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Knowledge, Self-Efficacy, Use of Practices and Focus of Teaching Among Teachers of Students with Autism Spectrum Disorder in Saudi Arabia: A Cross-Sectional Study

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Knowledge, Self-Efficacy, Use of Practices and Focus of Teaching Among Teachers of Students with Autism Spectrum Disorder in Saudi Arabia: A Cross-Sectional Study

A dissertation submitted in partial satisfaction of
the requirements for the degree Doctor of Philosophy
in Special Education

by

Faisal Alnemary

2017

ABSTRACT OF THE DISSERTATION

Knowledge, Self-Efficacy, Use of Practices and Focus of Teaching Among Teachers of Students with Autism Spectrum Disorder in Saudi Arabia: A Cross-Sectional Study

by

Faisal Alnemary

Doctor of Philosophy in Special Education

University of California, Los Angeles, 2017

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Special education services provided students with Autism Spectrum Disorder (ASD) in Saudi Arabia have been growing rapidly over the last two decades and teachers must be well-versed to address their students' needs. However, studies examining aspects of these services are scarce. The current study aimed to assess knowledge about ASD, self-efficacy, the use of teaching and intervention practices, and the focus of teaching among teachers working with students with ASD in schools affiliated with the Ministry of Education. Data were collected using an online-survey with a small sample size (N=135). Results indicated that teachers demonstrated a moderate level of knowledge about ASD, and many teachers possessed faulty information related to the etiology, symptoms, or therapeutic approaches. Levels of self-efficacy varied among teachers and increased with professional development and being in an inclusive classroom. Teachers reported the use of a mixture of practices and the majority reported the use of at least one of the supported practices. While years of experience and being in an inclusive classroom increased the odds of reporting the use of at least one of the supported practices, self-efficacy lowered the odds of using such practices.

Teachers reported focusing on multiple areas and the majority focused on language and communication, social skills, and academics on a daily basis. The degree of focus on different areas of teaching (daily, weekly, biweekly, monthly, or never) was associated with some students' characteristics (i.e., communication level, and having at least one student who exhibited self-injurious, aggressive, or stereotypic and repetitive behaviors). Although limited by the method and the small sample, findings from the current study are timely and worthwhile as they help to direct the next questions in research.

The dissertation of Faisal Alnemary is approved.

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Sheryl Kataoka

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CHAPTER 1

Introduction

Autism spectrum disorder (ASD) is a complex neurodevelopmental disorder that is characterized by deficits in social interaction and communication and restricted and/or repetitive behaviors, and the severity of symptoms vary from one person to another (American Psychiatric Association, 2013). ASD may co-morbid with other impairments such epilepsy, gastrointestinal problems, sleep problems, eating issues, or other mental health issues (e.g., Attention-deficit/hyperactivity disorder, anxiety, depression). In addition, 30% of children with ASD may remain minimally verbal by the age of five (Tager-Flusberg & Kasari, 2013), and many of them engage in challenging behaviors such as self-injury, aggression, and stereotypic and repetitive movements (Baghdadli et al. 2003; Dominick et al., 2007). This variable level of development requires an individualized targeted intervention plan to address every child's unique needs. The prevalence of ASD has increased in recent years (Autism Speaks, 2012) rising from one in every 10,000 to one in every 162 globally (Elsabbagh et al., 2012). In the United States, the latest reports indicate that the prevalence of ASD is one in every 68 children (Christensen, D. L., 2016). While ASD research originated in Western countries and had moved the field forward, research from other parts of the world is limited (Alnemary et al., 2017b; Samadi, & McConkey, 2011).

Saudi Arabia

Saudi Arabia is approximately 772,200 square miles (Central Department of Statistics and Information, 2011), consisting of 13 administrative provinces (Hilal, 2013) located in the southwestern part of the Asian Continent. The population of Saudi Arabia is about 31,742,308 (Central Department of Statistics and Information, 2016), with most of the

population 20 years old or younger. The education system is separated based on gender for religious and cultural reasons.

Autism in Saudi Arabia

In Saudi Arabia, it is estimated that about six (under the age of 16 years) in every 1,000 individuals have ASD diagnosis (Aljarallah, Alwaznah, Alnasari, & Alhazmi, 2007), suggesting that the total number of individuals with ASD is closer to 448,000. Special education and related services (e.g., speech therapy, occupational therapy) for individuals with ASD are primarily provided through the Ministry of Education (MoE) and the Ministry of Labor and Social Development (MLSD) while diagnostic and health-related services are provided through clinics and hospitals affiliated with the Ministry of Health (MoH).

Although special education services have existed in Saudi Arabia since the mid-1960s, the prevision of services for students with intellectual disabilities did not start until the early 1970s. Services for students with an ASD designation started in the 1990s (Aldabas, 2015). Under the MLSD, ASD services started in 1993, after the Gulf War between Iraq and Kuwait, when a Kuwaiti mother of a female with autism came to Saudi Arabia. The mother (Samira Alsaad, Ph.D.) opened the first class at Al Faisaliah Women's Charitable Society to provide services to four children with autism based on the Treatment and Education of Autistic Children and Communication Handicapped model (TEACCH; Alfahad, 2005). After that, centers affiliated with MLSD continued to open to serve children with ASD along with other children with developmental disabilities. Currently, there are 112 special daycare centers that serve about 6,495 children with developmental disabilities (DD), including those with ASD who are 3-12 years of age. Also, there are about 35 rehabilitation centers that serve

about 8,095 individuals with developmental disabilities. The exact number of children with ASD that are served in these centers is not publicly available.

MoE services started in schools in 1997 when the first three special day classrooms were opened to serve 13 students ASD. Unlike the situation two decades ago where they were available in major cities, services are currently reaching different regions and small towns across all of Saudi Arabia (Battal, 2016). Recent documents show that the MoE provides special education services to a total of 1,677 students with ASD (Ministry of Education, 2016). These students are severed in special day classrooms or inclusive classrooms in public schools or in special educational institutes, which serve students with special needs only.

Despite the tremendous efforts by the MoE and the MLSD to enhance educational and rehabilitation services, the number of children with ASD receiving services in these schools remains limited. Many children with ASD receive services (i.e., special education services and/or respite care) either in neighboring countries (e.g., Jordan, Egypt, United Arab Emirates) or in Western countries (e.g., United Kingdom and U.S.).

The literature examining ASD services in Saudi Arabia is emerging (Alnemary et al., 2017b), and several researchers have emphasized the need to continue the examination of different aspects related to the provision special education services (Aldabas, 2015; Battal, 2016). With the increased number of students with ASD comes the need for qualified teachers who should be trained in the use of empirically validated practices and prepared to be a good consumer of current research (Blacher et al., 2015). The purpose of this study was to gauge the level of knowledge about ASD, self-efficacy, the use of practices and focus of

teaching among teachers working with students with ASD in schools affiliated with the MoE in Saudi Arabia.

Knowledge about ASD

ASD has received more attention in the media and research studies over the last two decades (Damiano et al., 2014; Hahler, & Elsabbagh, 2015). This awareness led to the proliferation of information about ASD diagnosis and symptoms, etiology, prevalence, and possible treatment venues. Unfortunately, available information about ASD is a mixed bag of scientific facts, myths, misconceptions, and in some cases harmful tips (Alnemary et al., 2017c; Matson et al., 2013; Reichow et al., 2012).

Limited levels of knowledge about ASD may impact services in non-Western high-income countries (Harrison et al. 2017). Evaluating knowledge about ASD (e.g., symptoms and diagnosis, etiology, and treatment) is an area of research that emerged 30 years ago (Stone, 1987), but has grown rapidly within the last decade (Harrison et al.). About 67 studies conducted in 21 different countries have assessed the level of knowledge about ASD among different groups, such as school professionals (teachers, administrators, speech and language pathologist), medical professionals and parents of children with ASD.

Although a few studies examined the level of knowledge among teachers, only one study (Haimour & Obadiat, 2013) was conducted on this topic in Saudi Arabia. The researchers used a 30-item questionnaire to assess knowledge about ASD among 391 general education and special education teachers from one city in Saudi Arabia, Jeddah. Findings indicated that teachers had a moderate to a weak level of knowledge about ASD and higher levels of knowledge were observed among special education teachers, those with higher educational levels and those with fewer years of experience. However, this study examined

the knowledge about ASD among teachers who do not work with students with ASD on a regular basis.

Examining the level of knowledge about ASD among teachers of students with ASD in Saudi Arabia is critical for several reasons. Teachers provide educational and rehabilitation supports to their students with ASD, and possessing faulty information may impact the decisions they make. Also, teachers communicate with caregivers about their children with ASD on a regular basis, and it has been reported that caregivers rely on teachers to obtain information about ASD (Mackintosh et al., 2005). It is possible that teachers who possess faulty knowledge about ASD may not only influence caregivers' decisions about what treatment they pursue with their children (Mackintosh et al.), but also may confirm myths or misconceptions about ASD, which may result in a waste of time and financial resources. If professionals, including teachers, do not possess accurate information about ASD, it would be challenging to change the mindset of the general public as whole (Matson et al., 2013). Finally, examining factors that might be associated with higher levels of knowledge about ASD may reflect the quality of current in-service and per-service training, and could potentially inform policy decisions about funding the preparation of proper professional development training materials. These factors may include years of experience of working with students with ASD, educational level, teacher credentials (Haimour and Obadiat, 2013), gender, school location, school type, and professional development.

Self-efficacy for Working with Students with ASD

Self-efficacy, a cognitive state introduced 40 years ago by Bandura (1977), which refers to the individuals' belief that they can perform specific actions to bring about change. For teachers, self-efficacy involves the beliefs they hold regarding their capability to execute

teaching-related responsibilities and attain educational goals (Ruble et al., 2011). It has been suggested that reporting higher levels of self-efficacy are associated with utilizing effective teaching and instructional practices, setting up higher goals for oneself and for students (Ross, 1998), creating supportive and positive classroom settings (Guo et al., 2012), and promoting job satisfaction (Klassen and Chiu, 2010). Conversely, perceived low levels of self-efficacy could negatively impact teachers' performance, elevate levels of job-related stress (Betoret, 2006), and increase burnout (Bandura, 1986; Pajress and Usher, 2007). Self-efficacy could also be conceptualized as a protective factor for burnout, one of the ongoing problematic issues that researchers have been trying to address for decades (Ruble et al.).

As education remains the primary form of treatment for many students with ASD (National Research Council, 2001) where they spend most of their time and receive services in school settings (Brookman-Frazee et al. 2009), teachers are obligated to deliver effective teaching and intervention practices that meet the unique needs of these students. Since it has been reported that children with ASD exhibit challenging behaviors more than typically developing children, teachers who are not well prepared to deal with such students may experience low self- efficacy (Allinder 1994). These experiences could be a significant source of stress (Kokkinos and Davazoglou, 2009), and long-term exposure to such a source could lead to burnout.

The literature on self-efficacy among teachers of students with ASD is in its infancy (Corona et al., 2017). Ruble et al. (2011) assessed self-efficacy in a sample of 35 teachers working with students with ASD and factors associated with it. Findings indicated that while burnout was negatively associated with self-efficacy, years of experience and perceived administrative support were not correlated with teacher self-efficacy. Acknowledging the small sample size, the authors provided several explanations for such findings. First, it could

be that the self-efficacy measure they used in the study did not capture autism-specific tasks. Second, it is possible that the characteristics of students with ASD may play a major role in determining the degree to which the level of self-efficacy is influenced by years of experience or administrative support alone. That is, although students with ASD may share a core impairment in the social communication domain, teaching a minimally verbal student entails possessing a different set of skills compared to teaching a student who is a fluent communicator. Finally, another factor that may influence self-efficacy is a teacher's preparation level including attending professional development training.

In another study, Corona et al. (2017) examined variables associated with the self-efficacy among 80 school professionals (36 of them were teachers) for working with students with ASD. These included knowledge about ASD, prior experience working with students with ASD and prior training in ASD and Positive Behavior Support (PBS; Carr et al., 2002). To assess self-efficacy, they used a new 30-item measure developed by Ruble and colleagues (2013). Their findings indicated that prior training in ASD, and training on PBS were associated with teachers' self-efficacy. Neither ASD knowledge nor years of experience were significant predictors. Corona et al. indicated that the measure used to assess knowledge about ASD might not have captured all aspects of knowledge about ASD, which would impact teachers' rating on self-efficacy. Also, if teachers do not receive ongoing training, years of experience may not have an impact on self-efficacy.

Factors that have been identified or at least hypothesized to be associated with self-efficacy for teachers working with students in other countries could be relevant to the Saudi teachers despite contextual variables that are unique to Saudi Arabia. An attempt to understand self-efficacy and its sources will move the international literature on self-efficacy

forward and may help researchers in Saudi Arabia to identify factors important for supporting teachers of students ASD.

Teaching Practices and Focus of Teaching

The literature exploring the use of ASD teaching and intervention practices is growing, where more studies have been conducted in the U.S. (i.e., Hendricks et al., 2005; Hess et al., 2008; Stahmer et al., 2005), China (Liu et al., 2016), and Singapore (Lian et al., 2008). Previous researchers reported that many ASD interventionists lack an adequate understanding of empirically validated practices (Hess et al.; Liu et al.; Stahmer et al.). A few studies on this topic were conducted in Saudi Arabia. Al-Shammari (2007) examined several aspects of special education services provided to students with ASD. He surveyed 164 school professionals (e.g., teachers, teacher aides, principals, occupational therapists, speech therapists) from five regions of Saudi Arabia (Riyadh, Makkah, Eastern, Al-Qassim, Ha'el and Tabouk) working in schools affiliated the MoE and those affiliated with MLSD. Findings indicated MLSD school professionals reported the use of more practices related to diagnostic assessment and evaluation techniques (i.e., diagnostic evaluation involves a multi-disciplinary team, use of valid diagnostic measures, use of direct observation, review of the medical history**),** the individualized educational plan (e.g., a comprehensive plan with measurable goals that addresses communication, social, cognitive, academic, and daily living skills, and includes a behavioral intervention plan to address challenging behaviors), and family involvement (e.g., providing parent training, allowing more participation during the diagnosis and evaluation process, requesting that parents work with their children at home and in the community, encouraging parents to advocate for their children) compared to those working in MoE schools. The exact scenario was found when comparing female to male teachers. That is, female school professionals reported the use of more practices related to

diagnostic assessment and evaluation techniques, the individualized educational plan, and family involvement. It is important to note that the author did not report the total number of male and female school professionals who worked at schools affiliated with each of the two ministries. Therefore, a conclusion about the differences based upon a school's affiliation or a teacher's gender cannot be drawn. Historically, students with ASD tended to be served by female school professionals in MLSD schools, and male schools professionals in MoE schools.

In another study, Alzaraa (2008) examined different aspects of special education services by surveying 20 school-level supervisors (9 from special education institutes, and 11 from public schools) across different regions of Saudi Arabia. He developed and used a quality indicator scale, assessing the evidence of different elements or practices as they relate to 11 different domains including 1) qualifications of school personnel, 2) assessment and diagnostic process, 3) individualized education plan, 4) curricula used, 5) teaching approaches and areas of teaching, 6) physical characteristics of the educational settings, 7) the use of applied behavior analysis (ABA), 8) preparation for inclusion, 9) related services, 10) family involvement, and 11) progress monitoring of services and professional development. Findings indicated that evidence of quality assurance indicators were met with a high degree for individualized education plans and the use of applied behavior analysis (ABA) domains, and with a moderate degree for the assessment and diagnostic process, curricula used, teaching approaches and focus of teaching domains. However, quality assurance indicators were met with a low degree for the related services, qualifications of school personnel, physical characteristics of educational settings and the family involvement domain.

Altogether, these studies have improved our understanding about different aspects special education services provided to students with ASD in Saudi Arabia. However, these studies were conducted before 2008 and the number of schools, classrooms, teachers and students of ASD have increased dramatically since then. In addition, teaching practices and areas of teaching were not explicitly explored in these studies. Respondents were provided with a list of practices to choose from. Using open-ended responses may yield different results that might reflect the real understanding of what happens in the classroom. Factors such years of experience, professional development, and classroom type might be associated with the use of teaching practices or the areas of skills that teachers focused on when working with their students with ASD.

Although these studies have contributed to the literature of ASD in schools in Saudi Arabia, additional areas of research warrant further examination. The provision of an appropriate education for students with ASD is dependent upon well-prepared teachers who feel that they are capable of using empirically validated teaching and intervention practices. Poorly understood and under-studied topics about the competencies of teachers may threaten the quality of the education and rehabilitation services offered to students with ASD and their families. Exploring these areas of research will provide information that may help policy makers to strategically plan inform how to improve ASD services.

The Current Study

The current study was exploratory in nature and was conducted to gauge the level knowledge about ASD, self-efficacy, the use of practices and the focus of teaching among teachers working with students with ASD in schools affiliated with the MoE in Saudi Arabia. Specifically, this study was carried out to address four aims. The first aim was to describe teachers' knowledge about ASD and examine how teacher and classroom characteristics may associate with higher knowledge about ASD. It was hypothesized that teachers would vary in their knowledge about ASD and those who work in a special day class, with more years of experience, and received ASD-related professional development would report higher level of knowledge. The second aim was to examine teachers' self-efficacy in working with students with ASD and identify factors that may associate with higher levels of self-efficacy. It was hypothesized that self-efficacy scores would vary and those who work in inclusive classrooms, with more years of experience, received ASD-related professional development and had higher knowledge about ASD would report higher level of self-efficacy. The third aim was to describe teaching and intervention practices used when working with students with ASD. It was hypothesized that teachers would report the use of a mixture of practices, some of which may lack empirical support. Also, it was hypothesized that more years of experience, more professional development, higher knowledge about ASD, and higher self-efficacy would be linked to the use of empirically supported practices. The fourth aim was to explore the focus of teaching when working students with ASD and how the degree of focus on each area may be related to students' characteristics. It was hypothesized that teachers would report focusing on multiple areas and the degree of focus would vary based on students' characteristics, including communication level and challenging behaviors.

CHAPTER 2

Methods

Research Design

A cross-sectional design was used address the aims of the current study and data were obtained from an online survey.

Sampling Procedures and Recruitment Process

A non-probability convenience sampling procedure was used. Despite the disadvantages of using this sampling procedure, it was determined that this sampling procedure was suitable for the primary purpose of this study, the context, limited resources, the workforce, the duration of the study, and the tool (online-survey) by which data were collected (Etikan et al., 2016; Wright, 2005). Ethical approval was obtained from the UCLA Institutional Review Boards (IRB#17-000223). With the assistance from the Center for Autism Research at King Faisal Specialist Hospital & Research Centre, in Riyadh, Saudi Arabia, an approval from the MoE was obtained to recruit teachers of students with ASD.

The recruitment process involved multiple steps. First, by the end of the 2016/2017 school year, the Office of Research and Studies sent an electronic letter to all school districts (n= 45) across all 13 regions of Saudi Arabia. The letter included a brief description of the survey, a URL of the survey, and a request to share the link with teachers. The estimated duration for completing the survey (about 25 min) for teachers was provided. The link was activated for less than three months, April 1st, 2017through June 20th, 2017. Second, the list of all schools that serve students with ASD was obtained from the General Education Statistics Center. To increase the response rate, the supervisors at each school district were

contacted via email or phone. They were provided with the URL of the survey and asked to encourage teachers to complete the survey.

Survey Development

The survey consisted of multiple existing measures that were adapted from similar studies conducted in the U.S. (Schwartz & Drager, 2008), China (Liu et al., 2016) and Singapore (Lian et al., 2008). It included four sections: 1) teacher-related, school-related, and student-related characteristics, 2) knowledge about ASD, 3) self-efficacy in working with students with ASD, and 4) intervention and teaching practices and focus of teaching. A detailed description about each section is provided below.

Teacher-related, school-related, and student-related characteristics. This section consisted of three subsections: a) teacher-related characteristics, b) school-related characteristics, and c) student-related characteristics. In the first subsection, teachers responded to questions related to general demographics including gender (i.e., male, or female), age (in years), educational level (i.e., bachelor, higher diploma after a bachelor degree, or a master degree), years of experience working with students with ASD, major of higher degree obtained (special education, psychology, or others), and total hours of professional development received within the last 3 years.

In the second subsection, teachers responded to questions about their current school type (i.e., public, private, or special education institute), classroom type (i.e., inclusive, special day class or special day class for students with ASD only), and city where the school is located.

In the third subsection, teachers were asked to provide information regarding some

student-related characteristics such as the number of students with ASD they serve and grade level. Also, teachers were asked to report information about the level of communication and challenging behaviors of their students. For the communication level, teachers reported the number of their students who were minimally verbal (i.e., those who do not use speech, or use single words) among the student they serve. Teachers also reported the number of students who engaged in challenging behaviors that fell within: a) self-injurious behaviors (SIB), such as self-biting, self-hitting, self-scratching, b) aggressive behaviors, such as hitting others, biting others, pushing others, throwing objects at others, and c) stereotypic and repetitive behaviors (SRB), such as body rocking, hand-flapping, or spinning objects turning.

Knowledge about ASD. A modified 12-item measure (Schwartz et al., 2008) was developed to assess teachers' knowledge about ASD. Items of this measure included statements about diagnostic features of ASD, etiology, current myths, and possible therapeutic approaches. Teachers rated each statement as "True," "False," or "I do not know." Each correct response was coded as 1 and each incorrect response was coded as zero. A statement with "I do not know" was coded as zero. The number of correct items was summed to create a knowledge total score that could range from 0-12. In addition, the total score was grouped into three categories: a) high ($\geqslant$80%), which was equivalent to responding to 10 out the 12 items correctly, b), moderate (50-79%) which was equivalent to responding to 6 to 9 items correctly, or c) low (<50%), which was equivalent to answering less than 6 items correctly.

Self-efficacy. To assess teachers' perception about their competencies toward working with their students with ASD, a 5-item measure, modified from the work of Schwartz et al. (2008) was used. Using a 4-point Likert scale (1= strongly disagree to 4= strongly agree), teachers rated statements about their ability to carry out basic

responsibilities: assessment, designing and delivering interventions, and providing consultation or support to parents of their students with ASD. Ratings for all items were added to create a self-efficacy total score ranging from 5 (reflecting a low level of self-efficacy) to 20 (reflecting a high level of self-efficacy).

Teaching and intervention practices. Teachers were asked to list 3-5 teaching practices and strategies they use with their students with ASD. Rather than providing a list of practices that might influence teachers' responses, this approach was used to allow teachers to report the practices they use on a regular basis.

Each of the reported practices was coded into one of three categories: supported, unsupported, or other. Several reports of validated ASD practices were used to inform the coding in this study (Fisher et al., 2009; Iovannone et al., 2003; Maglione et al., 2012; Simpson et al, 2005; Wong et al., 2015). These reports were developed within the last 15 years by different groups of experts in the field of ASD who are affiliated with different organizations. The developers of each of the above-mentioned reports used different definitions of what is considered an intervention or practice, used different segments of the literature, and used different criteria and coding metrics that varied regarding the rigor for identifying and determining the level evidence supporting the efficacy of any given intervention or a practice. Across all reports, some practices were identified as highly supported or established, beneficial and could produce favorable outcomes for specific targets or skills. Other practices were identified as promising with a moderate level of evidence, or as ineffective, with limited support (level of evidence was insufficient). However, Iovannone et al. described six elements of effective educational practices for students with ASD.

Because of the discrepancies among the above-mentioned reports on the exact level of evidence (moderate vs. high; established vs. promising) for the efficacy of some of the intervention practices, this is a controversial issue in the field of ASD (Mesibov & Shea, 2011; Kasari & Smith, 2016). However, there was some agreement among the above-mentions report on some practices that could be considered to have some empirical support. Therefore, based on this assumption, a coding rubric was developed by the researcher.

Supported intervention and teaching practices included those that were identified as either established, promising/emerging, scientifically-based or with a moderate level of evidence across at least two of the above mentioned-reports. Examples of these practices included structured teaching, modeling, visual schedules, prompting, and the Picture Exchange Communication System (PECS; Bondy and Frost, 1994). Unsupported intervention and teaching practices included those that were identified as lacking evidence from empirical research of being beneficial if implemented with students with ASD. Practices and intervention such as auditory integration training (AIT), sensory integration (SI), and facilitated communication (FC) could be included under this category. The reporting of each supported practice was given a score of 1, and the non-reporting of a supported practice was given a score of 0. Finally, practices or strategies that were reported by teachers but did not fit the practices listed within the supported or the unsupported category were coded under a third category titled as: “other practices”. It should be noted that these categories were created to characterize the reported practices, rather than to endorse or favor a practice or a set of practices.

The researcher coded the open-ended responses. Another graduate student coded 20% of the responses (17 randomly selected) for inter-coder reliability purposes. The two records from both coders were compared using a response-by-response method. For each response,

agreement (i.e., identifying the exact type and number of practices) between recorders was given a score of 1 and disagreement (i.e., not identifying the exact type or number of practices) between recorders was given a score of 0. To obtain the percentage of inter-coder reliability, the total number of agreement was divided by total number of agreement plus disagreement then multiplied by 100%. Inter-coder reliability was 94%.

Focus of teaching. To assess the type of skills targeted when working with their students with ASD, teachers were asked to select the degree to which they focus on different areas of skills from a list using a 5-point scale (1= never, 2=monthly, 3= biweekly, 4= weekly, 5= daily*).* This list represented possible areas that could be targeted in school settings (National Autism Center (NAC), 2009; Wong et al., 2015). These areas included: 1) management of challenging behaviors (e.g., conducing behavioral observation assessment and creating a behavioral plan to decrease or eliminate behaviors that could interfere with the student's ability to learn); 2) academic (e.g., reading, writing, math, science, history, religious studies); 3) pre-linguistic communication and joint attention behaviors (e.g., following a point, teaching pointing to objects, showing items/activities to another person, or following an eye gaze); 4) language and communication (e.g., receptive language, following simple directions, labeling, answering simple questions); 5) social skills (e.g., initiating, maintaining the conversation, use of appropriate gestures, turn taking); 6) play skills (e.g., parallel play, functional play, symbolic play, social dramatic play, etc.); 7) adaptive skills (e.g., preparing a simple meal, toilet training, dressing, brushing teeth, etc.); 8) executive functioning skills (e.g., problem solving, planning, working memory), and 9) vocational skills (e.g., training on job-related activity such as, filing or printing papers, etc.). In addition, teachers were provided with additional spaces to list other areas of focus or skills targeted when working with their students with ASD.

Experts' Review (English version)

Five English-speaking experts (Ph.D. level) reviewed the survey and evaluated the scientific merit of it. They ensured that the items of each of the sections were aligned with the purpose of this study, and easy to understand and ready to be translated into Arabic. Each expert was emailed an editable version (word document) of the survey. Each expert reviewed all sections individually then emailed comments and suggestions to the researcher. Changes to the survey were made based on all feedback provided before moving to the Arabic translation step.

Arabic Translation

A forward-translation method was used (Hambelton & Kanjee, 1995) where a bilingual committee translated the survey into Arabic. That is, the committee included two Ph.D. level, and two M.A. level experts who have knowledge about ASD and have experience working with children with ASD in Saudi Arabia. Each expert independently translated all items in the survey. After translation, the committee convened and discussed translated versions of the survey and agreed on one final Arabic version of the survey.

Experts' Review (Arabic Version)

A team of eight Arabic-speaking experts (five with Ph.Ds. in special education, and three with M.As. in special education) reviewed the survey and evaluated the scientific merit of it. Each team member was emailed an editable version (word document) of the survey. The main job of this team was to ensure that the items of the questionnaire were objective and aligned with the purpose and the context of the study. Each team member reviewed the survey independently and emailed back the researcher the edited version of survey with

comments. Revisions based on reviewers' comments and feedback were completed.

Pilot Testing

Following the experts' review of the Arabic version of the survey, the pilot-testing phase was initiated. That is, a hard-copy version of the survey was shared with five teachers of students with ASD. This step was taken to evaluate the respondents' understanding and ensure the readability and appropriateness of the items of the questionnaire. Revisions based on teachers' comments and feedback were completed.

Statistical Analyses

Table 1 presents the variables for each aim of the study. Univariate statistics were used to describe the entire sample (numbers and percentages for count data and means and standard deviations for continuous variables). In addition, bivariate analyses were used to examine the relationship between individual independent variables and the dependent variables. For the continuous outcome variables, the mean with standard deviations and median with associated range were calculated for all levels of each categorical variable while cross-tabulations was used to calculate numbers and percentages for the categorical dependent variable. Continuous independent variables were categorized to run the bivariate analyses.

Linear regression was conducted to examine the relationship between the hypothesized independent variables and the continuous dependent variables (knowledge about ASD, self-efficacy, degree of focus on teaching and management of challenging behaviors, degree of focus on teaching on academic skills, degree of focus of teaching on pre-linguistic and joint attention behaviors, degree of focus on teaching on social skills, degree of focus on teaching of language and communication skills, degree of focus on teaching of play

skills, degree of focus on teaching of adaptive skills, degree of focus on teaching of advanced cognitive skills, and degree of focus on teaching of vocational skills). Initially, each independent variable was entered into a linear regression model with the associated dependent variable. Unadjusted regression coefficients with associated 95% confidence intervals (CIs) were calculated for each independent variable. All hypothesized independent variables were then introduced together into multivariate models to produce the adjusted regression coefficients with associated 95% CIs. A force entry method was used to run the multivariate analysis. In addition, two independent sample t-tests were performed to examined mean differences of knowledge about ASD and self-efficacy by teachers' teaching settings (classroom type): special day class versus inclusive classroom (see Appendix A).

Logistic regression was conducted to examine the relationship between teacher and classroom characteristics and the binary outcome variable (i.e., reporting the use of supported practices). Initially, each predictor was entered into a logistic regression model with the use of supported practices as an outcome variable. Unadjusted odds ratios (ORs) with 95% confidence intervals were calculated for each variable. All hypothesized predictors were then introduced together into a multivariate model to produce adjusted odds ratios with 95% confidence intervals. A force entry method was used to for the multivariate analysis.

CHAPTER 3

Results

Response Rate

Initial data screening indicated that about 200 opened the link of the survey. A total of 65 surveys were excluded, as respondents did not complete any questions. A total of 135 teachers attempted to complete at least some questions on the survey during the data collection period and their data were included in the analyses as appropriate. Table 2 provides detailed information about survey responses including the total number of ASD teachers from each of the 13 regions of Saudi Arabia and the percentage of teachers who completed the survey within each region and the overall response rate. According to reports obtained from MoE, there were 946 teachers working with students with ASD in 264 schools across the different regions of Saudi Arabia during the time of which the online link for the survey was shared. The average response rate was 12%, but varied across regions (0%-29%). The two regions with highest response rate were Makkah Al-Mukarmmah (29%) and Al-Qassim (17%). None of the respondent teachers were reported to be working in schools located in either Najran or the Northern Borders. It should be noted that the majority of 135 respondent teachers worked in schools located in one of the three largest and most populated regions of Saudi Arabia: Riyadh (13%), Makkah Al-Mukarmmah (47%), the Eastern region (13%).

Sample Characteristics

Table 3 presents the sample characteristics with the focus on teacher-related characteristics and school-related characteristics. About 44% of the teachers were male. Teachers' age ranged from 22 to 49 years. While the majority of teachers (90%) were special education teachers, the remaining teachers reported that they were general education teachers

(5%) or other specialists (5%; e.g., teacher aides, behavioral specialists). In terms of experience working with students with ASD, the average years of experience was 4.7 (*SD* = 3.3). About 47% had less than three years of experience, 37% with 4-9 years, and only 16% of those with ⩾10 years. Nearly 82% of the teachers had a bachelor's degree, 10% had a post-baccalaureate diploma, and 8% had a master's degree. About 92% of teachers reported that their highest degree was in special education, and 8% reported that their degree was non-special ed. (e.g., general ed., psychology). On average, teachers reported receiving 28 (*SD=30*) hours of ASD-related professional development in the form of workshops and hands-on training within the last three years; 44% received less than 25 hours, 28% received more than 25 hours, and 18% of the teachers reported not receiving any ASD-related professional development training.

Nearly 53% of the teachers worked in schools located in one of three major cities in Saudi Arabia (i.e., Riyadh, Jeddah, and Dammam), and 47% worked in schools located in non-major cities. More than half of the teachers worked in public schools (53%), about less than one-quarter of the teachers worked in private school (21%), and the rest worked in special education institutes (26%). In the terms of the classroom type, the majority of teachers served students with ASD in special day classrooms (82%), 16% served students with ASD in inclusive classrooms, and only 3% of the teachers reported serving students in both settings.

Table 4 presents student-related characteristics. On average, teachers reported working with 7 (*SD*=4.8) students with ASD. In terms of grade level, the majority of teachers reported working with elementary level students (61%), fallowed by Pre-K level students (21%), middle school (5%), and high school students (2%). About 12% of the teachers reported working with students across mixed grades.

With regards to the communication level of students with ASD served, 92% of the teachers reported that they worked with at least one minimally verbal student. About 40% of the teachers reported that they worked with at least one student who exhibited SIB, 51% worked with at least one student who exhibited aggressive behaviors, and 83% worked with at least one student who exhibited stereotypic and repetitive behaviors.

Aim 1: Knowledge About ASD and Associated Factors

A total of 88 teachers completed the knowledge about ASD questionnaire. Only five teachers responded correctly to all items. On average, the teachers' score was *8.6 (SD=1.8)*. This score is equivalent to 72% suggesting that teachers demonstrated a moderate level of knowledge about ASD. Teachers' scores ranged from 3 (or 25%), which fell within the low level of knowledge range to 12 (or 100%), which fell within the high level of knowledge range. Also, it should be noted that none of the teachers responded incorrectly to all items. Figure 1 presents the total number of teachers based on their level of knowledge about ASD. Twenty-seven (31%) teachers demonstrated a high level of knowledge about ASD, and 58 (66%) teachers demonstrated a moderate level of knowledge about ASD. Only three (2%) teachers demonstrated a low level of knowledge about ASD.

Table 5 shows the number and percentages of teachers who responded correctly to each item. Overall, about 89% of teachers responded correctly to more than half of the items. About two-third of the teachers responded correctly to item number 1 (67%), 3 (68%), 4 (68%), and 12 (72%) suggesting that they acknowledge that early behavioral intervention that focuses on pre-linguistic, early social communication, and play skills could lead to better outcomes, and that they know about the diagnostic features of ASD. On the other hand, less than one-third of the teachers responded correctly to item number 8 (30%) and 9 (16%)

suggesting that most of the teachers believed in the myth that there is a link between vaccinations and ASD and that children can grow fully out of ASD after receiving effective intervention. Only 60% of the teachers were knowledgeable of the fact that more boys are diagnosed with ASD than girls. About 48% of the teachers responded incorrectly to item number 7, which was about the misconception that children with ASD never make eye contact.

Results of bivariate analyses of knowledge about ASD by teacher characteristics and classroom characteristics are presented in Table 6. On average, female teachers scored slightly higher (*M= 8.6*) than male teachers (*M= 8.4*). Teachers with <3 years of experience scored slightly lower (*M=8.4*) compared to those with 4-9 years of experience (*M= 8.8*) and those with ⩾10 years of experience (*M=8.6*). Also, teachers who did not receive ASD-related professional development scored slightly lower (*M=8*) compared to those who received <25 hours (*M=8.6*) or those who received 25+ hours of professional development training (*M*= 8.9). Teachers working in an inclusive classroom (although this represented a small portion of the sample) scored slightly lower (*M= 7.8*) compared to those working in a special day class (*M*= 8.8) or both settings (*M*= 8.6).

Predictors of knowledge about ASD. Unadjusted and adjusted regression coefficients and associated 95% CIs calculated with the continuous knowledge about ASD outcome variable are presented in Table 7. None of the associations of the hypothesized predictors were found to be significant at the level of alpha < 0.05 in the unadjusted or adjusted regression models.

Aim 2: Self-efficacy Toward Working with Student with ASD and Associated Factors

A total of 88 teachers completed the self-efficacy scale. Figure 2 illustrates teachers' responses to each item. The majority (90%) of teachers agreed that they feel competent in their abilities in determining appropriate intervention goals for their students with ASD; 91% felt that they were capable of providing consultation and support to the parents of their students. Only 16% indicated that they felt competent in delivering the intervention to their students. On the other hand, 55% of the teachers felt they need support from a more experienced-ASD specialist and 88% could benefit from taking additional ASD-related courses in order to effectively help their students with ASD.

Results of bivariate analyses of self-efficacy are presented in Table 8. On average, the self-efficacy total score for female teachers was slightly higher (*M= 12*) compared to their male counterparts (*M= 11*). In addition, the total self-efficacy scores for teachers with <3 years of experience and those with 4-9 years of experience were slightly lower (*M=11*) compared to those with ⩾10 years of experience (*M=12*). Also, teachers who did not receive ASD-related professional development scored slightly lower (*M=10*) compared to those who received <25 hours of professional development (*M=11*) or those who received 25+ hours of professional development (*M*= 12). Furthermore, self-efficacy scores were slightly lower for teachers with a high level of knowledge (*M*= 11) compared to those with a moderate level of knowledge about ASD (*M*= 11.7). Finally, teachers working in inclusive classrooms scored slightly higher (*M= 12.5*) compared to those working in special day classrooms (*M*=11) or those who reported working in both settings (*M*= 11).

Predictors of self-efficacy. Unadjusted and adjusted regression coefficients and associated 95% CIs calculated with the continuous self-efficacy outcome variable are presented in Table 9. In total, associations with two independent variables were found to be significant at the level of alpha < 0.05. These include professional development and

classroom type. Being in a special day class was associated with a 1.1 lower self-efficacy score when compared to teachers in inclusive classrooms (95% CI: -2.12 – -0.10). An additional hour of professional development was associated with a 0.02 increase in the self-efficacy total score (95% CI: 0.01– 0.03). However, when controlling for other teacher characteristics, in the multiple regression, none of these associations were found to be significant at the level of alpha < 0.05.

Aim 3: Interventions and Teaching Practices and Associated Factors

Figure 3 presents reported teaching and intervention practices used by teachers when working with their students with ASD. A total of 86 teachers responded to this open-ended question. Overall, teachers listed four or fewer practices that may fall under one or more of three categories: supported, unsupported or other practices. Sixty-five (46%) teachers reported using at least one of the practices falling under the supported category. Specifically, 27 (20%) reported using modeling, 21 (16%) reported using visual schedules/aides, 16 (12%) reported using prompting procedures, 11 (8%) reported using reinforcement, eight (6%) reported using an individualized teaching approach, five (4%) reported using social stories, five (4%) reported using computer aided instruction, and only four (3%) reported using PECS. In addition, nine (7%) of the teachers reported using the Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH; Shea, 2013) and about seven (5%) reporting using Applied Behavior Analytic (ABA) strategies and practices. However, only two teachers (2%) reported the use of the intervention of sensory integration (SI). This intervention was listed under the unsupported practices category because different groups of experts found that empirical evidence for its efficacy for children with ASD is lacking (Fisher et al., 2009; Maglione et al., 2012; Wong et al., 2015). On the other hand, teachers reported the use of other practices that did not fall within either the supported or the

unsupported category. About 22 (26%) teachers reported the use of play-based strategies; four (5%) reported the use of cooperative learning strategies, and three (2%) of the teachers used repetition, and three (3%) reported using active learning strategies. In addition, three (3%) of teachers reported using punishment. Finally, two (2%) teachers reported using the Montessori approach (Cossentino, 2017).

Results of bivariate analyses for the use of at least one supported practice by teacher-related characteristics and classroom type are presented in Table 10. The majority of both male (77%) and female (73%) teachers and those with more experience (83% of those with 4-9 years and 81% of those with ≥10 years of experience) reported the use of at least one of the practices under the supported category. No major differences between those who received <25 hours (75%) and those who received 25+ hours (77%) reported using at least one supported practice compared to those who did not receive ASD-related professional development (67%). About 85% of those with a high level of knowledge, 69% of those with a moderate level of knowledge, and 67% of those with low level of knowledge (only three teachers demonstrated low level of knowledge), those with ≤ an average total self-efficacy score (88%), and those with an average self-efficacy score (60%) reported using at least one supported practice. Finally, 80% of the teachers who worked in a special day class reported using at least one supported practice compared to 60% of those working in inclusive classroom.

Predictors of the use of at least one supported practice. Unadjusted and adjusted logistic regression ORs and associated 95% CIs calculated with the binary outcome variable (use of at least one of the supported practices versus not using supported practices) are presented in Table 11. In the unadjusted logistic regression, the ORs with two independent variables were found to be significant at the level of alpha <0.05. These include classroom

type and self-efficacy. Being a teacher in a special day classroom increased the odds of using at least one supported practice compared to teachers in an inclusive classroom (OR: 3.56 [95% CI: 1.16–10.88]). An additional unit in the self-efficacy total score lowered the odds of using supported practices by 34% (OR: 0.66 [95% CI: 0.48–0.90]).

In the adjusted model, the ORs with these two independent variables remained significant. The OR with teacher's years of experience also became significant at the level of alpha <0.05. Controlling for other teachers' characteristics (gender, years of experience, professional development), having <3 years of experience lowered the odds of using supported practices by 90% (OR: 0.10 [95% CI: 0.01–0.80]) when compared to those who have 10 or more years of experiences. The effect of self- efficacy remained the same as in the unadjusted regression (OR: 0.65 [95% CI: 0.45–0.92]) while the effect of the classroom type increased (OR: 4.55 [95% CI: 1.01–20.42]).

Aim 4: Focus of Teaching and Associated Factors

A total of 96 teachers responded to questions related to the focus of their teaching. Figure 4 illustrates the extent to which the different areas of skills were targeted by teachers when working with their students with ASD. The degree to which different areas were targeted varied across skills. The majority of teachers reported targeting the area of language and communication (83%), social (74%), and academic (79%) skills on a daily basis. About 47% focused daily on play skills, and 55% focused daily on adaptive skills with at least one of their students. On the other hand, about half the teachers reported not targeting advanced cognitive (43%), and vocational skills (47%) with any of their students with ASD. The proportion of teachers who targeted play, advanced cognitive skills, and vocational skills was close to being equally distributed based on the degree of focus. Two teachers reported

focusing on an additional area in the open-ended responses. This area was motor movement (e.g., gross and fine motors skills).

Results of bivariate analyses for the focus on each of the areas are presented in Table 12 – 20. Teachers who reported that they focused daily on management of challenging behaviors indicated that at least one of their students was minimally verbal (61%), at least one their students exhibited SIB (71%), at least one of their students exhibited aggressive behaviors (71%), and at least one of their students exhibited SRB (62%; see Table 12). Those who reported focusing daily on academic skills indicated that at least one of their students was minimally verbal (80%), at least one their students exhibited SIB (66%), at least one of their students exhibited aggressive behaviors (73%), and at least one of their students exhibited SRB (82%; see Table 13).

Teachers who reported that they focused daily on skills related to pre-linguistic and joint attention behaviors when at least one of their students was minimally verbal (58%), at least one their students exhibited SIB (49%), at least one of their students exhibited aggressive behaviors (56%), and at least one of their students exhibited SRB (57%; see Table 14). Teachers who reported that they focused daily on social skills when at least one of their students was minimally verbal (76%), at least one their students exhibited SIB (66%), at least one of their students exhibited aggressive behaviors (69%), and at least one of their students exhibited SRB (77%; see Table 15).

Those who reported focusing daily on skills related to language and communication reported that at least one of their students was minimally verbal (84%), at least one their students exhibited SIB (77%), at least one of their students exhibited aggressive behaviors (82%), and at least one of their students exhibited SRB (84%; see Table 16).

Teachers reported that they focused daily on skills related to play indicated that least one of their students was minimally verbal (47%), at least one their students exhibited SIB (37%), at least one of their students exhibited aggressive behaviors (38%), and at least one of their students exhibited SRB (45%; see Table 17). Those who reported that they focused daily on adaptive skills indicated that least one of their students was minimally verbal (56%), at least one their students exhibited SIB (60%), at least one of their students exhibited aggressive behaviors (56%), and at least one of their students exhibited SRB (53%; see Table 18). Teachers who reported that they focused daily on skills advanced cognitive domain indicated that least one of their students was minimally verbal (24%), at least one their students exhibited SIB (7%), at least one of their students exhibited aggressive behaviors (10%), and at least one of their students exhibited SRB (23%; see Table 19).

Teachers reported that they focused daily on vocational skills indicated that least one of their students was minimally verbal (18%), at least one their students exhibited SIB (29%), at least one of their students exhibited aggressive behaviors (22%), and at least one of their students exhibited SRB (18%; see Table 20).

Predictors of the degree of focus on different areas of teaching. Unadjusted and adjusted regression coefficients and associated 95% CIs calculated with each of the continuous outcome variables (i.e., management of challenging behaviors, academic, pre-linguistic communication and joint attention behaviors, language and communication, social, play, adaptive, advanced cognitive, and vocational skills,) are presented in Table 21 -29.

Management of challenging behavior. In the unadjusted regression, the association of having at least one student who exhibited SIB was found to be significant at the level of alpha < 0.05. Having at least one student who exhibited SIB increased the degree of focus on

management of challenging behaviors (coefficient = 0.79 [95% CI: 0.14 – 1.43]). However, this effect was not significant in the adjusted model.

Academic skills. In the unadjusted regression, the association of having at least one student who exhibited SIB was found to be significant at the level of alpha < 0.05. Having at least one student who exhibited SIB lessened the degree of focus on academic skills (coefficient = -0.21 [95% CI: -.38 – - 0.40]). This effect remained significant with a slight increase in the adjusted model (coefficient = -0.19 [95% CI: -.36 – - 0.01]).

Pre-linguistic communication and joint attention behaviors. None of the associations of students' characteristic were found to be significant at the level of alpha < 0.05 in the unadjusted or adjusted linear regression models of the pre-linguistic communication and joint attention behaviors (Table 23).

Social skills. None of the associations of students' characteristics were found to be significant at the level of alpha < 0.05 in the unadjusted or adjusted linear regression models of the social skills (Table 24).

Play skills. In the unadjusted regression, the association of having at least one student who exhibited SIB was found to be significant at the level of alpha < 0.05. Having at least one student who exhibited SIB lessened the degree of focus on play skills (coefficient = -0.21 [95% CI: -.38 – - 0.21]). However, this effect was not significant in the adjusted model (Table 25).

Adaptive skills. None of the associations of students' characteristics were found to be significant at the level of alpha < 0.05 in the unadjusted or adjusted linear regression models of the adaptive skills (Table 26).

***Advanced cognitive skills*.** None of the associations of students' characteristics were found to be significant at the level of alpha < 0.05 in the unadjusted or adjusted linear regression models of the advanced cognitive skills (Table 27).

***Vocational skills*.** None of the associations of students' characteristics were found to be significant at the level of alpha < 0.05 in the unadjusted or adjusted linear regression models of the vocational skills (Table 28).

CHAPTER 4

Discussion

This study aimed to explore the knowledge about ASD, self-efficacy, the use of practices and the focus of teaching among teachers working with students with ASD in schools affiliated with MoE in Saudi Arabia. Data were gathered from an online survey. The response rate was fairly low at 12% of all teachers in the MoE. As such, these findings are preliminary, but they begin to address issues that should be followed up in further research.

Findings from the current study will be discussed in the following sections as they relate to: a) response rate and sample characteristics, b) knowledge about ASD, c) self-efficacy toward working with students with ASD, d) the reported use of teaching and intervention practices, and e) the focus of teaching.

Response Rate and Sample Characteristics

Previous studies that have attempted to examine topics related to special education services for students with ASD in Saudi Arabia surveyed teachers or school professionals from only five regions in one study (Al-Shammari, 2007) and eight regions in the other two studies (Al-Othman 2002; Alzaraa, 2008). Although the response rate in the current study was low, the respondent teachers came from 11 different regions in Saudi Arabia. In addition, although none of the respondent teachers reported to be working in schools located in either Najran or the Northern Borders, the proportion of the teachers within these two regions relative to the of total number of teachers working with students with ASD in schools affiliated with the MoE in Saudi Arabia is only 1% (n= 13). While the number of schools and classrooms serving students with ASD in Saudi Arabia has grown rapidly over the last decade (Battal, 2016), it is possible that the link for the online survey was an easier way to

share with teachers in the distant regions of Saudi Arabia with the exception of those from the Northern Borders and Najran.

With respect to the sample characteristics, although more female than male teachers completed the online survey, the actual data from the MoE indicated that there are more male than female teachers working with students with ASD. Furthermore, the majority of respondent teachers reported that they work with students in elementary grads (Pre-K – 6th grade), and work in special day classrooms. This finding might reflect existing special education services for students with ASD. Recent reports from MoE indicate that more services are available in elementary schools compared to the middle and high school levels combined.

Knowledge About ASD

One finding from the current study was that teachers had a moderate level of knowledge about ASD. The fact that teachers demonstrated some faulty information related to the knowledge about ASD corroborates findings of similar studies conducted in Saudi Arabia (Haimour, & Obaidat, 2013), Oman (Al-Sharbati et al., 2013), Singapore (Lain et al., 2007), China (Liu et al., 2016) and non-teachers (university students, faculty and staff) in the United States (Tipton, & Blacher, 2014). However, it should be noted that the majority of the teachers who completed the knowledge questionnaire in the current study have their bachelor degrees in special education (i.e., some of them with emphasis on ASD) and work with students with ASD on a daily-basis. Having a moderate level of knowledge may impact teachers' decisions about the educational practices they use when working with their students with ASD. Although concerning, this finding should be investigated further in future research.

Some of the positive findings included that the majority of the teachers were knowledgeable about the core deficits of ASD, and that they acknowledge that early behavioral interventions that focus on pre-linguistic, early social communication, and play skills could lead to better outcomes. On the other hand, similar to the findings from previous studies, teachers demonstrated faulty knowledge about ASD when they believed that vaccinations could cause ASD (Al-Sharbati et al., 2013; Haimour & Obaidat, 2013; Tipton & Blacher, 2014), that all children with ASD have poor eye contact (Haimour & Obaidat; Tipton & Blacher), that gluten-free and casein-free diets could lessen symptoms associated with ASD (Haimour & Obaidat; Lian et al., 2008; Liu et al., 2016; Tipton & Blacher), and children with ASD can grow out it (Haimour, & Obaidat; Lian et al.; Liu et al., Tipton & Blacher). Again, these findings might be concerning as teachers communicate with caregivers about their children with ASD on a regular basis. As it has been found that caregivers rely on these teachers to obtain information about ASD (Mackintosh et al., 2005), teachers who possess faulty information about the ASD symptoms, causes or therapeutic approaches may influence parents' decisions where invaluable time and financial resources could be wasted. It is even more worrisome in Saudi Arabia as services are still in the growing phase and a lot of parents are looking for therapeutic approaches that could alleviate their children's ASD symptoms (Alnemary et al., 2017a).

With regards to the predictors of knowledge about ASD, it was hypothesized that teachers who work in special day classrooms, with more years of experience, and who received ASD-related professional development would report higher level of knowledge. However, it was surprising that none of the associations in both the unadjusted and adjusted linear regression models were found to be significant at the level of alpha < 0.05. While the small sample size might have not offered sufficient power to detect these potential

associations, the possible impact of years of experience, professional development and classroom type should not be undermined. Although years of experience of working with students with ASD may reflect the amount of support from one's supervisor and colleagues, descriptive statistics from the current study indicated that teachers demonstrated a moderate level of knowledge about ASD regardless of years of experience. It is also possible that teachers have attended hands-on training workshops that covered topics related to assessment procedures or special education teaching and intervention practices, and have not attended those about the symptoms or the etiology of ASD. It is also possible that the quality of information presented to these teachers is not up date. However, these two possibilities should be investigated in future studies. With respect to the classroom type, descriptive statistics indicated that the total knowledge score for teachers of special day classrooms was higher compared to those working in inclusive classrooms. Again, it should be noted that three-fourths of the teachers who completed the knowledge questionnaire reported to be working in special day classrooms.

Self-Efficacy Toward Working with Students with ASD

Findings regarding self-efficacy suggest that teachers feel competent in their abilities in determining appropriate intervention goals, competent in delivering ASD intervention, and capable of providing consultation and support to the parents of their students with ASD. This positive finding might be attributable to the fact the majority of teachers have received formal training in special education. On the other hand, the majority of teachers felt that they needed support from a more experienced-ASD specialist and that they could benefit from taking additional ASD-related courses in order to effectively help their students with ASD. These needs should be met urgently as the numbers of students with ASD who are receiving special education services in school affiliated with the MoE are growing rapidly across all regions of

Saudi Arabia.

When looking at the self-efficacy total score, none of the teachers achieved the highest possible score (i.e., 20) on the measure used in the current study. This finding may speak to the type of students severed by these teachers and teachers' preparation level. Previous research found that having high self-efficacy might translate to employing more positive and less aversive intervention practices to address students' challenging behaviors (Gebbie et al. 2011). On the other hand, having a low level of self-efficacy could impact teacher's performance negatively, and may increase job-related stress (Betoret, 2006), and thus lead to burnout (Bandura, 1986; Pajress and Usher, 2007).

The average of the total self-efficacy score for female teachers was slightly higher than that of male teachers. It is possible that female teachers have perceived themselves as more efficacious compared to their male counterparts, a finding that is consistent with previous research (Cavers, 1988; Greenwood et al., 1990). It should be noted that both female and male teachers must have special education credentials in order to work with students with ASD in schools affiliated with the MoE. Another possible explanation for the difference in self-efficacy is that it might be female teachers are receiving more support from their supervisors, and such support served as a source of self-efficacy. In addition, although a small effect, consistent with previous research (Corona et al., 2017) this study showed that the number of hours of professional development was associated with higher self-efficacy. Blacher et al. (2015) suggested that appropriate professional development training that covers topics related to the management of students with ASD could be potentially beneficial in improving teachers' self-efficacy and their performance in the classroom. Finally, the association found between classroom type and self-efficacy might reflect the responsibilities associated with each classroom's setting. Being a teacher in special day classroom where

students might be more impacted requires more support compared to being a teacher in an inclusive classroom, where students with ASD may require less support.

Teaching and Intervention Practices

When asked about intervention practices or intervention strategies used when working with students with ASD, teachers reported the use of four or fewer practices that fell under one of the three categories, supported, unsupported, or other practices. Such a finding might be similar to those reported by Hess et al. (2008), who examined the use of practices among teachers in the state of Georgia, and by Stahmer et al. (2005), who examined the use of practices among a sample of early childhood special educators in Southern California, and found that teachers reported the use of different practices and many of which were not empirically-supported. The fact that teachers in Saudi Arabia reported the use of practices many of which are commonly used by teachers of students with ASD in the U.S. may support the possibility that the education of students with ASD and other developmental disabilities is influenced by the education system of the U.S. (Alquraini, 2010). Also, it is possible that they learned about the practices reported in their preparation programs from faculty members who graduated from universities in the U.S. other Western countries. Or, teachers might have self-taught themselves in order to address their student's needs by reading books, online blogs, and website materials, where many of these different sources may contain inaccurate information about ASD (Alnemary et al., 2017c; Riechow et al., 2012).

The fact that more teachers reported the use of at least one of the practices under the supported category compared to those who reported the use of other practices under the unsupported practices (only two teachers) could be viewed as a positive finding, as it may reflect the pre-service and in-service trainings that these teachers received and it may also

represent a sketch of what happen in the classrooms. However, reporting the use of supported practices does not guarantee that these practices are implemented with a high degree of fidelity.

Clearly, the way by which data were collected (open-ended questions in an online-survey) may have limited teachers' responses, resulted in teachers' underreporting of the practices that they use. For example, modeling was the most reported practice. However, modeling is only one strategy that is usually implemented as an element of a larger intervention package. Teachers may have used other practices, along with modeling, such as direct instruction, repetition, or individualized teaching but did not report such a practices. Such a finding should be explored in future studies.

The majority of both female and male teachers reported using at least one of the practices under the supported category. This finding is expected, as credentialing requirements are the same for both female and male special education teachers who are working in schools affiliated with the MoE. Another finding was that the proportion of teachers with more experience (4-9 or ≥10 years) who reported the use of at least one supported practice was higher compared to that of those with ≤3 years of experience. It is possible that in-service professional development training along with access to other teachers may have an influence on such a finding. The association that being a teacher in a special day classroom increased the odds of using at least one supported practice compared to being a teacher in an inclusive classroom could be explained by the possibility that teachers in special day classrooms work with more students with ASD who are severely impacted, thus the reported use of more supported practices finding, compared to those working in inclusive classrooms. The association of higher self-efficacy with the lower odds of using supported practices was not expected but might be attributed to the definition used for what could be

identified as a supported practice.

Focus of Teaching

Teachers reported that they focused on different areas, but the majority focused on teaching communication and social skills on a daily basis. This is expected given that deficits in social communication are one of the core features of ASD (American Psychiatric Association, 2013). Teachers also reported a focus on teaching academic skills on a daily basis. Teachers are required to follow the special education curriculum developed by the MoE for those educated in special day classrooms or apply accommodation and modification procedures for the general education curriculum for those in inclusive classrooms (Aldabas, 2015; Battal, 2016).

The majority of teachers focused on the management of challenging behaviors to some degree, and those with at least one student who exhibited SIB, at least one student who exhibited aggressive behaviors, at least one student who exhibited SRB focused daily on this area. Such a finding is logical but future research should examine what practices or procedures teachers are applying to eliminate or reduce their students' challenging behaviors. Assessment and intervention practices that are designed to reduce such challenging behaviors in school settings exist (Bloom et al, 2011; Sigafoos & Saggers, 1995), and teachers may benefit from receiving a comprehensive training on this topic (Iadarola et al., 2017).

More than half of the teachers reported targeting pre-linguistic and joint attention behaviors and less than half reported focusing on play skills daily. It is not clear how teachers target these areas, as data from the current study did not permit answering such a question. For those who do not focus on such areas, especially joint attention, it is possible that they lack awareness of the importance of such an area (Mundy, Sigman, & Kasari, 1990) on

language development. Teachers may not have received proper training on why and how to address this core deficit of ASD. Naturalistic development behavioral interventions (Schreibman et al., 2015) that target these core deficits exist, including the Joint Attention Symbolic Play Engagement and Regulation (JASPER; Chang et al., 2016), and teachers could benefit from receiving formal training on how to implement such interventions.

The finding that teachers did not focus on advanced cognitive skills may speak to students' characteristics and/or teachers' level of preparation to address their students' needs. It is possible that many of the students with an ASD designation are those who are severely impacted and those who are high functioning are not getting or obtaining such a designation, therefore not being taught by these teachers. Such an interoperation is plausible but needs to be explored in future research. The fact that a fewer teachers targeted vocational skills could be attributable to the fact that the majority of respondent teachers were working with students in the elementary grade level in special day classrooms located of public schools. Such skills are targeted with older students who attend special educational institutes.

Finally, having at least one student who exhibited SIB lessened the degree of focus on academic skills or play skills. Such a finding could be interpreted in two different ways. First, teachers may have focused on areas other than academic skills to address their students' needs and this is appropriate. However, it is possible that teachers have attempted previously to target academic skills or play skills, but they discontinued focusing on such skills because their students exhibited challenging behaviors. In this case, teachers might need more support and more training not only on how to deal with challenging behaviors that might interfere with teaching academic or play skills, but also how and when to select appropriate intervention targets that fit their students' needs and that are compatible with the settings where they are educated.

Practical Implications

Despite the governmental effort to improve services for students with special needs, including those with ASD, more is needed to improve such services (Alquraini, 2010). Because outside-school services (e.g., behavioral services, speech therapy, occupational therapy) might not be available for many students with ASD, such students may need more from their teachers in school settings. Therefore, teachers feel obligated to address their needs rather than focusing on academic skills only. One of the most challenging issues for the MoE is keeping up with the increased need for teacher training to provide appropriate supports for their students with ASD. Teachers who work with these students must be knowledgeable of the range of available intervention and teaching practices, and must be able to implement them individually based on each student' needs (National Research Council, 2001). Data from the current study indicate that a pressing need exists to develop trainings that can be delivered on a large scale to all teachers across all regions of Saudi Arabia that focus on empirically validated interventions for different skills or areas of deficits to address the needs of their students with ASD. Teachers may benefit from training on intervention packages that could be divided into small modules to address a particular area they need to target when working with their students with ASD (Kasari & Smith, 2013). For example, training may cover topics related to providing 1) individualized supports and services, 2) systematic instruction, 3) structured learning environments, 4) specialized curriculum content, 5) functional approach to problem behavior; and (6) family involvement (Iovannone et al., 2003). Teachers should be taught skills on how to differentiate empirically valid practices from the unsubstantiated ones (Blacher et al., 2015). Training should also cover different topics that improve knowledge about ASD, and how teachers can implement different interventions to meet the needs of their students. Training should be tailored based both on

teachers' needs, and the needs of their students with ASD. As found in the current study, level of knowledge and self-efficacy of teachers working in special day classrooms may be different than those working in inclusive classrooms, and therefor may need training on different topics (see Appendix A). The use of learning management online platforms may be one of the tools that could accelerate the development and delivery of professional development and support teachers efficiently and effectively across all regions of Saudi Arabia. Those who are in areas where access to an ASD-specialist is not feasible on a regular basis may benefit from the use of the freely available video-conferencing technologies (Alnemary et al., 2015)

Limitations

The current study has several limitations that are noteworthy. Collectively, the methodology, the sampling procedure, the design, and the tool by which data were collected may have limited the amount of information that could have been gathered (Etkan, et al., 2016). Had other methods (e.g., extensive interviews, focus group, direct observation) been used, a richer and more informative data would have been obtained. Teachers could have been given the opportunity to elaborate and provide examples of how and what interventions they apply when working with their students with ASD. The sample size and its representativeness is another major limitation. Data gathered for this study was based on a low response rate of the entire population of teachers of students with ASD in schools affiliated with the MoE. The design of the current study (cross-sectional) may also be viewed as a limitation as data were collected at one time point. However, it should be noted that the data collection period was done at the end of the 2016-2017 school year. The use of the online survey as a data collection tool may be viewed as a limitation as well. Despite the above-mentioned limitations, the current study shed some light on four interrelated special

education topics: teachers' knowledge about ASD, perceived competencies, the use of intervention practices, and the focus of teaching in Saudi Arabia. While two of these topics (i.e., use of practices and the focus of teaching) have been touched upon in previous research (Al-Othman, 2002; Al-Shammari, 2007, Alzaraa, 2008), the other two have never been examined (i.e., knowledge and self-efficacy) with such as a population.

Directions for Future Research

Future research should thoroughly examine topics explored in the current study. A study with a larger and a more representative sample where information about knowledge about ASD, self-efficacy toward working with students with ASD, the use of teaching and intervention practices, and the focus of teaching where data are gathered by multiple methods will improve our understanding of the current status of education services provided to students with ASD in Saudi Arabia. Asking teachers to report their level of knowledge with measures that cover additional aspects other that those examined in the current study would be informative. Asking teachers to list goals from the individualized education plan or present them with case scenarios might be helpful ways of examining teachers' use of intervention and teaching practices. The current study did not address explicitly how these teachers determine appropriate intervention targets for their students with ASD, a question that could be investigated in future studies. A longitudinal study with professional development training modules that are based on teachers' needs might be worth doing. By taking these steps, policy makers in Saudi Arabia will be better equipped with the necessary information to strategically plan for the advancement of education of students with ASD.

List Tables and Figures

Table 1.
Study Variables

Aim	Dependent Variable(s) (*Definition; Type*)	Independent Variable(s) (*Definition; Type*)
1	Knowledge about ASD (*Total score of correct responses on the 12-item measure, and scores range from 0-12; continuous*).	• Years of experience (*≤ 3 years, 4 to 9 years, ⩾10 years; categorical*) • Professional development (*Total hours of ASD-related professional development received within the last 3 years; continuous*) • Gender (*categorical*) • Classroom type (*Special day class vs. inclusive; categorical*)
2	Self-efficacy toward working with students with ASD *(Total score of rating on the 5-item scale, ranging from 5-20; continuous*)	• Years of experience (*≤ 3 years, 4t o 9 years, ⩾10 years; categorical*) • Professional development (*Total hours of ASD-related professional received within the last 3 years; continuous*) • Gender (*categorical*) • Knowledge about ASD (*continuous*) • Classroom type (*Special day class vs. inclusive; categorical*)
3	Reported use of supported teaching and intervention practices *(Reporting the use of at least one supported teaching or intervention practices as defined by the researcher following multiple reports on ASD teaching and intervention practices;*	• Years of experience (*≤ 3 years, 4t o 9 years, ⩾10 years; categorical*) • Professional development (*Total hours of ASD-related professional received within the last 3 years; continuous*) • Gender (*categorical*)

	binary)	• Knowledge about ASD (*continuous*) • Self-efficacy (*continuous*) • Classroom type (*Special day class vs. inclusive; categorical*)
4	Degree of focus of teaching (*Management of challenging behaviors, academic, pre-linguistic communication and joint attention behaviors, language and communication, social skills, play skills, adaptive skills, vocational skills, and executive functioning skills; 5-point scale, daily= 5, 4= weekly, 3=biweekly, 2=monthly, 1= do not target*)	Students' characteristics • Communication level (*Not working with a student who is minimally verbal vs. having at least one student; categorical*) • Challenging behaviors Self-injury (*Not working with a student who exhibited SIB vs. having at least one student who exhibited SIB; categorical*) • Challenging behaviors Aggression (*Not working with students who exhibited aggression vs. having at least one student who exhibited aggression; categorical*) • Challenging behaviors Stereotypic and repetitive behaviors (*Not working a student who exhibited SRB vs. having at least one student who exhibited SRB; categorical*)

Table 2
Response Summation by Region

	Number of ASD Teachers Within Each Region	Number of Respondents	Response Rate
Riyadh	188	17	9%
Makkah Al-Mukarmmah	222	63	29%
Eastern	257	21	8%
Al-Madinah	77	5	7%
Al-Qassim	29	5	17%
Asir	30	3	10%
Ha'il	22	2	9%
Jazan	34	8	24%
Tabuk	49	8	16%
Al-Bahah	16	2	13%
Al-Jawf	9	1	11%
Najran	11	0	0
Northern Borders	2	0	0
Total	946	135	-

Note. *Response Rate Mean = 12% (SD = 8%)*

Table 3
Sample Characteristics (Teacher and School-Related Characteristics)

Variable	*N*	Categories	*n* (%)	M (SD)
Gender	135			
		Male	59 (44%)	
		Female	76 (56%)	
Age				
		22-25 years old	33 (24%)	
		26-30 years old	47 (35%)	
		31-35 years old	25 (26%)	
		35-49 years old	20 (15%)	
Position	135			
		Special ed. teacher	121 (90%)	
		General ed.	7 (5%)	
		Other	7 (5%)	
Years of experience working with students with ASD	135			4.7 (3.3)
		< 3 years	63 (47%)	
		4-9 years	50 (37%)	
		⩾10 years	22 (16%)	
Educational level	135			
		Bachelor	110 (82%)	
		Post-Bachelor diploma	14 (10%)	
		Master	11 (8%)	
Major of highest degree earned	135			
		Special ed.	124 (92%)	
		Non-special ed.	11 (8%)	
ASD-related professional development	135			28 (30)
		0 hours	24 (18%)	
		< 25 hours	60 (44%)	
		25+ hours	51 (38%)	
School location	135			
		Major city	72 (53%)	
		Non-major city	63 (47%)	
School type	135			
		Public	75 (53%)	
		Private	28 (21%)	
		Special ed. institute	35 (26%)	
Classroom type	135			
		Inclusive	21 (16%)	
		SDC	110 (82%)	
		Both	4 (3%)	

Note. Note. *N*= total number of respondents for each variable, *n* = number of respondents within each category, *M*= mean, *SD* = standard deviation, *Mdn*= median, SDC = special day class.

Table 4

Student-Related characteristics as Reported by Teachers

Variable	N of respondents	Category	*n* (%)	*M (SD)*
Number of students with ASD on current roster	113			6.6 (4.8)
Grade level	112			
		Pre-K	24 (21%)	
		Elementary	68 (61%)	
		Middle	5 (5%)	
		High	2 (2%)	
		Mixed	13 (12%)	
Communication level (Minimally verbal)	113			
		None of the students	9 (8%)	
		At least one student is minimally verbal	104 (92%)	
Challenging behaviors (*Self-injury*)	113			
		None of the students	67 (60%)	
		At least one student with SIB	46 (40%)	
Challenging behaviors (*Aggressive behaviors*)	112			
		None of the students	55 (49%)	
		At least one student with aggressive behaviors	57 (51%)	
Challenging behaviors (*Stereotypic and repetitive behaviors*)	109			
		None of the students	18 (17%)	
		At least one student with SRB	91 (83%)	

Note. Note. *N*= total number of respondents for each variable, *n* = number of respondents within each category, *M*= mean, *SD* = standard deviation, *Mdn*= median, *SIB* = self-injury, *SRB* = *stereotypic and repetitive behaviors.*

Aim 1: Knowledge about ASD and Factors Associated With It

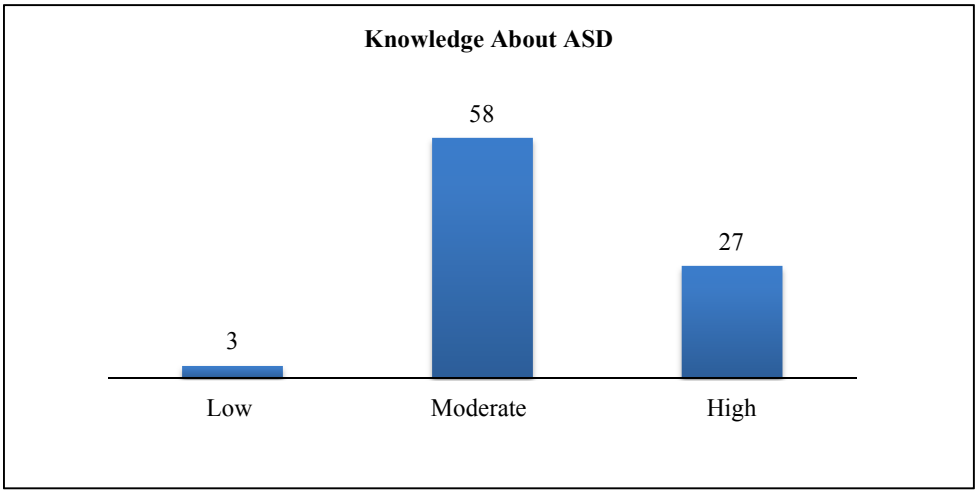

Figure 1. Total number of teachers based on their level of knowledge about ASD; high⩾80%, moderate = 79-50%; low = <50%

Table 5
Teachers' Responses on the Knowledge About ASD (N= 88)

Statement	Correct *n* (%)
1. Children must exhibit impaired social interaction to receive a diagnosis of autism (T)	59 (67)
2. Children must exhibit behaviors and interests that are repetitive and stereotyped to receive a diagnosis of autism (T)	53 (60)
3. Children must exhibit self-injurious behaviors to receive a diagnosis of autism (F)	60 (68)
4. Children must exhibit aggressive behaviors toward others to receive a diagnosis of autism (F)	60 (68)
5. More boys are diagnosed with autism than girls (T)	53 (60%)
6. Some children with autism demonstrate uneven gross motor and fine motor skills (T)	49 (56)
7. Children with autism never make eye contact (F)	46 (52)
8. There is a link between vaccination and autism (F)	27 (31)
9. Gluten-free and casein and diet is an effective treatment to alleviate ASD symptoms (F)	16 (18)
10. With effective intervention(s), a child can be cured from ASD (F)	38 (43)
11. ASD diagnosis can be given as early as 18 months of age (T)	37 (42)
12. Early behavioral intervention that focus on pre-linguistic, social communication, and play will lead to better outcomes (T)	63 (72)

Note. *N*= number of respondents to the Knowledge About ASD questionnaire, *n* = number of those responded correctly.
Knowledge about ASD total score M= 8.6 (SD 1.8); range (3-12).

Table 6
Knowledge About ASD by Teacher -Related Characteristics and Classroom Type

	n (%)	*M (SD)*	*Mdn (Range)*
Gender of teacher			
Male	44 (50%)	8.4 (1.7)	8 (5-12)
Female	44 (50%)	8.6 (1.9)	9 (3-12)
Years of experience working with students with ASD			
< 3 years	39 (44%)	8.4 (1.8)	9 (3-12)
4-9 years	32 (36%)	8.8 (1.9)	9 (5-12)
⩾10 years	17(19%)	8.6(1.8)	8 (6-12)
ASD-related professional development			
0 hours	15 (17%)	8 (1.9)	8 (3-11)
< 25 hours	43(49%)	8.6 (1.8)	9 (5-12)
25+ hours	30 (34%)	8.9 (1.8)	9 (6-12)
Classroom type			
Inclusive	15 (17%)	7.8 (2.4)	8 (3-12)
Special day class	70 (80%)	8.8 (1.6)	9 (5-12)
Both	3 (3%)	8.6 (1.8)	7 (6-12)

Note. *n* = number of respondent within each category, *M*= mean, *SD* = standard deviation, *Mdn*= median, *SIB* = self-injury, *SRB = stereotypic and repetitive behaviors.*

Table 7

Linear Regression Predicting Knowledge About ASD

Variable	Unadjusted				Adjusted*			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
Gender (Male)	-.409	.390	-1.184	.366	-.538	.433	-1.399	.323
Years of experiences (≤ 3 years)	.134	.535	-.929	1.198	-.215	.609	-1.427	.998
Years of experiences (4t o 9 years)	.491	.552	-.607	1.589	.339	.552	-.759	1.437
Professional development	.008	.007	-.006	.022	.009	.007	-.005	.024
Classroom type (SDC)	.813	.478	-.138	1.764	.921	.493	-.059	1.902

Note. *B* = unstandardized beta coefficient, *SE B* = standard error, *CI* = confidence interval.

*F (5, 82) = 1.497, p = < 0.200. Adjusted R^2 = .03.

Default case is female, years of experiences (≥10 years), in inclusive sitting.

[a] P < .01.

[b] P< .05.

Aim 2: Self-Efficacy For Working with Students with ASD and Associated Factors

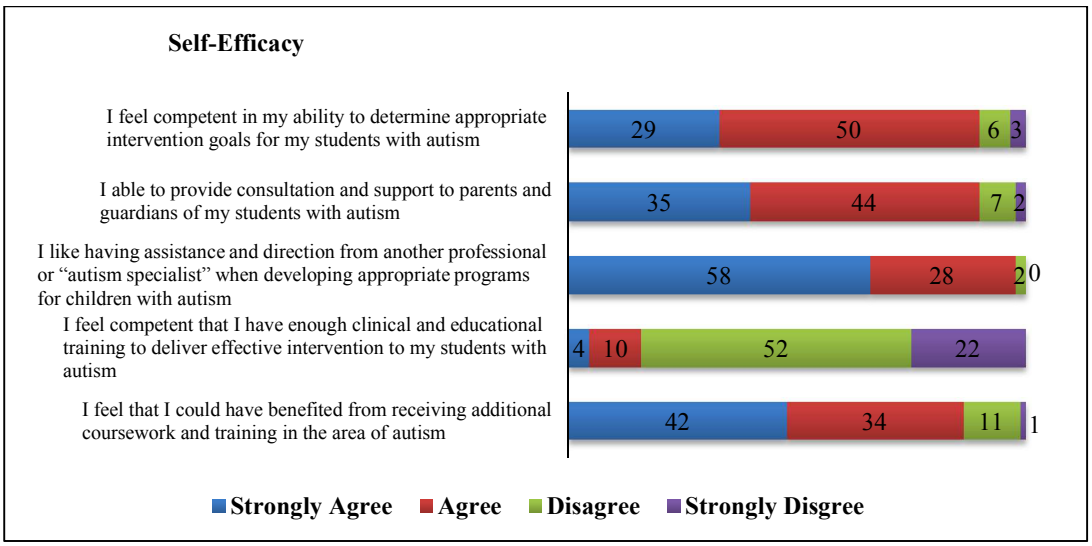

Figure 2. Teachers' responses on the self-efficacy scale based on the rating category

Table 8
Self-efficacy (Total Score) Toward Working with Students with ASD by Teacher -Related Characteristics and Classroom Type (n= 88)

	No. (%)	*M (SD)*	*Mdn (Range)*
Gender of teacher			
Male	44 (50%)	12(2.1)	12 (6-15)
Female	44 (50%)	11(1.8)	11 (7-14)
Years of experience working with students with ASD			
< 3 years	39 (44%)	11 (2)	11 (6-15)
4-9 years	31(35%)	12 (2)	11 (8-15)
⩾10 years	17(19%)	11 (1.6)	12 (9-14)
ASD-related professional development			
0 hours	15 (17%)	10 (2.4)	11 (6-14)
< 25 hours	43(48%)	11 (1.8)	11 (8-15)
25+ hours	17 (19%)	12 (1.8)	12 (9-15)
Knowledge about ASD			
High	27 (31%)	11 (1.7)	11 (8-15)
Moderate	58 (66%)	11.7 (2.1)	12 (6-15)
Low	3 (3%)	11 (2)	11 (9-13)
Classroom type			
Inclusive	15 (17%)	12.5 (1.9)	13 (9-15)
Special day class	70 (80%)	11.2 (1.9)	11 (6-15)
Both	3 (3%)	11.3 (1.2)	12 (10-12)

Note. *M*= mean, *SD* = standard deviation, *Mdn*= median, *SIB* = self-injury, *SRB* = *stereotypic and repetitive behaviors.*

Table 9
Linear Regression Predicting Self-Efficacy

Variable	Unadjusted				Adjusted *			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
Gender (Male)	.545	.418	-.286	1.377	.261	.466	-.667	1.188
Experiences (≤ 3 years)	-.839	.571	-1.974	.297	-.201	.651	-1.496	1.095
Experiences (4 to 9 years)	-.316	.590	-1.488	.856	-.050	.590	-1.225	1.125
Classroom type (SDC)	-1.105 [b]	.510	-2.119	-.091	-.786	.537	-1.855	.283
Professional development	.016 [a]	.007	.001	.030	.014	.008	-.002	.029
Knowledge about ASD	-.133	.115	-.362	.096	-.121	.118	-.356	.114

Note. *B* = unstandardized beta coefficient, *SE B* = standard error, *CI* = confidence interval, SDC= special day class.
* F (5, 82) = 1.681, p = < 0.136. Adjusted R^2 = 0.05.
Default case is female, years of experiences (≥10 years), in inclusive sitting.
[a] P < .01
[b] P < .05.

Aim 3: Teaching and Intervention Practices and Factors Associated with the Use of Supported Practices

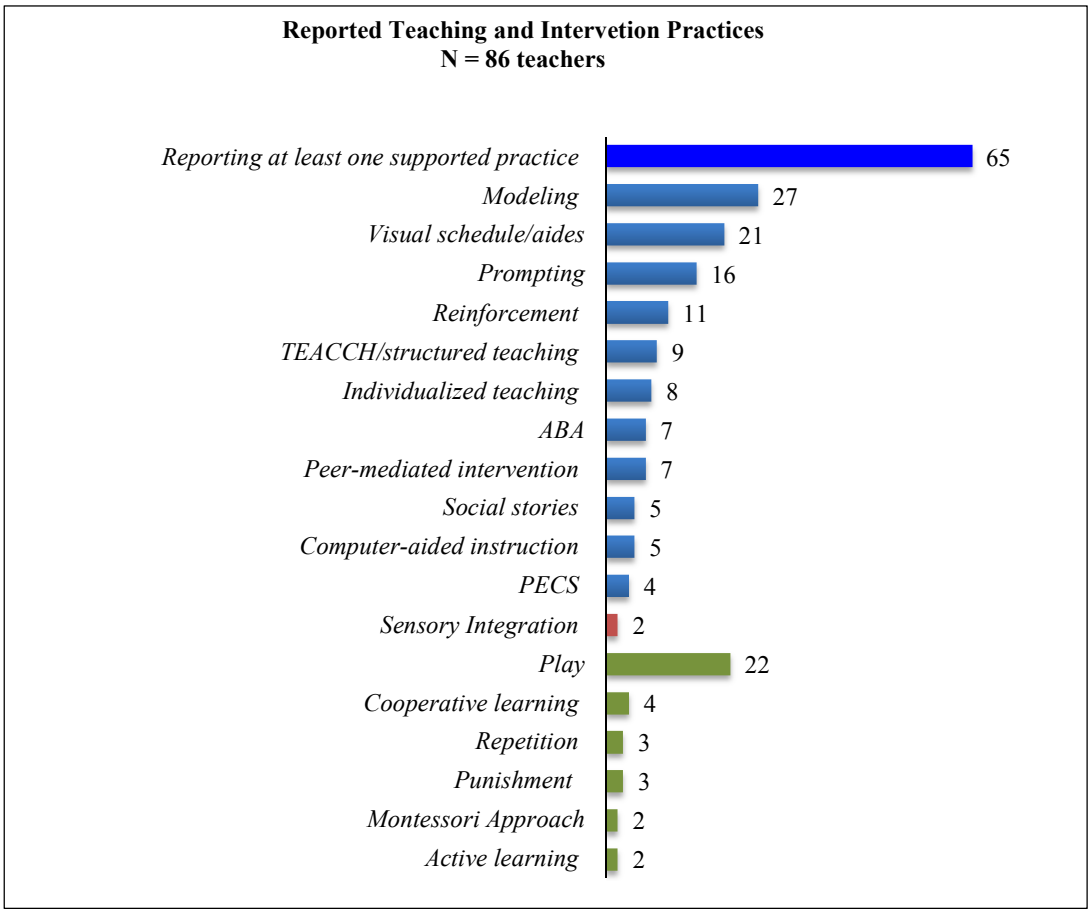

Figure 3. Reported use of teaching and intervention practices. The dark blue bar represents the number of teachers who reported the use of at least one supported practice; light blue bars represent number of teachers as they correspond the use of each of supported practices; the orange bar represents number of teachers who reported the use of unsupported practice; the gray bars represent the number of teachers as they correspond the use of each of other practices

Table 10
Reported Use of at Least One Supported Practices by Teacher-Related Characteristics and Classroom Type (N= 86)

	Reported	*Did not report*
Gender	*n* (%)	*n* (%)
Male	36 (77%)	11 (23%)
Female	29 (73%)	11 (27%)
Years of experience working with students with ASD		
≤3 years	14 (34%)	27 (66%)
4-9 years	25 (83%)	5 (17%)
≥10	13 (81%)	3 (19%)
ASD-related professional development		
0 hours	10 (67%)	5 (33%)
< 25 hours	31 (75%)	10 (24%)
25+ hours	24 (77%)	7 (23%)
Knowledge about ASD		
Low	2 (67%)	1 (33%)
Moderate	36 (69%)	16 (31%)
High	22 (85%)	4 (15%)
Self-efficacy		
≤ Average	36 (88%)	5 (12%)
> Average	24 (60%)	16 (40%)
Classroom type		
Inclusive	9 (60%)	6 (40%)
Special day class	56 (80%)	14 (20%)

Note. *n* = number of respondents within each category, *M*= mean, *SD* = standard deviation, *Mdn*= median, *SIB* = self-injury, *SRB* = *stereotypic and repetitive behaviors.*

Table 11

Logistic Regression Predicting Use of Supported Practices

	Unadjusted			Adjusted*		
	OR	95% CI for OR		OR	95% CI for OR	
		Lower	Upper		Lower	Upper
Gender (Male)	.806	.306	2.121	.475	.118	1.917
Experiences (≤ 3 years)	.445	.108	1.826	.097 [b]	.012	.798
Experiences (4 to 9 years)	1.154	.238	5.605	.770	.122	4.858
Professional development	.997	.981	1.014	.997	.976	1.018
Knowledge about ASD	1.276	.966	1.684	1.133	.822	1.560
Self-efficacy	.660 [a]	.484	.899	.646 [b]	.453	.921
Classroom type (SDC)	3.556 [b]	1.162	10.876	4.551 [b]	1.014	20.420

Note. *OR* = odd ratio, *CI* = confidence interval, *SDC*= special day class.
*Model $x2(7) = 20.935$, $p < .004$. Hosmer and Lemeshow $\chi^2(8) = 7.631$, $p < .470$. $R^2 = .23$ (Cox & Snell), .33 (Nagelkerke).
Default case is female, years of experiences (≥10 years), in inclusive sitting.
[a] $P < .01$.
[b] $P < .05$.

Aim 4: Focus of Teaching and Associated Factors

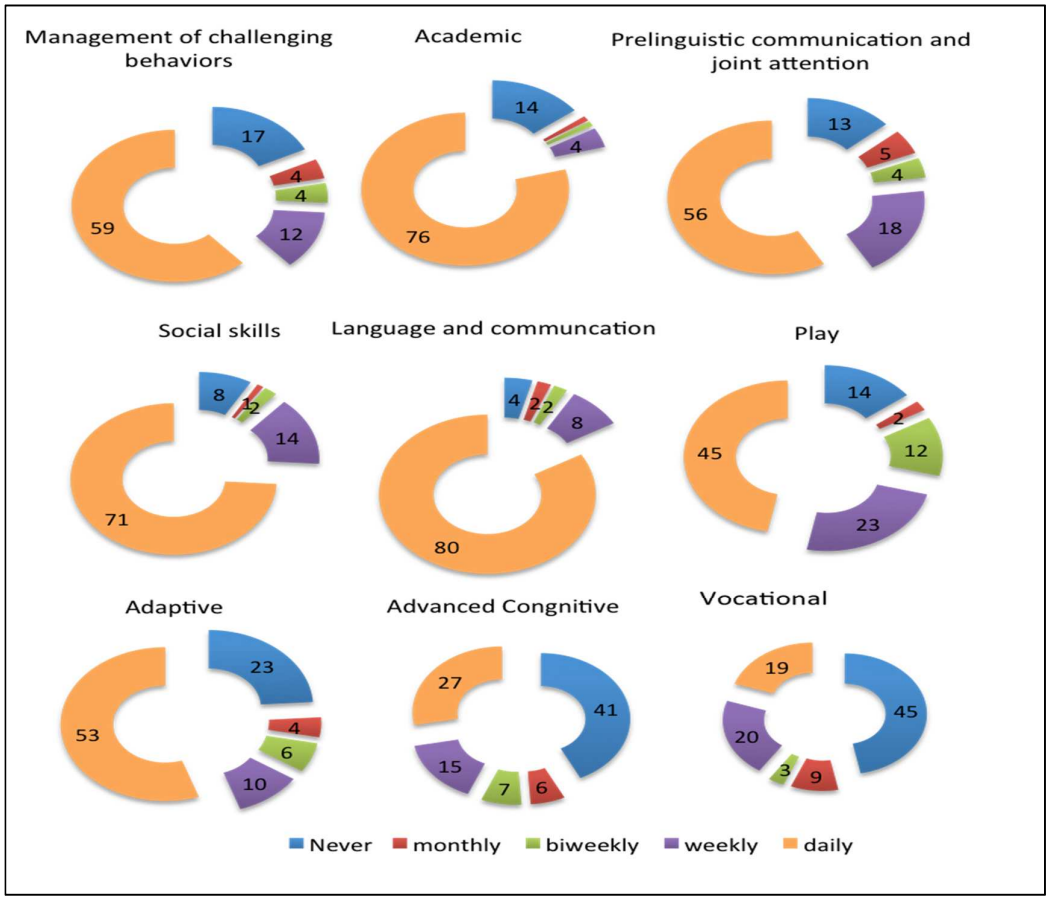

Figure 4. Teachers' degree of focus on teaching different areas when working with their students with ASD

Table 12
Focus of Teaching on Management of Challenging Behaviors by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (Minimally verbal)					
None of the students	4 (67%)	0 (0%)	0 (0%)	0 (0%)	2 (33%)
At least one student is minimally verbal	55 (61%)	12 (13%)	4 (4%)	4 (4%)	15 (17%)
Challenging behaviors (*Self-injury*)					
None of the students	34 (56%)	7 (12%)	2 (3%)	2 (3%)	16 (26%)
At least one student with SIB	25 (71%)	5 (14%)	2 (6%)	2 (6%)	1 (3%)
Challenging Behaviors (*Aggressive behavior*)					
None of the students	27 (53%)	8 (16%)	1 (2%)	3 (6%)	12 (26%)
At least one student with aggressive behaviors	32 (71%)	4 (9%)	3 (7%)	1 (2%)	5 (11%)
Challenging Behaviors (*Stereotypic and repetitive behaviors*)					
None of the students	7 (54%)	2 (15%)	0 (0%)	1 (8%)	3 (23%)
At least one student with SRB	52 (62%)	10 (12%)	4 (5%)	3 (4%)	14 (17%)

Note. *SIB* = self-injury, *SRB = stereotypic and repetitive behaviors.*

Table 13
Focus of Teaching on Academic Skills by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (Minimally verbal)					
None of the students	4 (67%)	0 (0%)	0 (0%)	0 (0%)	2 (33%)
At least one student is minimally verbal	72 (80%)	4 (4%)	1 (1%)	1 (1%)	12 (13%)
Challenging behaviors (*Self-injury*)					
None of the students	53 (87%)	0 (0%)	1 (2%)	1 (2%)	6 (10%)
At least one student with SIB	23 (66%)	4 (11%)	0 (0%)	0 (0%)	8 (23%)
Challenging behaviors (*Aggressive behaviors*)					
None of the students	43 (84%)	1 (3%)	0 (0%)	1 (2%)	6 (12%)
At least one student with aggressive behaviors	33 (73%)	3 (7%)	1 (2%)	0 (0%)	8 (18%)
Challenging behaviors (*Stereotypic and repetitive behaviors*)					
None of the students	8 (62%)	0 (0%)	0 (0%)	0 (0%)	5 (39%)
At least one student with SRB	68 (82%)	4 (5%)	1 (1%)	1 (1%)	9 (11%)

Note. *SIB* = self-injury, *SRB* = *stereotypic and repetitive behaviors.*

Table 14
Focus of Teaching on Pre-linguistic and Joint Attention Skills by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (Minimally verbal)					
None of the students	4 (67%)	0 (0%)	0 (0%)	1 (17%)	1 (17%)
At least one student is minimally verbal	52 (58%)	18 (20%)	4 (4%)	4 (4%)	12 (13%)
Challenging behaviors (*Self-injury*)					
None of the students	39 (64%)	7 (12%)	2 (3%)	4 (7%)	9 (15%)
At least one student with SIB	17 (49%)	11 (31%)	2 (6%)	1 (3%)	4 (11%)
Challenging behaviors (*Aggressive behaviors*)					
None of the students	31 (61%)	8 (16%)	1 (2%)	2 (4%)	9 (18%)
At least one student with aggressive behaviors	25 (56%)	18 (18%)	4 (4%)	5 (5)	13 (14%)

Challenging behaviors (*Stereotypic and repetitive behaviors*)					
None of the students	9 (69%)	1 (7%)	0 (0%)	2 (15%)	1 (7.7)
At least one student with SRB	47 (57%)	17 (20%)	4 (5%)	3 (4%)	12 (15%)

Note. *SIB* = self-injury, *SRB = stereotypic and repetitive behaviors.*

Table 15

Focus of Teaching on Social Skills by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (Minimally verbal)					
None of the students	3 (50%)	1 (17%)	0 (0%)	0 (0%)	2 (33%)
At least one student is minimally verbal	68 (76%)	13 (14%)	2 (2%)	1 (1%)	6 (7%)
Challenging behaviors (*Self-injury*)					
None of the students	48 (79%)	6 (10%)	2 (3%)	1 (2%)	4 (7%)
At least one student with SIB	23 (66%)	8 (23%)	0 (0%)	0 (0%)	4 (11%)
Challenging behaviors (*Aggressive behaviors*)					
None of the students	40 (78%)	6 (12%)	1 (2%)	1 (2%)	3 (6%)
At least one student with aggressive behaviors	31 (69%)	8 (18%)	1 (2%)	0 (0%)	5 (11%)
Challenging behaviors (*Self-injury*)					
None of the students	7 (54%)	3 (23%)	1 (8%)	0 (0%)	2 (14%)
At least one student with SRB	64 (77%)	11 (13%)	1 (1%)	1 (1%)	6 (7%)

Note. *SIB* = self-injury, *SRB = stereotypic and repetitive behaviors.*

Table 16

Focus of Teaching on Language and Communication Skills by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (Minimally verbal)					
None of the students	4 (67%)	0 (0%)	0 (0%)	0 (0%)	2 (30%)
At least one student is minimally verbal	76 (84%)	8 (9%)	2 (2%)	2 (2%)	2 (2%)
Challenging behaviors (*Self-injury*)					
None of the students	53 (87%)	5 (8%)	1 (2%)	1 (2%)	1 (2%)
At least one students exhibited SIB	27 (77%)	3 (9%)	1 (3%)	1 (3%)	3 (9%)
Challenging behaviors (*Aggressive behaviors*)					

None of the students	43 (84%)	4 (8%)	1 (2%)	1 (2%)	2 (4%)
At least one student with aggressive behaviors	37 (82%)	4 (9%)	1 (2%)	1 (2%)	2 (4%)
Challenging behaviors (*Stereotypic and repetitive behaviors*)					
None of the students	10 (78%)	0 (0%)	1 (8%)	0 (0%)	2 (15%)
At least one student with SRB	70 (84%)	8 (10%)	1 (1%)	2 (2%)	2 (2%)

Note. *SIB* = self-injury, *SRB = stereotypic and repetitive behaviors.*

Table 17
Focus of Teaching on Play Skills by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (Minimally verbal)					
None of the students	3 (50%)	1 (17%)	0 (0%)	0 (0%)	2 (33%)
At least one student is minimally verbal	42 (47%)	22 (24%)	12 (13%)	2 (2%)	12 (13%)
Challenging behaviors (*Self-injury*)					
None of the students	32 (53%)	12 (20%)	9 (15%)	1 (2%)	7 (12%)
At least one student with SIB	13 (37%)	11 (31%)	3 (9%)	1 (3%)	7 (20%)
Challenging behaviors (*Aggressive behaviors*)					
None of the students	28 (55%)	11 (22%)	6 (12%)	1 (2%)	5 (10%)
At least one student with aggressive behaviors	17 (38%)	12 (27%)	6 (13%)	1 (2%)	9 (20%)
Challenging behaviors (*Stereotypic and repetitive behaviors*					
None of the students	8 (62%)	0 (0%)	1 (8%)	0 (0%)	4 (31%)
At least one student with SRB	37 (45%)	23 (28%)	12 (13%)	2 (2%)	14 (15%)

Note. *SIB* = self-injury, *SRB = stereotypic and repetitive behaviors..*

Table 18
Focus of Teaching on Adaptive Skills by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (minimally verbal)					
None of the students	3 (50%)	0 (0%)	0 (0%)	0 (0%)	3 (50%)
At least one student is minimally verbal	50 (56%)	10 (11%)	6 (7%)	4 (4%)	20 (22%)
Challenging behaviors (*Self-injury*)					
None of the students	32 (53%)	6 (10%)	5 (8%)	2 (3%)	16 (26%)
At least one student	21 (60%)	4 (11%)	1 (3%)	2 (6%)	7 (20%)

with SIB					
Challenging behaviors (*Aggressive behaviors*)					
None of the students	28 (55%)	7 (14%)	1 (2%)	1 (2%)	14 (28%)
At least one student with aggressive behaviors	25 (56%)	3 (7%)	5 (11%)	3 (7%)	9 (20%)
Challenging behaviors (*Stereotypic and repetitive behaviors*)					
None of the students	9 (69%)	0 (0%)	1 (8%)	0 (0%)	3 (23%)
At least one student with SRB	44 (53%)	10 (12%)	5 (6%)	4 (5%)	20 (24%)

Note. *SIB* = self-injury, *SRB = stereotypic and repetitive behaviors.*

Table 19
Focus of Teaching on Advanced Cognitive (Executive Functioning) Skills by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (minimally verbal)					
None of the students	3 (50%)	0 (0%)	0 (0%)	0 (0%)	3 (50%)
At least one student is minimally verbal	24 (27%)	15 (17%)	7 (8%)	6 (7%)	38 (42%)
Challenging behaviors (*Self-injury*)					
None of the students	20 (33%)	8 (13%)	5 (8%)	4 (7%)	24 (39%)
At least one student with SIB	7 (20%)	7 (20%)	2 (6%)	2 (6%)	17 (49%)
Challenging behaviors (*Aggressive behaviors*)					
None of the students	17 (33%)	9 (18%)	4 (8%)	3 (6%)	18 (35%)
At least one student with aggressive behaviors	10 (22%)	6 (13%)	3 (7%)	3 (7%)	23 (51%)
Challenging behaviors (*Stereotypic and repetitive behaviors*)					
None of the students	4 (31%)	1 (8%)	1 (8%)	0 (0%)	7 (54%)
At least one student with SRB	23 (28%)	14 (17%)	6 (7%)	6 (7%)	34 (41%)

Note. *SIB* = self-injury, *SRB = stereotypic and repetitive behaviors.*

Table 20
Focus of Teaching on Vocational Skills by Student-Related Characteristics

	Degree of Focus				
	Daily	Weekly	Biweekly	Monthly	Never
Communication level (Minimally verbal)					

None of the students	3 (50%)	0 (0%)	0 (0%)	0 (0%)	3 (50%)
At least one student is minimally verbal	16 (18%)	20 (22%)	3 (3%)	9 (10%)	42 (47%)
Challenging behaviors (*Self-injury*)					
None of the students	11 (18%)	12 (20%)	2 (3%)	6 (10%)	30 (49%)
At least one student with SIB	8 (29%)	8 (29%)	1 (3%)	3 (9%)	15 (43%)
Challenging behaviors (*Aggressive behaviors*)					
None of the students	9 (18%)	11 (22%)	0 (0%)	6 (12%)	25 (49%)
At least one student with aggressive behaviors	10 (22%)	9 (20%)	3 (7%)	3 (7%)	20 (44%)
Challenging behaviors (*Stereotypic and repetitive behaviors*)					
None of the students	4 (31%)	0 (0%)	0 (0%)	2 (15%)	7 (54%)
At least one student with SRB	15 (18%)	20 (24%)	3 (4%)	7 (8%)	38 (46%)

Note. *SIB* = self-injury, *SRB* = *stereotypic and repetitive behaviors.*

Table 21

Linear Regression Predicting Focusing on Management of Challenging Behaviors

	Unadjusted				Adjusted*			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	.580	.316	-.046	1.207	.352	.334	-.311	1.015
At least one student exhibited SIB behaviors (yes)	.785 [b]	.323	.144	1.426	.667 [b]	.345	-.018	1.352
At least one student exhibited SRB behaviors (yes)	.308	.467	-.620	1.236	.262	.477	-.685	1.210
At least one student is minimally verbal (yes)	.311	.661	-1.002	1.624	.136	.674	-1.202	1.474

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

*F (4, 91) = 1.877, p = < 0.121. Adjusted R^2 = .04.

[a] P < .01.

[b] P< .05.

Table 22

Linear Regression Predicting Focusing on Academic Skills

	Unadjusted				Adjusted *			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	-.110	.083	-.275	.055	-.061	.086	-.232	.110
At least one student exhibited SIB behaviors (yes)	-.212 [a]	.084	-.379	-.044	-.189 [a]	.089	-.366	-.012
At least one student exhibited SRB behaviors (yes)	.204	.121	-.036	.443	.191	.123	-.054	.436
At least one student is minimally verbal (yes)	.133	.172	-.209	.476	.074	.174	-.272	.420

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

*F (4, 91) = 2.459, p = < 0.051. Adjusted R^2 = .06.

[a] P < .01.

[b] P< .05.

Table 23

Linear Regression Predicting Focusing on Pre-linguistic and Joint Attention Behaviors

	Unadjusted				Adjusted *			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	-.052	.102	-.254	.150	.004	.108	-.211	.220
At least one student exhibited SIB behaviors (yes)	-.154	.104	-.361	.054	-.156	.112	-.379	.066
At least one student exhibited SRB behaviors (yes)	-.126	.148	-.420	.168	-.123	.155	-.431	.185
At least one student is minimally verbal (yes)	-.089	.210	-.506	.328	-.036	.219	-.471	.398

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

*F (4, 91) = 2.459, p = < 0.577. Adjusted R^2 = -.01.

[a] P < .01.

[b] P< .05.

Table 24

Linear Regression Predicting Focusing on Social Skills

	Unadjusted				Adjusted *			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	-.095	.090	-.274	.084	-.079	.095	-.267	.109
At least one student exhibited SIB behaviors (yes)	-.130	.093	-.315	.055	-.102	.098	-.296	.092
At least one student exhibited SRB behaviors (yes)	.233	.130	-.026	.491	.200	.135	-.068	.469
At least one student is minimally verbal (yes)	.256	.185	-.112	.623	.192	.191	-.187	.572

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

*F (4, 91) = 1.685, p = < 0.160. Adjusted R^2 = .03.

[a] P < .01.

[b] P< .05.

Table 25

Linear Regression Predicting Focusing on Language Communication Skills

	Unadjusted				Adjusted *			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	-.021	.077	-.174	.132	.003	.082	-.160	.166
At least one student exhibited SIB behaviors (yes)	-.097	.079	-.255	.060	-.099	.085	-.268	.069
At least one student exhibited SRB behaviors (yes)	.074	.112	-.148	.297	.039	.117	-.193	.272
At least one student is minimally verbal (yes)	.178	.158	-.135	.491	.165	.166	-.163	.494

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

*F (4, 91) = 0.725, p = < 0.160. Adjusted R^2 = -.01.

[a] P < .01.

[b] P< .05.

Table 26

Linear Regression Predicting Focusing on Play Skills

	Unadjusted				Adjusted *			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	-.171	.102	-.373	.031	-.130	.109	-.346	.086
At least one student exhibited SIB behaviors (yes)	-.212 [b]	.084	-.379	-.212 [b]	-.111	.112	-.334	.112
At least one student exhibited SRB behaviors (yes)	-.170	.149	-.466	.127	-.170	.155	-.479	.138
At least one student is minimally verbal (yes)	-.033	.213	-.455	.389	.055	.219	-.380	.491

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

*F (4, 91) = 1.225, p = < 0.160. Adjusted R^2 = -.01.

[a] P < .01.

[b] P< .05.

Table 27

Linear Regression Predicting Focusing on Adaptive Skills

	Unadjusted				Adjusted *			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	.007	.103	-.198	.211	-.014	.110	-.232	.205
At least one student exhibited SIB behaviors (yes)	.075	.106	-.136	.286	.077	.114	-.149	.303
At least one student exhibited SRB behaviors (yes)	-.162	.149	-.458	.134	-.184	.157	-.496	.128
At least one student is minimally verbal (yes)	.056	.212	-.365	.476	.126	.222	-.314	.567

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

*F (4, 91) = 0.491, p = < 0.743. Adjusted R^2 = -.02.

[a] P < .01.

[b] P< .05.

Table 28

Linear Regression Predicting Focusing on Advanced Cognitive Skills

	Unadjusted				Adjusted *			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	-.111	.092	-.294	.072	-.072	.098	-.268	.123
At least one student exhibited SIB behaviors (yes)	-.128	.095	-.317	.062	-.101	.102	-.303	.101
At least one student exhibited SRB behaviors (yes)	-.031	.135	-.300	.238	.018	.141	-.261	.298
At least one student is minimally verbal (yes)	-.233	.190	-.611	.144	-.227	.199	-.621	.168

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

*F (4, 91) = 0.940, p = < 0.444. Adjusted R^2 = -.02.

[a] P < .01.

[b]*P*< .05.

Table 29

Linear Regression Predicting Focusing on Vocational Skills

	Unadjusted				Adjusted [*]			
	B	*SE*	95% CI		*B*	*SE*	95% CI	
			Lower	Upper			Lower	Upper
At least one student exhibited aggressive behaviors (yes)	.046	.082	-.117	.209	.049	.087	-.124	.221
At least one student exhibited SIB behaviors (yes)	.048	.085	-.121	.217	.033	.090	-.145	.212
At least one student exhibited SRB behaviors (yes)	-.127	.119	-.364	.110	-.072	.124	-.319	.174
At least one student is minimally verbal (yes)	-.322	.166	-.653	.008	-.302	.175	-.651	.046

Note. *B* = unstandardized beta coefficient, SE *B* = standard error, CI = confidence interval.

[*]*F* (4, 91) = 1.161, *p* = < 0.333. Adjusted R^2 = .01.

[a] *P* < .01.

[b]*P*< .05.

Appendix A

Additional Analyses

Table 30
Results of t-test and Descriptive Statistics for Knowledge and Self-Efficacy by Classroom Type Setting

	Special Day Class			Inclusive				
	M	*SD*	*n*	*M*	*SD*	*n*	t-test	df
Knowledge	8.8	1.6	70	7.9	2.4	*15*	-1.77	83
Self-efficacy	11.2	1.9	70	12.5	1.9	*15*	2.38[b]	83

Note. *M* = mean, *SD* = standard deviation, *n*= total number of teachers within each category
[a] $P < .01$.
[b] $P < .05$.

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