	Sometimes (2)	Most of the time (3)	Always (4)
Free Play (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Response to Name (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Response to Joint Attention (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bubble Play (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anticipation of a Routine with Objects (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsive Social Smile (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anticipation of a Social Routine (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Functional and Symbolic Interaction (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Birthday Party (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Snack (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

---

Q12 When administering the ADOS-2 Module 2, how often do you give this subtest?

	Never (1)	Sometimes (2)	Most of the time (3)	Always (4)
Construction Task (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Response to Name (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make-Believe Play (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Joint Interactive Play (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conversation (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Response to Joint Attention (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstration Task (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Description of a Picture (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Telling a Story from a Book (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Free Play (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Birthday Party (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Snack (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anticipation of a Routine with Objects (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bubble Play (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13 When administering the ADOS-2 Module 3, how often do you give this subtest?

	Never (1)	Sometimes (2)	Most of the time (3)	Always (4)
Construction Task (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make-Believe Play (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Joint Interactive Play (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstration Task (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Description of a Picture (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Telling a Story from a Book (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cartoons (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conversation and Reporting (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotions (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social Difficulties and Annoyance (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Break (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friends, Relationships, and Marriage (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loneliness (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating a Story (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14 When administering the ADOS-2 Module 4, how often do you give this subtest?

	Never (1)	Sometimes (2)	Most of the time (3)	Always (4)
Construction Task* (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Telling a Story from a Book (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Description of a Picture* (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conversation and Reporting (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Current Work or School* (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social Difficulties and Annoyance (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotions (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstration Task (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cartoons* (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Break (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Daily Living* (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friends, Relationships, and Marriage (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loneliness (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plans and Hopes (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating a Story (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Please indicate the most often reason for not administering Free Play.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Response to Name.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)

- Lack of materials (6)
  - Not appropriate for client level of functioning (9)
  - Other (8) \_\_\_\_\_
- 

Please indicate the most often reason for not administering Response to Joint Attention.

- Client refusal (1)
  - Gathered information from a different item (2)
  - Time consuming (3)
  - Administration difficulty (4)
  - Decided ASD not indicated (5)
  - Lack of materials (6)
  - Not appropriate for client level of functioning (9)
  - Other (8) \_\_\_\_\_
-



Please indicate the most often reason for not administering Bubble Play.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Anticipation of a Routine with Objects.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Responsive Social Smile.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)

- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Anticipation of a Social Routine.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Functional and Symbolic Interaction.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)

- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Birthday Party.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Snack.

- Client refusal (1)
  - Gathered information from a different item (2)
  - Time consuming (3)
  - Administration difficulty (4)
  - Decided ASD not indicated (5)
  - Lack of materials (6)
  - Not appropriate for client level of functioning (9)
  - Other (8) \_\_\_\_\_
-

Please indicate the most often reason for not administering Construction Task.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- It is an optional item (module 4 only) (7)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Demonstration Task.

- Client refusal (1)
  - Gathered information from a different item (2)
  - Time consuming (3)
  - Administration difficulty (4)
  - Decided ASD not indicated (5)
  - Lack of materials (6)
  - Not appropriate for client level of functioning (9)
  - Other (8) \_\_\_\_\_
-



Please indicate the most often reason for not administering Description of a Picture.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- It is an optional item (module 4 only) (7)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Telling a Story from a Book.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)

- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Make-Believe Play.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Joint Interactive Play.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)

Lack of materials (6)

Not appropriate for client level of functioning (9)

Other (8) \_\_\_\_\_



Please indicate the most often reason for not administering Cartoons.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- It is an optional item (module 4 only) (7)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Conversation and Reporting.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)

- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Emotions.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Social Difficulties and Annoyance.

- Client refusal (1)
  - Gathered information from a different item (2)
  - Time consuming (3)
  - Administration difficulty (4)
  - Decided ASD not indicated (5)
  - Lack of materials (6)
  - Not appropriate for client level of functioning (9)
  - Other (8) \_\_\_\_\_
-

Please indicate the most often reason for not administering Break.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_



Please indicate the most often reason for not administering Friendships, Relationships, and Marriage.

- Client refusal (1)
  - Gathered information from a different item (2)
  - Time consuming (3)
  - Administration difficulty (4)
  - Decided ASD not indicated (5)
  - Lack of materials (6)
  - Not appropriate for client level of functioning (9)
  - Other (8) \_\_\_\_\_
-

Please indicate the most often reason for not administering Loneliness.

- Client refusal (1)
  - Gathered information from a different item (2)
  - Time consuming (3)
  - Administration difficulty (4)
  - Decided ASD not indicated (5)
  - Lack of materials (6)
  - Not appropriate for client level of functioning (9)
  - Other (8) \_\_\_\_\_
-

Please indicate the most often reason for not administering Creating a Story.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Conversation.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Current Work or School.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- It is an optional item (module 4 only) (7)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Daily Living.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)
- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- It is an optional item (module 4 only) (7)
- Other (8) \_\_\_\_\_

Please indicate the most often reason for not administering Plans and Hopes.

- Client refusal (1)
- Gathered information from a different item (2)
- Time consuming (3)
- Administration difficulty (4)

- Decided ASD not indicated (5)
- Lack of materials (6)
- Not appropriate for client level of functioning (9)
- Other (8) \_\_\_\_\_

Q15 Have you ever trained someone else on the ADOS-2?

- No (1)
- Yes (2)

Please indicate the position of all those you have trained on the ADOS-2.

- Student clinician (1)
- Non-student clinician working at your site (2)
- Non-student clinician working at a site different from your own (3)
- Student clinician for the purpose of research (5)
- Non-student clinician for the purpose of research (4)

Q16 Please indicate your race/ethnicity:

- American Indian or Alaska Native (1)
- Asian (2)
- Caucasian, not Latino (3)
- Hispanic or Latino (4)
- Black or African American (5)
- Native Hawaiian or other Pacific Islander (Guam, Samoa, other Pacific Islands) (6)
- Other (7)



Q17 Gender?

- Male (1)
  - Female (2)
  - Prefer not to answer (3)
- 

Q18 Highest level of education?

- Bachelor's Degree (1)
  - Master's Degree (2)
  - Ph.D. (3)
  - Ed.D. (4)
  - Psy.D. (5)
  - Other (6) \_\_\_\_\_
-

Q19 Please indicate the region from which you currently work.

- Northeast (ME, NH, VT, MA, RI, CT, NY, PA, NJ) (1)
- Midwest (WI, MI, IL, IN, OH, ND, SD, NE, KS, MN, IA, MO) (2)
- South (DE, MD, DC, VA, WV, NC, SC, GA, FL, KY, TN, MS, AL, OK, TX, AR, LA) (3)
- West (ID, MT, WY, NV, UT, CO, AZ, NM, AK, WA, OR, CA, HI) (4)

---

Page Break

Incentive Do you wish to participate for the opportunity to win a \$25 Amazon.com gift card?

\*Note: if you answer, "yes" you will be redirected to a separate page where you will be asked to provide your contact information. Your contact information cannot be linked to your survey responses.

Yes (1)

No (2)

End of Block: Default Question Block

---

**APPENDIX C**

**PERMISSION TO USE THE AUTISM DIAGNOSTIC  
AND ASSESSMENT SERVICES PROJECT**

**Akshoomoff**, Natacha <nakshoomoff@ucsd.edu>  
Sat 1/26/2019 11:12 AM  
Luallin, Stephanie ✉



Dear Ms. Luallin,

Thank you for your interest in our study.

Here is a copy of the survey we used. I request that you cite our paper and indicate in the Method section of your paper that you used this survey with the authors' permission- or a modified version.

Please let me know if you have any questions.

Dr. Natacha **Akshoomoff**

--

Natacha **Akshoomoff**, Ph.D.  
Professor, Department of Psychiatry  
Faculty Member, Center for Human Development  
Director, Brain and Early Experiences Lab  
Clinical Pediatric Neuropsychologist, Clinical Neuropsychology La Jolla  
University of California San Diego

858-822-2757  
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<https://profiles.ucsd.edu/natacha.akshoomoff>

[beelab.ucsd.edu](http://beelab.ucsd.edu)

<https://bit.ly/2oNPNcZ>

**APPENDIX D**  
**THE AUTISM DIAGNOSTIC AND ASSESSMENT**  
**SERVICES PROJECT**

adapt  
Autism Diagnostic and Assessment Services Project  
adapt  
Survey

University of California, San Diego

**INSTRUCTIONS:**

**PLEASE WRITE NEATLY AND CLEARLY.**

**THIS SURVEY IS BEING DISTRIBUTED TO PEOPLE IN A VARIETY OF PROFESSIONS, SO NOT ALL QUESTIONS WILL APPLY TO EVERYONE. *PLEASE ATTEMPT TO ANSWER ALL QUESTIONS, EVEN IF THEY DO NOT DIRECTLY APPLY TO YOU.***

**YOUR ANSWERS TO THE QUESTIONS ARE CONFIDENTIAL. THEY WILL NOT BE MADE AVAILABLE TO YOUR SUPERVISOR OR ANYONE ELSE AT ANY TIME. NO IDENTIFYING INFORMATION, SUCH AS YOUR NAME, WILL BE ATTACHED TO THE SURVEY AT ANY TIME.**

**AUTISM ASSESSMENT AND DIAGNOSTIC PRACTICES SURVEY**

1. Please indicate your position:

- Clinical Psychologist
- School Psychologist
- Psychologist – Research
- Pediatrician
- Neurologist
- Speech and Language Pathologist
- Social Worker
- Post-Doc
- Graduate Student
- Post-Bachelor's degree Research Assistant
- Other: \_\_\_\_\_

2. Are you considered an autism specialist?

- Yes
- No

If no, is there someone in your workplace who is considered an autism specialist?

- Yes
- No

3. Do you work on a team when conducting assessments? If yes, who is on this team (e.g., a speech-language pathologist, psychologist, psychiatrist, etc.)?



**TRAINING:**

4. What kind of graduate program did you attend?

- Clinical Psychology, Ph.D.
- Clinical Psychology, Psy.D.
- School Psychology, Ph.D.
- Developmental Psychology, Ph.D.
- Other Psychology, Ph.D.
- Other Ph.D.
- M.D. Specialty: \_\_\_\_\_
- Psychology, Masters
- Education, Masters
- Social Work, Masters
- Other Masters
- Have not attended Graduate School

5. How long was the program?

- Less than 2 years
- 2 years
- 3 years
- 4 years
- 5 years
- More than 5 years
- N/A

6. Did you receive any training on the diagnosis of Autistic Spectrum Disorders (ASD) through your graduate school coursework?

Yes

No

N/A

If yes, what kind of training?

Seminars

Practicum/Field Work/Internship

Classes

Other, please describe: \_\_\_\_\_

7. a. Describe any training that you have received outside of graduate school on the assessment and diagnosis of ASD (excluding ADOS and ADI-R workshops).

b. What did you find to be particularly helpful during these trainings?

**EXPERIENCE AND CURRENT WORK PLACEMENT:**

8. What clinical groups of children do you typically work with now?





**TOOLS:**

21. INSTRUMENTS ADMINISTERED IN AN ASD ASSESSMENT - FOR EACH TOOL, PLEASE CHECK THE APPROPRIATE BOX THAT CORRESPONDS TO HOW OFTEN YOU ADMINISTER THE INSTRUMENT: NEVER, SOMETIMES, MOST OF THE TIME, OR ALWAYS.

	Never	Sometimes	Most of time
Always			
Parent Interview <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developmental History of the Child <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teacher Interview <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teacher Questionnaires <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cognitive Assessments			
<i>Children under 5 years of age:</i>			
<input type="checkbox"/> Bayley	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Mullen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> WPPSI-R	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Children 5 years of age and older:</i>			
<input type="checkbox"/> Bayley	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Mullen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> WPPSI-R	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> WISC-III	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> DAS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<input type="checkbox"/> Stanford-Binet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> School or Home Observation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diagnostic Instruments designed for ASD			
<input type="checkbox"/> Autism Diagnostic Observation Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Autism Diagnostic Interview – Revised	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Childhood Autism Rating Scale (CARS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Always	Never	Sometimes	Most of time
Diagnostic Instruments designed for ASD, cont.			
<input type="checkbox"/> Modified Checklist for Autism in Toddlers (M-CHAT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Checklist for Autism in Toddlers (CHAT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Autism Behavior Checklist (ABC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> PDD Screening Test (PDDST)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Gilliam Autism Rating Scale (GARS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Gilliam Asperger’s Rating Scale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Psychoeducational Profile –Revised (PEP-R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Play-based Assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please explain:			

Communication and Symbolic Behavior Scales <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
(CSBS)				
Vineland Adaptive Behavior Scales (VABS) <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scales of Independent Behavior <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Child Development Inventory (CDI) <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Review of Records <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Others? (List) _____ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
_____ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
_____ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
_____ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
_____ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

22. If you are assessing a child for something other than an ASD, but throughout the course of the assessment you begin to suspect an ASD, what do you do?

**AUTISM DIAGNOSTIC OBSERVATION SCHEDULE (ADOS):**

23. Do you use the ADOS?

Yes

No

24. Have you ever watched videotapes of the ADOS, including those that were part of a training or from WPS?

Yes

No

25. Have you completed a workshop on the ADOS? If yes, did you attend the clinical training, the research training, or both?

*If no, please proceed to question #26. If yes, please answer the following:*

a. Why did you attend this training?

b. When did you attend the workshop?

c. Where was the workshop held?

d. What did you find to be useful about the ADOS workshop?

e. Were there any limitations or do you have any suggestions that might make the ADOS workshop more helpful?



f. Since attending the ADOS workshop, have you consulted with colleagues or trainers regarding questions or concerns you may have had about administration or coding? Please give specific examples.

26. Have you achieved reliability on the ADOS?

27. Approximately how many times have you administered the ADOS for clinical or research purposes?

Per Year: \_\_\_\_\_ Total: \_\_\_\_\_

28. How many times has someone watched you administer the ADOS outside of a training workshop?

29. How many times have you watched someone else administer the ADOS?

30. How do you typically administer the ADOS? (i.e. do you videotape the administration? do other coworkers attend? How is the caregiver involved?)

31. In your opinion, what are some of the possible advantages of using the ADOS as part of a standard battery when there is a question of ASD?

32. What are some possible disadvantages of using the ADOS as part of a standard battery when there is a question of ASD?

33. Have you ever used “parts” of the ADOS?  
If so, why and how was the information useful?

34. Have you ever trained someone else on the ADOS?  
If yes, who did you train and for what reason?

**AUTISM DIAGNOSTIC INTERVIEW – REVISED (ADI-R):**

35. Do you use the ADI-R?

Yes

No

36. Have you ever watched videotapes of the ADI-R, including those that were part of a training or from WPS?

Yes

No

37. Have you completed a formal workshop on the ADI-R?

Yes

No

*If no, please proceed to question #38. If yes, please answer the following:*

a. Why did you attend this training?

b. When did you attend the workshop?

c. Where was the workshop held?

d. What did you find to be useful about the ADI-R workshop?

e. Were there any limitations or do you have any suggestions that might make the ADI-R workshop more helpful?

f. Since attending the ADI-R workshop, have you consulted with colleagues or trainers regarding questions or concerns you may have had about administration or coding? Please give specific examples.

38. Have you achieved reliability on the ADI-R?
39. Approximately how many times have you administered the ADI-R for clinical or research purposes?
- Per Year: \_\_\_\_\_ Total: \_\_\_\_\_
40. How many times has someone watched you administer the ADI-R outside of a training workshop?
41. How many times have you watched someone else administer the ADI-R?
42. In your opinion, what are some of the possible advantages of using the ADI-R as part of a standard battery when there is a question of ASD?

43. What are some possible disadvantages of using the ADI-R as part of a standard battery when there is a question of ASD?
44. Have you ever used “parts” of the ADI-R or administered it in a nonstandardized way?  
If so, why and how was the information useful?
45. Have you ever trained someone else on the ADI-R?  
If yes, who did you train and for what reason?

**PARENT ROLE:**

46. When you decide that a child meets criteria for ASD, how does a parent’s attitude about their child’s needs or strengths and weaknesses affect your presentation of the diagnosis of ASD?

47. Similarly, when you give a child a diagnosis of autism, how do parent attitudes affect the placement and intervention recommendations you will make for that child?

**FINAL QUESTIONS:**

48. When seeing a child for a question or confirmation of an ASD, what do you find difficult or different about the diagnostic process compared to other children?

49. Do you have any other comments that you would like to make?

**DEMOGRAPHICS:**

50. Please indicate your race/ethnicity:

- American Indian or Alaska Native
- Asian
- Caucasian, not Latino
- Hispanic or Latino
- Black or African American
- Native Hawaiian or other Pacific Islander (Guam, Samoa, other Pacific Islands)
- Other

51. Gender
- Male
  - Female
52. What is your highest level of education?
- Bachelor's Degree
  - Master's Degree
  - Ph.D.
  - Ed.D.
  - Psy.D.
  - Other: \_\_\_\_\_
53. What is the size of the area in which you live?
- Rural – fewer than 5,000 residents
  - Small town – 5,000-24,999 residents
  - Large town – 25,000-74,999 residents
  - Small city – 75,000-299,999 residents
  - Large city – more than 300,000 residents

**FOR SCHOOL PERSONNEL ONLY:**

Approximately how many students are served by your district?

\_\_\_\_\_

Approximately how many of the following are there in your district?

\_\_\_\_\_ School Psychologists

\_\_\_\_\_ Autism Specialists

\_\_\_\_\_ Speech and Language Pathologists

***Thank you for your participation!!!***