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TEACHERS' KNOWLEDGE ON EVIDENCE BASED PRACTICES FOR STUDENTS WITH AUTISM SPECTRUM DISORDERS IN SAUDI ARABIA

A Dissertation Presented

by

AHMED H. KHODARI

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TEACHERS' KNOWLEDGE ON EVIDENCE BASED PRACTICES FOR STUDENTS WITH
AUTISM SPECTRUM DISORDERS IN SAUDI ARABIA

A Dissertation Presented

By

AHMED H. KHODARI

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DEDICATION

This dissertation is dedicated to my father and my mother, and my wife Fatemah for their encouragement and support. Special thanks for my wonderful kids, Farah, Joud, Juri, and my new born son Anas.

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I would like to thank and express the deepest appreciation to my committee chair and academic advisor, Dr. Michael Krezmien. Thank you for all the guidance and expertise you have shared, which has helped to shape this project. Thank you for your time, your patience, and for the feedback that you have provided to me from the beginning to the end of the dissertation. You have played a significant role in supporting me throughout this Journey. I also extend my thanks to Dr. Michelle Hosp and Dr. Jason Travers for serving on my committee and providing guidance and insight throughout every stage of my dissertation.

ABSTRACT

TEACHERS' KNOWLEDGE ON EVIDENCE BASED PRACTICES FOR STUDENTS WITH

AUTISM SPECTRUM DISORDERS IN SAUDI ARABIA

SEPTEMBER 2019

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Autism Spectrum Disorders (ASD) programs have spread rapidly all over Saudi Arabia in recent years. A number of teachers have been provided to teach students with ASD to improve their academic, communication, social, and behavioral skills. The main purpose of this study was to investigate teachers' knowledge on Evidence Based Practices (EBP) for individuals with ASD. The second purpose was to ensure the study was designed to meet the standards for quality survey research. A survey was used to meet the first purpose and a methodological review was used to meet the second purpose. The results indicated that the teachers of students with ASD in Saudi Arabia had low to moderate knowledge of EBP on communication, social and behavioral skills to improve those skills in students with ASD. Implications from this study indicate that the Ministry of Education may provide more training on EBP for in-services teachers, and to improve teacher preparation programs at universities to better prepare pre-service teachers on EBP for ASD students.

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CHAPTER 1

INTRODUCTION

ASD is a neurodevelopmental disorder that is defined by two primary diagnostic markers, which are problems in social communication and restricted or repetitive behaviors and interests (American Psychiatric Association, 2013). Problems in social communication can include having difficulties in social reciprocity, nonverbal social behaviors, or establishing social relationships. Restricted and repetitive behaviors can include excessive devotion to routines, obsessive interests, and stereotypical behavior and speech (APA, 2013). As a result, ASD presents a major challenge to educators who are charged with advancing the academic, social, and behavioral skills of this population of learners. Over the past two decades, the prevalence of ASD has increased remarkably. In the United States, childhood diagnoses of ASD has risen from 1 in 500 in 1990 to 1 in 68 in 2014 (Centers for Disease Control and Prevention, 2014). There are more than 400,000 students with ASD who are currently enrolled in schools in the United States (Centers for Disease Control and Prevention, 2012); those students are now the fastest growing group served through special education (Ludlow, Keramidas, & Landers (2007).While the reasons for the increased prevalence of ASD are not fully understood, the fact nevertheless remains that more students identified with ASD require evidence based interventions in schools. The United States has been at the forefront of Special Education support for students with ASD, compiling a robust body of EBP for supporting those students across the communication, social, and behavioral domains.

Autism Spectrum Disorders in Saudi Arabia

The Situation of students with ASD in Saudi Arabia is somewhat different. First, the prevalence rate lower in In Saudi Arabia, with an estimate of about 1 in 250 to 1 in 168

individuals with ASD diagnosis (Aljarallah, Alwaznah, Alnasari, & Alhazmi, 2007; Alkhashrami, 2011 & Alnemary, 2017). The Ministry of Education and The Ministry of Labor and Social Development are responsible for providing special education and related services for individuals of ASD while Ministry of Health provide diagnostic and related services (Alnemery, 2017). According to Ministry of Education (2016) there are 1,677 students with ASD receiving special education services in inclusive classrooms in public schools or in special educational institutes. However, because of the limitation of special education services provided for students with ASD inside the country, many of the students go abroad to receive more intensive services either in neighboring countries such as Jordan, Egypt, UAE or in Western countries like U.S. and United Kingdom (Alnemery, 2017).

During the last three decades, special education services for individuals with ASD in Saudi Arabia have continued to develop through a series of stages. In 1993, Al-Faisalya Women's Welfare Society provided first educational services for children with ASD. The first class included only four students with ASD. The FWWS trained five teachers to provide services for students with ASD. This class was the first educational services provided for students with ASD in Saudi Arabia (Al-Fisalyah Women's Welfare Society, 2017). In 1997, the Saudi Autistic Society was established and became one of the largest non-governmental organizations in the country that provide services for people with ASD. The SAS receive nearly 70 new cases everyday with all ranges of autism symptoms. The SAS provides individualized education, language, and communication services, and many others (the Saudi Autistic Society, 2013). In 1999, Mother of Fisal Autism Center was established as a non-profit center in Riyadh. The center collaborated with the King Faisal Specialist Hospital to provide diagnoses services for the center using a multidisciplinary team (Mother of Fisal Autism Center, 2013).

In 1999, The ministry of education started to provide formal special education services and supports for students with ASD in public school in three major cities: Riyadh, Jeddah, and Dammam (MOE,2013). In 2002, Prince Sultan Bin Abdul-Aziz Humanitarian City (SBAHC) was established to provide medical and rehabilitation services for people with disabilities. The SBAHC established the Child Development Center to provide early intervention services and supports from birth to age 10 for children with disabilities including children with ASD. The SBAHC also provide training and consultation services for parents, teachers, and professionals. In 2006, The Society Autistic Society established a new branch in Jeddah under the supervision of the Ministry of Labor and Social Development. The center became the first governmental center for individuals with ASD in Jeddah City. This center collaborates with government and private agencies to adopt policies and services for children with ASD and their families (Saudi Autistic Society, 2013).

Special Education and Evidence Based Practices

In the last two decades, the field of education in general and special education in particular begin focusing on developing EBPs intend to improve the outcomes of students especially those with special needs (Fixsen et al. 2013). According to Sackett, Rosenberg, Gray, Haynes, & Richardson (1996) the EBP emerged from the field of medicine in the early 1990 (Cook & Odom, 2013). The EBPs are practices, interventions, strategies, and programs that have positive effects on students' outcomes and scientifically proven by high quality research (Mesibov & Shea, 2011). High-quality research is defined as studies with an experimental, quasi-experimental, or single-subject research designs that have multiple replications of results, and are published in peer-reviewed professional journals (Marder & deBettencourt, 2015).

The No Child Left Behind Act (NCLB), (2002) clearly stated that teachers should use "proven education methods". This means the teachers should make sure when using any practices, strategies, or programs that have been proven effective through high quality research. Moreover, the US Federal Law Elementary and Secondary Education Act (NCLB, 2001) included that schools require to receive certain federal funds to select and implement interventions based on Scientifically Based Research. In fact, NCLB uses the term "scientifically based research" approximately 111 times (Simpson, 2005). Similarly, (the Individuals with Disabilities Education Improvement Act, 2004) repeatedly highlights the need for teachers to be trained in evidence-based practices to improve the outcomes of students with special needs (Cook et al, 2008). According to the National Research Council (NRC; 2001) training in EBPs is an essential prerequisite for teachers who serve students with ASD.

Evidence Based Practices for Individuals with ASD

The increasing of prevalence rate of ASD in the last few decades has pushed educators to provide high-quality education services in schools through the implementation of EBPs (Odom & Brock, 2013). Therefore, both (IDEIA, 2004) and (NCLB, 2001) required special education teachers use EBPs when teaching students with disabilities including students with ASD.

Practitioners and researchers in the field of autism face substantial challenges to improve the number and variety of evidence-based practices, and to systematically implement these practices for children in classrooms. A review of ASD litigations concluded that school districts should improve services for students with ASD and ensure teachers implement EBPs (Hill & Hill, 2012 & Zeirkel, 2011). Mayton, Menendez, Wheeler, and Zhang (2010) mentioned three reasons to ensure that educators use and implement EBPs for students with ASD: (1) the increasing numbers of students who are identified with autism in public school, (2) the potential

risks of using unproven educational interventions on the children's outcomes and it reflection on

their families, and (3) the number of public schools still using unsubstantial interventions

(Marder & deBettencourt, 2015). According to Hendricks (2011), improving the outcomes of

individual of ASD depends on the programs or strategies that are based on proven methods.

There are a number of studies and literature reviews that provided comprehensive details

about the interventions and treatments that generate positive outcomes for individuals with ASD.

A comprehensive review by Wong et al (2015) identified the EBPs for children, youth, and

young adults with ASD. The researchers identified two types of practices that appeared in the

literature.

The first type were Comprehension Treatment Models (CTM$_s$), that consist of a set of

practices organized around a conventional framework and designed to achieve a broad learning

or developmental impact on the core deficits of ASD. A number of practices were part of this

category including as Lovaas/UCLA model, the TEACCH program, Early Start Denver Model,

LEAP, and Pivotal Response Treatment (Wong et al (2015).

The second type of EBP were focused interventions, which were designed to teach or

train students with autism on one single skill or goal (Odom et al. 2010). These practices

determine a specific outcome for the student and operationally define it, and tend to occur over a

shorter time period until the goal is achieved. These practices are known as the building blocks

of educational programs for individuals with ASD, and they are highly salient features of the

CTMs. Examples include discrete trial teaching, peer-mediated instruction, prompting, and video

modeling. Wong et al (2015) focused on the second type of practices on their literature review.

They found that twenty-seven practices met the criteria for being evidence based. Fifteen of the

twenty-seven EBPs, especially those with foundation of applied behavior analysis techniques,

had over 10 studies providing empirical support for the practice. In addition, some of the

practices, such antecedent-based intervention, differential reinforcement, and video modeling,

had substantial support, with over 25 studies supporting their efficacy. Another review by

Simpson (2005) had consistent findings, that EBPs were based on applied behavior analysis,

discrete trial teaching, pivotal response training, and learning experiences.

Training Challenges in EBPs

A number of studies have addressed the question of why teachers of students with ASD

may not use EBPs. Although legislation, families, agencies, and insurance companies push

educators to implement EBPs., educators still may not know what the evidence based practices

are, or how to find them, or what criteria they need to use to verify that a practice is evidence

based (Odom et al.2010, Burns & Ysseldyke, 2009; Stahmer, Collings, & Palinkas, 2005). This

occurs due to the weakness of teacher preparation programs in colleges and universities in the

area of EBPs (Morrier, Hess & Heflin, 2011). Many programs do not train teachers in how to use

evidence based practices to meet the needs of students with ASD (Scheuermann, Webber,

Boutot, & Goodwin, 2003). According to Morrier, Hess & Heflin (2011), fewer than 5% of

teachers reported using EBPs for students with ASD in their classrooms, and fewer than 20%

reported that they had learned how to use evidence-based strategies through a university-based

teacher preparation program. In another study by Brock et al (2014), teachers showed moderate

levels of confidence implementing the 24 evidence based practices (overall=3.07). Hess et al.

(2008) reported that less than one third of Georgia general and special education teachers used

EBPs for students with ASD. Training programs should prepare teachers not only to understand

the characteristics of ASD but also how to implement a range of EBPs (Maddox & Marvin,

2013).

Alexander, Ayres & Smith (2015) explained the barriers to use of EBPs in classroom. First, there is a lack of training in university preparation. This lack of training leaves teachers unprepared to teach students with ASD effectively. Second, delivering information about EBPs through lecture and handout only is ineffective. Training in EBPs must include follow up training to encourage teachers to put their knowledge into practice, and then to observe student outcomes. Third, some teachers do not like to change their methods to use new methods. Fourth, some teachers attempt to use EBPs, but implememnt them wrongly. Finally, teachers may not have time to participate in training that is available.

According to the National Research Council (2001), "personnel preparation remains one of the weakest elements of effective programming for children with autistic spectrum disorders and their families" (p.225). The National Research Council (2001) also reported that most educators graduate from institutions of higher education with minimal training in evidence-based research practices for students diagnosed with autism. Therefore, the council (2001) suggested,

> "The teachers must be familiar with theory and research concerning best practices for children with autism spectrum disorders, including methods of applied behavior analysis, naturalistic learning, and assistive technology, socialization, communication, and inclusion, adaptation of the environment, language intervention, assessment, and the effective use of data collection systems". (p. 225)

The challenge of preparing teachers of students with ASD in EBPs is one of many challenges in the preparation of special education teachers and in particular teachers of students diagnosed with ASD. According to Muller (2005), there are few states throughout the nation with licensure in the area of autism spectrum disorders, and therefore, there are no consistent guidelines for teacher skills for those who want to work with students with ASD. The result is a

heterogeneous set of teachers with different types of certificates teaching students with ASD, often without adequate preparation to work with this group of children (Simpson, 2004). However, the U.S. continues to lead in the development of EBPs, and more schools are adopting EBP for students with ASD, though the process is slow (Katsiyannis & Zhang,2003). Still, the direction for advancing the situation is clear: train teachers to implement EBPs in a systematic and supportive manner.

Teacher Preparation in Special Education in Saudi Arabia

The problem in Saudi Arabia may be even more pronounced than in the U.S., and there is almost no research related to EBP for students with ASD in the literature. As in the U.S., teachers of students with ASD vary by training, nationality, and experience. However, the opening of the first special education teacher preparation program at King Saud University in 1984 played a significant role in increasing the number of qualified Saudi special education teachers across the country. Now, there are more than 11 Special Education Departments in Saudi Universities, and those departments offer bachelor's and master's degrees in special education, visual impairment, hearing impairment, intellectual disabilities, learning disabilities, autism spectrum disorders, and gifted and talented students (Battal, 2016). Despite improvement, however, we know little about these teachers, or their knowledge and understanding of EBPs for students with ASD in Saudi Arabia.

Statement of Problem

The number of ASD students in public schools in Saudi Arabia is growing, and schools faces challenges as they work to meet these students' needs. The schools must employ teachers with adequate knowledge about EBPs for students with ASD, and must have the capacity to imply these practices in the classroom. Unfortunately, there is a lack of research assessing

teachers' knowledge on evidence based practice for students with ASD in Saudi Arabia. In my review of the literature, I did not find a single studythe investigated the knowledge of Saudi teachers regarding students with ASD. I found one study that investigated the knowledge of Saudi teachers regarding students with emotional and behavior disorders (Alhossein, 2016), but there is relatively little overlap in the EBPs across those two groups. Some studies examined Saudi teachers' knowledge of applied behavior analysis (Alotaibi, 2015), and knowledge of Autism Spectrum Disorders (Haimour & Obadiat, 2013), but none addressed the knowledge of teachers of students with ASD about EBPs.

The absence of this research is a major gap in the knowledge base, and understanding teacher knowledge of EBP for students with ASD is critical for several reasons. First, if we do not know what teachers of ASD know about EBPs, we cannot accurately assess their capacity to apply knowledge of EBP to implement effective practices in teaching students with ASD. Second, if teachers do not know about EBPs and use non-EBPs, they may be contributing to negative outcomes for students, that also make their parents feel dissatisfaction with the services provided for their children. Establishing an understanding of the knowledge base will be critical to respond to the current training needs in the field. For example, if we know that teachers of ASD do not know about EBPs, we can work with the Ministry of Education and Universities to develop professional development trainings and associated supports to increase teachers' knowledge and improve practice and outcomes. Additionally, studies about teachers' knowledge of EBPs can be used by teacher preparation programs in universities to evaluate and revise their programs, to ensure that the program includes courses that focus on EBPs for students with ASD. Finally, the disseminated knowledge may help practitioners to identify their own shortcomings,

and to pursue independent ways to learn about and implement evidence-based practices in their own work.

Purpose of the Study & Research Questions

The purpose of the current study is to learn what teachers of students with ASD know about EBPs. I will use a survey design to meet this purpose, utilizing the quality indicators for survey research in order to design my survey and conduct my study in a robust manner that contributes to the literature in a way that improves the quality of education and life for individuals with ASD.

The current study will be guided by two research questions:

1. What do SA teachers of students with ASD know about evidence-based practices?

2. Is there a relationship between knowledge of evidence-based practices and (a) gender, (b) Position, (c) Years of experience teaching students with ASD, (d) level of education, (e) Education setting, and/or (e) Region?

3. Is the survey of education of ASD a reliable and valid tool?

CHAPTER 2

LITERATURE REVIEW

Beginning in 1990, when the term of Evidence based practice emerged from the medicine, the research has grown on EBPs. A number of reviews of evidence-based practices for individuals with ASD have been conducted that provide important information about the effectiveness of the interventions used with students with ASD. The reviews concluded with number of interventions that are effective for improving the social, language, communication and academic skills of students with ASD. However, there is a challenge related to the knowledge and implementation of these practices in the classroom. Schools face obstacles that make it difficult for them hiring qualified teachers who know the EBPs to work with students with ASD. There is a lack of research on the extent to which teachers of students with ASD have knowledge of EBPs. Some research has been done in the USA regarding this issue, but almost no research has been done in Saudi Arabia.

Training teachers on EBPs is important in order to improve the outcomes of students with ASD. Thus, knowing teachers' knowledge is an essential prerequisite to creating new training programs that focus on EBPs for students with ASD. The purpose of this review is to find the most recent research in the USA and in Saudi Arabia regarding teachers' knowledge of EBPs for children with ASD, and also to ensure that the study will meet the standards for quality survey research in order to develop a more robust body of literature on improving the quality of education and life for individuals with ASD. The literature review of the current study is a methodological review. I will review the studies, based on quality indicators to differentiate between high and low quality research, to help me to accept or reject the findings.

Search Process

Several procedures were used to identify the studies included in the literature review. First, four databases, including the Educational Resource Information Center (ERIC), Academic Search Premiere, PsychInfo, and PsychArticles, were used for nine searches. Second, nine search terms were identified as relevant, including the following: "evidence based practices & autism spectrum disorders", "evidence based practices and ASD", "evidence based practices & Autism", "evidence based interventions & autism spectrum disorders", "evidence based interventions & ASD", "evidence based interventions & autism", " Saudi Arabia & autism spectrum disorders", "Saudi Arabia & ASD" and "Saudi Arabia & Autism. Third, the limiters peer reviewed journals, academic journals, publication dates of 2000 to present, and empirical studies, were applied to these searches. The first search yielded 635 records, the second search yielded 399 records, the third search yielded 961 records, the fourth search yielded 291 records, the fifth search yielded 202 records, the sixth search yielded 407 records, the seventh search yielded 110 records, the eighth search yielded 76 records, and the ninth search yielded 186 records. From a total of 3,267 titles, journal articles were published in a language other than English, as well as articles that were not related to the field of education, were eliminated. Then, 207 journal articles were classified as evidence-based practices for the individuals with ASD related, and not EBPs for ASD individuals related, articles. Finally, a total of 69 journal articles were identified, and their abstracts were read. Abstracts of EBPs for ASD individuals related articles were read in order to identify survey research studies, and to remove any other design research studies and studies that were not conducted in the U.S. or Saudi Arabia. A total of 17 journal articles were identified and read. Of those, 17 survey studies (including 14 studies conducted in the U.S. and three in Saudi

Arabia) examining knowledge of teachers of students with ASD regarding EBPs were included in this review.

Next, the references of these 17 articles were reviewed to identify any new articles that were not discovered from the initial search. The reference sections of all 17 articles were searched by scanning the titles. From these references, two articles were found that met the criteria. Thus, a total of 19 articles were included to the methodological review. Finally, the journals that published these 19articles were examined to find any other articles may meet the criteria. This search included 12 journals, and each journal was searched between 2013 to 2018, with the criteria of inclusion of this study applied. No other articles were found in this search. Finally, the 19 studies were read and analyzed to determine if they met standards of quality survey research.

Criteria for Inclusion

Studies meeting the following criteria were included in this review: (a) a survey research study; (b) done in US/Saudi Arabia; (c) participants must be teachers; (d) focused on knowledge of evidence-based practices for students with ASD. For purposes of this review, I relied on two studies to define and identify evidence-based practices for students with ASD. The first study was done by National Autism Center in Randolph, Massachusetts. The title of this study was Evidence-Based Practice and Autism in the Schools (2nd ed). The second study was done by a group of researchers (Odom et al., 2014) at Frank Porter Graham Child Development Institute at the University of North Carolina at Chapel Hill. This study is titled Evidence Based Practices for Children, Youth, and Young Adults with ASD (2014). Both studies identified a number of interventions that were most effective with individuals with ASD. Knowledge of EBPs includes, but is not limited to, teachers' perceptions of the meaning of EBPs, teachers' knowledge of EBPs

for students with ASD, use of EBPs in classroom, pre/in-service training in ASD and EBPs, and obstacles to use EBPs. Moreover, I included only survey research studies, and excluded all qualitative, and experimental research, including single case design research.

Two doctorate colleagues reviewed each of the identified studies to ensure that they met the criteria for inclusion in this review. The colleagues agreed that 19 of the 19 articles met the inclusion criteria. Of those 19 survey studies, 16 studies were conducted in the U.S., and three were conducted in Saudi Arabia. All studies addressed teachers' knowledge of, use of, or training in EBPs for students with ASD.

Coding System and Intercoder Agreement

I used a code system of 0 or 1 to identify studies included or excluded from the literature review. Then I used the same system with the 19 studies included in the literature review to decide if each study met the standards for quality survey research.

Criteria for Standards

I developed eight quality standards using a combination of quality indicators from Gerston et al (2005), Horner et al (2005), Thompson et al (2005), Krezmien (2016), and Dillman (2014). All eight quality standards were used to measure the quality of research about the knowledge of educators on EBPs for students with ASD across 19 articles and dissertations. These eight quality standards are (1) Research basis, (2) Sampling, (3) Participants, (4) Setting, (5) Instrument, (6) Variables, (7) Statistical analysis, and (8) Implication and limitation. Each of the standards were made up of number of components that described replicable quality research within special education.

I describe the results of our analysis relative to each standard. I provide examples and non-example of studies that met the particular standard.

Standard 1: Research Basis

In education, in order to make an impact on the field, the researcher must connect a study to the prior research (Gersten et al., 2005 & Krezmien et al., 2016). To make that connection, the researcher must explain why current study is important, and how the findings will fill the gap in knowledge. As a part of that explanation, the researcher must clearly state research questions or/and hypotheses, and both must be clearly linked to the purpose and rationale of the research study. This is important because people must know how the researcher will answer the research questions and test the hypotheses. Research basis is the first standard that was selected for the methodological review process, consistent with Krezmien et al., 2016. This standard includes of four components: (1) Clearly articulated purpose based on a review of the literature, (2) a rationale that demonstrates the importance of the work, (3) clearly articulated research questions, and (4) Clearly articulated research hypotheses. These criteria were based on Krezmien, 2016. In order to meet the requirements for standard 1, a study must include all four components.

Table 1 displays the components for standard 1. Only two of the studies (Sciuchetti, McKenna & Flower, 2016; Seymour, 2017) met all criteria for research basis standard. For example, Sciuchetti and colleagues (2016) reported that the purpose of the study was to examine the current state of educator knowledge with regard to the term 'evidence-based practice'. Authors of 12 studies (Alhossein, 2016; Herzog, 2011; Brock, Huber, Carter, Juarez, & Warren, 2014; Callahan, Henson, & Cowan, 2008; Alotaibi & Almalki, 2016; Corona, Christodulu & Rinaldi,2017; Loiacono & Allen, 2008; Locke et al., 2016; Alotaibi, 2015; Cahill, 2015; Hendricks, 2011; Hess, Morrier, Heflin & Ivey, 2008) met all but one of the criteria. Four of those studies did not include research questions, and eight studies did not include a hypothesis. The failure to write research questions or hypotheses makes it difficult for the reader to

determine if a study is logically linked to the research purpose or to the research design. Only

authors of six of the 19 studies (Herzog, 2011; Brock, Huber, Carter, Juarez & Warren, 2014;

Corona, Christodulu & Rinaldi, 2017; Locke et al, 2016; Sciuchetti, McKenna & Flower, 2016;

Seymour, 2017) clearly stated a research hypothesis.

Table 1: Research Basis

Main Author	Purpose	Rational	Research questions	Hypotheses	Sum	Met Criteria
Alhossein,2016	1	1	1	0	3	0
Alotaibi, 2015	1	1	1	0	3	0
Alotaibi, 2016	1	1	1	0	3	0
Bain, 2009	1	1	0	0	2	0
Borders, 2014	1	1	0	0	2	0
Brock,2014	1	1	0	1	3	0
Cahill, 2015	1	1	1	0	3	0
Callahan, 2008	1	1	1	0	3	0
Corona, 2017	1	1	0	1	3	0
Hendricks,2011	1	1	1	0	3	0
Herzog, 2011	1	1	0	1	3	0
Hess, 2008	1	1	1	0	3	0
Locke, 2016	1	1	0	1	3	0
Loiacono, 2008	1	1	1	0	3	0
Morrier, 2011	1	1	0	0	2	0
Sciuchetti,2016	1	1	1	1	4	1
Seymour, 2017	1	1	1	1	4	1
Stahmer, 2009	1	1	0	0	2	0
Williams, 2011	1	1	0	0	2	0
Sum	19	19	10	6		2

This which diminished the problem associated with the absence of the question, because the reader is able to infer the research questions form the hypothesis. For example, Sciuchetti and colleagues (2016) provided clear hypothesis, "We hypothesized that the research to practice gap is due in part to teachers lack of awareness and knowledge about what makes a practice evidence-based." Authors of five studies (Morrier, Hess & Heflin, 2011; Bain, Brown & Jordan, 2009; Stahmer & Aarons, 2009; Borders, Bock & Szymanski, 2014; Williams, Fan & Goodman, 2011) included only two components of the research standards. None of these authors provided research questions or hypotheses.

The authors of all studies included the purpose and rationale components. This means that all the articles provided clearly articulate purposes based on review of literature, and provided rationales that demonstrate the importance of the work. A good example was presented by Alotaibi, (2015),

"The findings will be disseminated in the field of Special Education and also reported to the Ministry of Education, to inform policy development on the preparation and training of teachers of students with ASD on ABA strategies in Saudi Arabia. It is expected that the findings will help faculty members in special education departments in Saudi Arabian universities develop appropriate training programs in the use of ABA for teachers of students with ASD, both at the preservice and in service levels. Such programs will help to improve the skills of these teachers and improve classroom performance."

This robust description exemplifies how a well-articulated rationale can support the readers' understanding of the importance of the paper in an applied manner.

Standard 2: Sampling

Researchers of quantitative studies must describe sampling procedures precisely and clearly (Krezmien, 2016). Researchers must provide adequate information about the target population to allow readers to identify the population to which findings may be generalized, and to understand to what extent the study sample represents the population from which it was drawn (Gersten al., 2005 & Krezmien, 2016). Researchers also must describe the sample frame, which is the list of the units (e.g., individuals, households, organizations) in the population that the sample is drawn from (Dillman et al, 2014). For instance, if a researcher intends to study the perspectives of teachers of students with autism about evidence based practices, he or she should make a list of all teachers of students with ASD in the region before selecting the sample. Then, the researcher must describe the sample selection, meaning how units are chosen from the sampling frame, and every unit in the population must have equal chance of being included in the sample. The researcher may use one of several ways of sampling, such as simple random sampling, systematic samples, or stratified samples (Dillman et al, 2014). Finally, the researcher must report response rate, which is simply the number of people who complete the survey divided by the number of eligible people (or units) sampled (Fowler, 2014).

The Sampling Standard includes five components: (1) sample size number provided, (2) numbers of any analyzed subgroup provided, (3) clear description of the population included, (4) clear description of the sampling procedures, and (5) response rate included. In order to meet the requirements for Indicator 2, a study must include all five components. These criteria were primary based on Krezmien, 2016. I eliminated some components which were not appropriate to the current methodological review. For example, I removed the component "use of random assignment" and "experimental and comparison groups are comparable" because these

components are not relevant to survey research. I added the Response Rate component, because of the importance of reporting response rate in survey research studies.

Table 2 displays the components for standard 2. Only three studies (Alotaibi, 2015; Cahill, 2015; Hendricks, 2011) met all components of sampling standard. This means those studies provided sufficient information about population, sample size, sampling selection procedure, and response rate. Alotaibi (2015) described the sample population, "There are about 400 teachers of students with ASD and approximately 40 ASD programs in the public schools and in the Institutes of Intellectual Education affiliated with the Ministry of Education throughout Saudi Arabia." For describing sample procedure, the author stated that the sample was obtained from various ASD public schools and institutes in the seven major cities (Riyadh, Jeddah, Makkah, Al-Madinah, Al-Dammam, Abha, and Hail) in Saudi Arabia. The author identified a response rate ofapproximately 40% (158 out of 400).

Authors of 13 studies (Alhossein, 2016; Herzog, 2011; Morrier, Hess & Heflin, 2011; Bain, Brown & Jordan, 2009; Brock, Huber, Carter, Juarez & Warren, 2014; Callahan, Henson & Cowan, 2008; Stahmer & Aarons 2009; Locke et al, 2016; Sciuchetti, McKenna & Flower 2016; Seymour, 2017; Borders, Bock & Szymanski, 2014; Hess, Morrier, Heflin & Ivey, 2008; Williams, Fan & Goodman, 2011) met all but one component. Nine of these studies did not provide any information about the numbers of analyzed subgroups. Alhossein (2016), Callahan and colleagues (2008) and Williams and colleagues (2011) did not describe the sampling procedure of their studies. It is important to describe the sampling procedure to ensure that the sample is representative of the population from which it was drawn. Authors who failed to describe the sampling procedure cannot generalize their findings. Eight of the 13 studies (Herzog, 2011; Morrier, Hess & Heflin, 2011; Brock, Huber, Carter, Juarez & Warren, 2014;

Table 2: Sampling

Main Author	Sample size N provided	N of subgroup provided	Population clearly described	sampling clearly described	Response rate reported	Sum	Met Criteria
Alhossein,2016	1	1	1	0	1	4	0
Alotaibi, 2015	1	1	1	1	1	5	1
Alotaibi, 2016	1	0	1	0	1	3	0
Bain, 2009	1	1	1	1	0	4	0
Borders, 2014	1	0	1	1	1	4	0
Brock,2014	1	0	1	1	1	4	0
Cahill, 2015	1	1	1	1	1	5	1
Callahan, 2008	1	1	1	0	1	4	0
Corona, 2017.	1	0	0	0	1	2	0
Hendricks,2011	1	1	1	1	1	5	1
Herzog, 2011	1	0	1	1	1	4	0
Hess, 2008	1	0	1	1	1	4	0
Locke, 2016	1	1	1	1	0	4	0
Loiacono,2008	1	0	1	0	0	2	0
Morrier, 2011	1	0	1	1	1	4	0
Sciuchetti,2016	1	0	1	1	1	4	0
Seymour, 2017	1	0	1	1	1	4	0
Stahmer, 2009	1	0	1	1	1	4	0
Williams, 2011	1	0	1	0	1	4	0
Sum	19	7	18	13	16		3

Stahmer & Aarons 2009; Sciuchetti, McKenna & Flower, 2016; Seymour, 2017; Borders, Bock & Szymanski, 2014; Hess, Morrier, Heflin & Ivey, 2008) provided the components of sampling size N, population description, sampling selection procedure, and response rate. For example,

Herzog, (2011) reported that the sample size of the study was 107 teachers from 54 school districts in New Jersey. The author sent a letter to the schools and explained the study and requested district for cooperation, and a total of 77 surveys were completed and returned.

Only one study (Alotaibi, 2016) met three criteria of sampling standard. The author provided information about sample size, population description, and response rate. For example, He selected 100 teachers of students with ASD from four mainstream schools located in Riyadh, in Saudi Arabia. The schools offered different services, such as support classes which facilitated the transition of special needs children into regular classes, as well as segregated programs. From the 100 teachers selected, 70 returned the questionnaires. Authors of two studies (Corona, Christodulu & Rinaldi, 2017; Loiacono & Allen 2008) met only two of the five components for sampling standard. These two studies addressed the component for the sample size numbers, but Corona and colleagues (2017) reported response rate, and Loiacono and colleagues (2008) clearly described the population.

All the 19 studies met the component of sample size number. This means the authors of the studies reported the sample size, which is critical for helping researchers to identify and compare the sample to the target population. Authors of all but one study met the component of population description. On other hand, only s few studies met the component for "numbers of any analyzed subgroup provided." Only seven authors of the 19 studies (Alhossein, 2016; Bain, Brown & Jordan, 2009; Callahan, Henson & Cowan,2008; Locke et al, 2016; Alotaibi, 2015; Cahill, 2015; Hendricks, 2011) addressed this component. In other words, most of the studies failed to meet this component. To fulfill this compnent, the authors should ensure that there are sufficient N within any proposed subgroup included in the analysis to be adequately analyzed. For instance, if a researcher is interested in analyzing the effects of gender in a survey design

study, there must be a sufficient number of each gender in each group to be analyzed using the chosen statistical analysis.

Standard 3: Participants

Researchers in survey studies must describe participants with sufficient detail to allow other researchers to replicate the study (Horner et al, 2005 & Krezmien, 2016)). Gersten et al, (2005) states that the description of the participants must be provided with enough information in order for the author and other researchers to generalize the findings to similar populations. Therefore, Gersten et al, (2005) suggested that researchers need to include information such as disabilities status, demographics (e.g., age, race, sex, subsidized lunch status; English language learner status, special education status), and academic status.

However, for the purpose of our study, that is, knowledge of teachers of students with ASD on EBPs, we need to collect extensive information about teachers' experiences in Autism field, their training in ASD and EBPs, the number of students with ASD taught, and the type of classroom in which students with ASD are taught. The standard for participants was created consistent with Mulcahy et al. (2016), Krezmien et al.,(2016), and Gersten et al, (2005). This standard includes of nine components: (1) Ethnicity, (2) Age, (3) Gender (4) Educational level, (5) Years of experience, (6) Role in school (general or SPED teacher), (7) Grade/type of classroom taught, (8), Number of ASD students taught OR years of experience teaching students with ASD and (9) Training in ASD & EBPs. These criteria were primarily based on Krezmien, 2016, with extensive use of the indicators established by Mulcahy and colleagues (2016). I modified some of the components to be appropriate for teachers as opposed to students. For example, instead of achievement and/or behavior scores (as used in Mucahy et al., 2016) I developed the standard "number of students with ASD taught" to catch information about the

participants of the surveys, namely SPED teachers. These criteria ensure that the findings from the studies can be generalized to the broader population.

Table 3 displays the components for standard 3. Only one study (Morrier, Hess & Heflin, 2011) met the nine criteria for the standard. The authors described the participants with sufficient details. They provided information about ethnicity, age, gender, educational level, and years of experience. For example, almost 99% of the respondents were female, ranging in age from 22 to 59 years old, 7.0% of the participants were African American, 84.0% were Caucasian, 1.1% were Hispanic, 5.7% were another ethnicity, and 2.3% were multiracial. From that participants 59.3% of the respondents held master's degrees, and 29.1% held bachelor's degrees. Total years of teaching experience ranged from 1 to 35 years (M = 12.28, SD = 8.45). Morrier and colleagues (2011) continued, providing sufficient information about the participants such as their role in school, type of classroom taught, numbers of students with ASD taught, and their training in ASD or EBPs. For example, the mean number of children with ASD taught was 2.51, and the majority of teachers (58.9%) taught in special education classrooms. The most commonly reported methods for training were attendance at workshops (i.e., full- and half-day workshops; 20.54%), hands-on training with students with ASD (18.92%), and self-taught methods (18.38%).

Less than half of the studies (Herzog, 201; Bain, Brown & Jordan, 2009; Brock, Huber, Carter, Juarez & Warren, 2014; Stahmer & Aarons, 2009; Alotaibi, 2015; Sciuchetti, McKenna & Flower, 2016; Cahill, 2015; Seymour, 2017; Hendricks, 2011; Hess, Morrier, Heflin & Ivey,2008) met five components or more for the standard of the participants. Alotaibi (2015) included all but the component for ethnicity. Cahill (2015) and Hess and colleagues (2008) described al of the components for the participant but two: numbers of students with ASD taught,

age, or training in ASD/EBPs. Herzog, (2011), Brock, Huber, Carter, Juarez & Warren (2014), Stahmer & Aarons (2009) and Seymour (2017) provided six out 9 components. For example, Herzog (2011), Brock and colleagues (2014), and Seymour (2017) described participants' educational level, years of experience, role in school, type of classroom taught, Number of ASD students, training in ASD & EBPs, but did not describe ethnicity, age, and gender. Stahmer & Aarons (2009) described all but the components for type of classroom taught, experience with students with ASD, and training in ASD & EBPs. Bain (2009), Sciuchetti (2016), and Hendricks (2011) described five components. Bain (2009) did not describe the components of years of experience, role in school, type of classroom taught, or number of ASD students. Sciuchetti (2016) did not provide information about ethnicity, age, experience with students with ASD, or training in ASD & EBPs. Hendricks (2011) did not include ethnicity, age, gender, or training in ASD & EBPs.

Authors of eight studies met four or fewer of the components. This means that they lacked sufficient information about the participants for the reader to make an informed decision about the findings. Three of the studies (Alhossein, 2016; Corona, Christodulu & Rinaldi, 2017; and Borders, Bock & Szymanski, 2014) provided adequate information about only four components: gender, educational level, years of experience, role in school, and type of classroom taught. For example, Alhossein (2016) reported the participants were 71% male and 23% female and 81% had completed bachelor's degrees and 15% had master's degrees or above. For describing participants' role in school, 47% were general education teacher and 53% special education teachers. For the experience component, he stated that the majority of participants had more than five years teaching experiences. Corona and colleagues (2017) also provided information about the same four components.

Table 3: Participants

Main Author	Ethnicity	Age	Gander	Educational level	Years of experience	Role in school	Grade taught	Experience with ASD	Training in ASD & EBPs	Sum	Met criteria
Alhossein,2016	0	0	1	1	1	1	0	0	0	4	0
Alotaibi, 2015	0	1	1	1	1	1	1	1	1	8	0
Alotaibi, 2016	0	0	0	0	0	0	0	0	0	0	0
Bain, 2009	1	1	1	1	0	0	0	0	1	5	0
Borders, 2014	0	0	0	1	1	1	1	0	0	4	0
Brock,2014	0	0	0	1	1	1	1	1	1	6	0
Cahill, 2015	1	0	1	1	1	1	1	0	1	7	0
Callahan, 2008	1	0	1	0	0	0	0	0	0	2	0
Corona, 2017	0	0	1	1	1	1	0	0	0	4	0
Hendricks,2011	0	0	0	1	1	1	1	1	0	5	0
Herzog, 2011	0	0	0	1	1	1	1	1	1	6	0
Hess, 2008	1	1	1	1	1	1	1	0	0	7	0
Locke, 2016	0	0	0	0	0	1	1	0	0	2	0
Loiacono, 2008	0	0	0	0	0	1	0	0	1	2	0
Morrier, 2011	1	1	1	1	1	1	1	1	1	9	1
Sciuchetti,2016	0	0	1	1	1	1	1	0	0	5	0
Seymour, 2017	0	0	0	1	1	1	1	1	1	6	0
Stahmer, 2009	1	1	1	1	1	1	0	0	0	6	0
Williams, 2011	0	0	0	0	0	1	0	0	0	1	0
Sum	6	5	10	14	13	15	11	6	8		1

The participants were 18% special education teachers, and 15% general education teachers. Most of the participants were female (90%), and had advanced degrees (93%). They had been serving

in their current roles for 5 or more years (71%). Borders (2014) reported that 45% of the teacher were licensed in D/HH only and 55% were licensed D/HH plus an additional area of licensure such as Learning Behavioral Specialist, Low Vision/Blindness, or Early Childhood. The author also stated that the majority of participants (72%) had over 10 years of teaching experience.

Five studies (Callahan, Henson & Cowan, 2008; Loiacono & Allen, 2008; Locke et al, 2016; Williams, Fan & Goodman, 2011; Alotaibi & Almalki, 2016) included only two or fewer components for the participants standard. Callahan and colleagues (2008) included only ethnicity and gender. Loiacono (2008) described participants' role in school, and their training in ASD and EBPs. Locke (2016) provided information about the components of teachers' roles in school and type of classroom taught. Williams (2011) included only one of the components of the participants (role in school). Alotaibi (2016) did not provide adequate description of any components.

Few studies included the components of ethnicity, age, number of ASD student taught, and training in ASD & EBPs. Authors of six studies (Morrier, Hess & Heflin, 2011; Bain, Brown & Jordan, 2009; Callahan, Henson & Cowan, 2008; Stahmer & Aarons, 2009; Cahill, 2015; Hess, Morrier, Heflin & Ivey, 2008) included the component of ethnicity. This means more than half of the studies did not describe the ethnicity of the participants. Authors of only five studies (Morrier, Hess & Heflin, 2011; Bain, Brown & Jordan, 2009; Stahmer & Aarons, 2009; Alotaibi, 2015; Hess, Morrier, Heflin & Ivey, 2008) included the component of age. Authors of six studies (Herzog, 2011; Morrier, Hess & Heflin, 2011; Brock, Huber, Carter, Juarez & Warren, 2014; Alotaibi, 2015; Seymour, 2017; Hendricks, 2011) included the component of "number of ASD students taught." Authors of eight studies (Herzog, 2011; Morrier, Hess & Heflin, 2011; Bain, Brown & Jordan, 2009; Brock, Huber, Carter, Juarez & Warren, 2014; Loiacono & Allen, 2008;

Alotaibi, 2015; Cahill, 2015; Seymour, 2017) included the component of training on ASD and EBPs.

The authors of survey design studies should describe the participants using demographic and educational characteristics. This is important because much of the demonstrated causal or correlational relationships among studied variables is influenced by characteristics of the individuals in the sample, which should be controlled to the maximum extent possible. Replication of survey design studies depends upon the ability to conduct the study with a comparable sample (Krezmien, 2016). Moreover, the capacity to generalize findings depends on the reader's knowledge of the well-described sample (Gersten et al, 2005 & Mulcahy, et al., 2015).

Standard 4: Setting

Horner et al (2005) state that researchers must describe setting clearly. Researchers must provide substantive information and details about physical setting to allow other researchers to understand it for replication (Horner et al, 2005). School environments are complex in nature (Odom et al, 2005). It is important for any researcher using quantitative methods to provide full description of the setting to help readers to understand the context. For example, readers need to know in which country, region, and city the survey has been done, how many districts and schools participated in the study, and what the educational setting looks like. For setting this standard, I created four components: (1) Region, (2) Number of counties/districts, (3) Number of schools, and (4) Type of school (public, private, special education school). I developed all of the indicators by using the recommendations of Horner and colleagues (2005) and Krezmien and colleagues (2005) for quality indicators of setting. I modified some indicators to be more appropriate to the current study. For example, instead of the indicator "size" in Krezmien and

colleagues study, I created the indicators "number of districts" and "number of schools" to capture the number of districts and schools participated in each city across Saudi Arabia.

Table 4 displays the components for standard 4. All authors of the 19 studies met the component of region. Three studies (Alotaibi, 2015; Seymour, 2017; Williams, Fan & Goodman; 2011) only met the four components for setting. For example, Seymour (2017) drew the sample from public elementary, middle, and high school teachers who taught during the 2015-2016 school year in Pennsylvania. The numbers of school districts that agreed to participate were 196. The author included 15 randomly selected charter schools. The author excluded: (a) juvenile correctional centers, (b) alternative schools, (c) special education schools, (d) schools for gifted and talented children only, and (e) virtual schools.

Four studies (Morrier, Hess & Heflin, 2011; Brock, Huber, Carter, Juarez & Warren 2014; Alotaibi & Almalki, 2016; Hess, Morrier, Heflin & Ivey, 2008) met three components for setting. Morrier et al (2011), Brock et al (2014), and Hess et al (2008) described the same three components: region, number of counties/districts, and type of school. All four studies failed to report the total number of schools participated in the study. For example, Morrier and colleagues (2011) sent the survey to 159 public school counties in the state of Georgia. The majority of teachers the responded (58%) taught in autism-self-contained or other self-contained settings. Fewer than half of the studies (Alhossein, 2016; Herzog, 2011; Bain, Brown & Jordan, 2009; Corona, Christodulu & Rinaldi, 2017; Stahmer, & Aarons, 2009; Loiacono & Allen, 2008; Locke et al, 2016; Cahill, 2015; Hendricks, 2011) met only two components for the standard of setting. Alhossein (2016), Bain and colleagues (2009), Cahill (2015), and Hendricks (2011) did not report number of counties/districts or number of schools.

Table 4: Settings

Main Author	Region	Number of counties/districts	Number of schools	Type of school/classroom	Sum	Met Criteria
Alhossein,2016	1	0	0	1	2	0
Alotaibi, 2015	1	1	1	1	4	1
Alotaibi, 2016	1	0	1	1	3	0
Bain, 2009	1	0	0	1	2	0
Borders, 2014	1	0	0	0	1	0
Brock, 2014	1	1	0	1	3	0
Cahill, 2015	1	0	0	1	2	0
Callahan, 2008	1	0	0	0	1	0
Corona, 2017	1	0	1	0	2	0
Hendricks,2011	1	0	0	1	2	0
Herzog, 2011	1	1	0	0	2	0
Hess, 2008	1	1	0	1	3	0
Locke, 2016	1	0	1	0	2	0
Loiacono, 2008	1	1	0	0	2	0
Morrier, 2011	1	1	0	1	3	0
Sciuchetti,2016	1	0	0	0	1	0
Seymour, 2017	1	1	1	1	4	1
Stahmer, 2009	1	1	0	0	2	0
Williams, 2011	1	1	1	1	4	1
Sum	19	9	6	11		3

For example, Alhossein (2016) conducted his study in the public schools in Riyadh, the capital of Saudi Arabia. The author stated that "several schools were selected in Riyadh." He did report the number of districts or schools that agreed to participate in the study. Three studies (Callahan et al, 2008; Sciuchetti et al, 2016; Borders et al, 2014) met only one criteria for setting. Three studies reported the component of region but failed to report number of districts, number of schools, or type of school. For example, Callahan (2008) sent the surveys via mail to the participants located in North Central Texas. The author did not provide any information other than the region, and this means that the setting was not described with sufficient information to meet the standard of a rigorous study. The authors should provide enough detail about the setting to allow readers to identify a similar setting.

The authors of the 19 studies all met the component for region. All studies named the country, state, region, or city where the survey been done. Less than half of the studies did not meet the components for number of counties/districts, and number of schools. Authors of only six studies (Alotaibi & Almalki, 2016; Corona, Christodulu & Rinaldi, 2017; Locke et al, 2016; Alotaibi, 2015; Seymour, 2017; Williams, Fan & Goodman, 2011) met the component for number of schools. Most of the studies did not mention the number of schools that participated in the study. Authors of nine studies (Herzog, 2011; Morrier, Hess & Heflin, 2011; Brock, Huber, Carter, Juarez & Warren, 2014; Stahmer & Aarons, 2009; Loiacono & Allen, 2008; Alotaibi, 2015; Seymour, 2017; Hess, Morrier, Heflin & Ivey, 2008; Williams, Fan & Goodman, 2011) met the component for number of counties/districts. The authors should mention the number counties, districts and/or schools that received an initial letter from the author, and the number that responded and participated in the study. This is important because the context and setting

should be described in enough precision and detail that it allows other researches clear understanding for replication (Horner et al., 2005).

Standard 5: Data collection (Instruments)

Quantitative research and survey studies in particular should describe data collection procedures clearly and precisely (Gersten et al., 2005). This includes description of instruments, including surveys or scales, as well as description of each instrument's administration. This is important because any error in data collection may lead to untrustworthy or incorrect results. Researchers should consider that all data in quantitative research are significant, so the data collection instruments must be clearly described and adequately administered to make the readers to better understand findings. Inappropriate data collection procedures limit the interpretability of the data and prevent replication (Gersten et al., 2005, Mulcahy et al., 2015). Qualitative researchers also must provide reliability of data collection, and inter-rater reliability of data collection (Gersten et al., 2005). According to Horner et al (2005) and Gersten et al (2005) acceptable standards for inter-rater range from 80% and 90%.

Data collection (Instrumentation) is the fifth standard for the methodological review. This standard includes four components: (1) Instrument clearly described, (2) Instrument administration clearly described, (3) Reliability of Instrument included (4) Validity of Instrument included. I developed all the components relying on Krezmien's research, but instead of the component "inter-rater reliability of data collection" I created "validity of the instrument" to be more appropriate to the purpose of the current methodological review.

Table 5 displays the components for standard 5. Eight studies (Morrier, Hess & Heflin, 2011; Alotaibi & Almalki, 2016; Stahmer & Aarons, 2009; Locke et al, 2016; Cahill, 2015; Hendricks, 2011; Hess, Morrier, Heflin & Ivey, 2008; Williams, Fan & Goodman, 2011) out of

19 met the standard for instrument. These studies provided clear and comprehensive descriptions of their instruments. The authors included the four components: instrument clearly described, instrument administration described, reliability of the instrument, and validity of the instrument. For example, Morrier and colleagues (2011) described the instrument of the study, whichwas a survey called the autism treatment survey (ATS). The purpose of the survey was to ask public school teachers about the most common practices used with students with ASD. The authors developed the questionnaires based on review of research on interventions used for teaching students with autism that developed by Simpson et al. (2005). Categories included (a) interpersonal relationships strategies (6 strategies); (b) skill-based strategies (18 strategies); (c) cognitive strategies (6 strategies); (d) physiological, biological, and neurological strategies (5 strategies); and (e) other. For the purpose of validity, four experts in autism and research reviewed the survey and provided their feedback for the authors. The authors conducted a pilot study on ATS, and the respondents provided feedback on the format and ease of access of the survey.

Two studies (Alhossein, 2016; Corona, Christodulu & Rinaldi, 2017) met three criteria for the standard of instrument. Alhossein did not describe the component of instrument administration, and Corona and colleagues did not provide information about the validity, but both authors described the other components. Less than half of the studies (Herzog, 2011; Bain, Brown & Jordan, 2009; Loiacono & Allen, 2008; Alotaibi, 2015; Sciuchetti, McKenna & Flower, 2016; Seymour, 2017; Borders, Bock & Szymanski, 2014) met only two out of four criteria. Loiacono et al (2008), Alotaibi (2015), Sciuchetti et al (2016), Seymour (2017), and Borders et al (2014) described the instrument clearly and described survey administration, but all authors did not provide any information about the reliability and validity of the surveys. For

example, Alotaibi (2015) described the survey that included five sections: (a) participants'

demographic information, (b) teachers' knowledge and frequency of use of ABA strategies,

Table 5: Data collection (Instruments)

Main Author	Instrument clearly described	Instrument administration	Reliability	Validity	Sum	Met Criteria
Alhossein,2016	1	0	1	1	3	0
Alotaibi, 2015	1	1	0	0	2	0
Alotaibi, 2016	1	1	1	1	4	1
Bain, 2009	1	0	1	0	2	0
Borders, 2014	1	1	0	0	2	0
Brock,2014	1	0	0	0	1	0
Cahill, 2015	1	1	1	1	4	1
Callahan, 2008	1	0	0	0	1	0
Corona, 2017.	1	1	1	0	3	0
Hendricks, 2011	1	1	1	1	4	1
Herzog, 2011	1	0	0	1	2	0
Hess, 2008	1	1	1	1	4	1
Locke, 2016	1	1	1	1	4	1
Loiacono, 2008	1	1	0	0	2	0
Morrier, 2011	1	1	1	1	4	1
Sciuchetti, 2016	1	1	0	0	2	0
Seymour, 2017	1	1	0	0	2	0
Stahmer, 2009	1	1	1	1	4	1
Williams, 2011	1	1	1	1	4	1
Sum	19	14	11	10		8

(c) the importance of various training activities and experiences, (d) the barriers to use of the ABA behavior management strategies, and (e) type of training/resources that desired to the teachers. The author also described the survey administration: "The survey was administered using Qualtrics, a secure online survey tool. The link for survey was shared electronically by General Secretariat for Special Education in Ministry of Education in Saudi Arabia. Participants were informed that their participation is voluntary and that they could quit the survey at any time. They were also informed that there is no incorrect response for each item in the survey."

The authors of two studies (Brock, Huber, Carter, Juarez & Warren, 2014; Callahan, Henson & Cowan, 2008) met only one component for instrument. Both authors met the component of "instrument described clearly" but did not meet any other components. For example, Callahan and colleagues (2008) included a total of 99 questions: "Survey questions 1–84 required respondents to rate specific autism intervention components on a scale of one to seven, and to indicate the response that most accurately represented their opinion about the importance of the component. Questions 85–98 addressed demographic factors. Question 99 was an open ended question inviting the respondent to write comments about the survey and/or essential components of high quality school-based programs for autism."

All studies fulfilled the component "instrument clearly described." The authors of the 19 studies described their surveys with details. On the other hand, fewer than half of the studies met the components for reliability and validity. Authors of eight studies (Herzog, 2011; Brock, Huber, Carter, Juarez & Warren, 2014; Callahan, Henson & Cowan, 2008; Loiacono & Allen, 2008; Alotaibi, 2015; Sciuchetti, McKenna & Flower, 2016; Seymour, 2017; Borders, Bock & Szymanski, 2014) failed to describe the reliability of the survey, and nine studies (Bain, Brown & Jordan, 2009; Brock, Huber, Carter, Juarez & Warren, 2014; Callahan, Henson & Cowan,

2008; Corona, Christodulu & Rinaldi, 2017; Loiacono & Allen, 2008; Alotaibi, 2015; Sciuchetti, McKenna & Flower, 2016; Seymour, 2017; Borders, Bock & Szymanski, 2014) failed to describe the validity. It is critical in quantitative research, and in particular in survey studies, that authors describe the reliability and validity of the instrument for the readers. The failure to meet the standard of collection data limits the ability of readers to interpret the findings, because the readers do not have sufficient information to trust the accuracy of the data (Krezmien, 2016).

Standard 6: Variables

Researchers should provide precise and operational definitions of all dependent, independent, and other variables in the study (Gersten et al., 2005; Horner et al., 2005 & Krezmien, 2016). This is important because a clear description of variables can affect the findings of the study, the interpretability of the data, and capability to replicate (Gersten et al., 2005 & Krezmien, 2016). Operational definitions also allow for valid interpretation of results and consistent assessment of the constructs being studied (Horner et al., 2005 & Krezmien, 2016).

Variables was the sixth standard for methodological review. This standard includes eight components: (1) IV is logically linked to the research question/hypothesis, (2) DV is logically linked to the research question/hypothesis (3), Type of variable is described (e.g., interval, ratio, dichotomous, ordinal, nominal) (4) IV is operationalized, (5) DV is operationalized, (6) Other variables included in analyses are operationalized, (7) Instrumentation for IV is described and appropriate, and (8) Instrumentation for DV is described and appropriate. I selected all components based on the quality indicators of Krezmien and colleagues (2016) and I did not change or add any components.

Table 6 displays the components for standard 6. Only one study (Locke et al, 2016) met all components for the standard. The variables in the study were adequately described and operationalized and were clearly linked to the research questions. The quality of the variables in this study enhances the confidence in the findings. The authors provided operational definitions for the independent and dependent variables. For example, the dependent variable was fidelity. "Program fidelity (i.e., adherence, dose, and competence) will be measured using an observer-rated fidelity checklist that examines four behavioral intervention strategies: discrete trial training, pivotal response training, functional routines, and positive reinforcement."

Half of the studies met all but one or two components. All of them did not describe the type of variables (e.g., interval, ratio, dichotomous, ordinal, nominal), and most of the studies also did not operationalize other variables included in analyses. If the authors do not have clear and well-established variables, it is difficult to analyze the data in a meaningful way, and limiting the interpretability of all findings. Three studies met the five components. The authors of the three studies did not have a research questions or hypotheses. So it is difficult to find a link between dependent and independent variables to the research questions or hypotheses.

Five studies (Bain, Brown & Jordan, 2009; Loiacono & Allen, 2008; Sciuchetti, McKenna & Flower, 2016; Cahill, 2015; Borders, Bock & Szymanski, 2014; Williams, Fan & Goodman, 2011) met only four or fewer components. Bain and colleagues and Borders and colleagues did not meet the following components: (1) IV is logically linked to the research question/hypothesis, (2) DV is logically linked to the research question/hypothesis (3), Type of variable is described (e.g., interval, ratio, dichotomous, ordinal, nominal), and (4) Other variables included in analyses are operationalized. Williams and colleagues failed to meet the first three

components, as well as the components for "other variables must be operationalized" and

"instrumentation for IV is described and appropriate." Krezmien et al

Table 6: Variables

Main Author	IV linked to RQ	DV linked to RQ	Type of variable	IV is operationaliz	DV is operationaliz	Other variables	instrumentati on for IV	instrumentati on for DV	Sum	Met Criteria
Alhossein,2016	1	1	0	1	1	0	1	1	6	0
Alotaibi, 2015	0	0	0	1	1	1	1	1	5	0
Alotaibi, 2016	1	1	0	1	1	0	1	1	6	0
Bain, 2009	0	0	0	1	1	0	1	1	4	0
Borders, 2014	0	0	0	1	1	0	1	1	4	0
Brock,2014	1	1	0	1	1	0	1	1	6	0
Cahill, 2015	1	1	0	1	0	0	1	0	4	0
Callahan, 2008	1	1	0	1	1	1	1	1	7	0
Corona, 2017	1	1	0	1	1	0	1	1	6	0
Hendricks,2011	1	1	0	1	1	1	1	1	7	0
Herzog, 2011	1	1	0	1	1	0	1	1	6	0
Hess, 2008	1	1	0	1	1	0	1	1	6	0
Locke, 2016	1	1	1	1	1	1	1	1	8	1
Loiacono, 2008	1	1	0	1	1	0	0	0	4	0
Morrier, 2011	0	0	1	1	1	1	1	1	6	0
Sciuchetti,2016	1	1	0	1	0	0	1	0	4	0
Seymour, 2017	1	1	0	1	1	0	1	1	6	0
Stahmer, 2009	0	0	0	1	1	1	1	1	5	0
Williams, 2011	0	0	0	1	1	0	0	1	3	0
Main Author	13	13	2	19	17	6	17	16		1

(2016) states "Methodologically rigorous studies must include variables that are meaningful, well described, and logically linked to the research questions. Furthermore, the variables must be operationalized, and the type and instrumentation used must be explicitly described."

All studies met the component of "IV is operationalized." They operationalized the independent variables in their studies. For example, Morrier and colleagues (2011) included several independent variables in their study (a) certification level obtained, (b) type of class taught, (c) the number of children with ASD in a class, (d) total years of teaching experience, and (e) total years of experience teaching children with ASD. Alternatively, only two studies (Morrier, Hess & Heflin, 2011; Locke et al, 2016) met the component for type of variable. Morrier, Hess & Heflin (2011) reported the type of the measurement scale on some variables (e.g., "For a few variables such as (e.g., teachers were dichotomized as either (a) undergraduate degree recipients or (b) graduate degree recipients"). Another example of explicitly indicating how the measurement scale was used is what is stated by the authors (e.g., teachers were grouped according to number of years taught and dichotomized as either (a) initial (0–3 years of teaching) or experienced (i.e., 4 or more years teaching)). The study also included other measurement scales such as interval (e.g., years of teaching experience which ranged from 1 to 35 years and total years of experience teaching children with ASD.) ordinal (e.g., education level), and nominal (e.g, Type of classroom taught which included three categories: (a) general education, (b) special education, and (c) other. Authors of more than half of studies failed to operationalize other variables included in the analysis. In survey studies the authors must define the variables and describe the type and instrumentation used. If the researcher does not have clear and well-established variables, it is impossible to analyze the data in a meaningful way, substantially limiting the interpretability of all findings.

Standard 7: Statistical Analysis

The quality of survey research depends on the quality of statistical analysis of the study. The researchers should consider three things when conducting statistical analysis; presenting and discussing descriptive statistics, appropriateness of statistical analysis, and reporting effect sizes and confidence intervals. First, descriptive statistical must be described and conducted in quantitative studies before running statistical analysis. This is necessary to ensure that final data meet the assumptions for proposed statistical analyses. Authors can test the assumptions of normality and to identify outliers in dataset. Second, statistical analysis must be appropriate. The tests used for analyzing data should be related to researcher questions (Gersten et al., 2005). In order to ensure that appropriate analysis is conducted, the researchers should report the assumptions of statistical analysis, and describe how the assumptions may be met. In addition, the statistical analysis must be appropriate to the type of data (e.g., ratio, ordinal, dichotomous, nominal, and ordinal). Finally, the authors must report effect sizes and confidence intervals for all quantitative analysis and should interpret them and discuss their effects in the context of prior research (Thompson, et al 2005 & Krezmien, 20). The effect sizes are important for showing the importance of a statistically significant finding.

Indicator 7 includes ten components: (1) Descriptive statistic procedures are described, presented, and discussed , (2) Analysis is related to the research question, (3) Assumption of statistical analyses are met, (4) Statistical analysis described, (5) Statistical analysis appropriate, (6) Analysis is appropriate to the type of data, (7) Effect sizes are reported, (8) Confidence intervals of the effect sizes are reported, (9) Multivariate PostHoc tests applied, (10) Univariate follow ups explained. I selected all these components relied on Krezmien and colleagues study, and did not adopt or add any new components.

Table 7 displays the components for standard 7. None of the studies met all components for statistical analysis. Five studies (Alhossein, 2016; Brock, Huber, Carter, Juarez & Warren, 2014; Corona, Christodulu & Rinaldi, 2017; Alotaibi, 2015; Hendricks, 2011) met all but two or

Table 7: Statistical Analysis

Main Author	descriptive Stats	Related to RQ	Assumption met	Analysis Described	Analysis Appropriate	Analysis appropriate	Effect sizes	Confidence intervals	Multivariate PostHoc	Univariate PostHoc	Sum	Met Criteria
Alhossein,2016	1	1	1	1	1	1	1	0	0	0	7	0
Alotaibi, 2015	1	1	1	1	1	1	1	1	0	0	8	0
Alotaibi, 2016	1	1	1	0	1	1	0	0	0	0	5	0
Bain, 2009	1	1	1	0	1	1	0	0	0	0	5	0
Borders, 2014	1	1	1	0	1	1	0	0	0	0	5	0
Brock,2014	1	1	1	1	1	1	1	0	0	0	7	0
Cahill, 2015	1	1	1	0	1	1	0	0	0	0	5	0
Callahan, 2008	1	1	1	0	1	1	1	0	0	0	6	0
Corona, 2017	1	1	1	1	1	1	1	0	0	0	7	0
Hendricks,2011	1	1	1	1	1	1	1	0	1	0	8	0
Herzog, 2011	1	1	1	1	1	1	0	0	0	0	6	0
Hess, 2008	1	1	1	0	0	1	0	0	0	0	4	0
Locke, 2016	1	1	1	1	1	1	0	0	0	0	6	0
Loiacono, 2008	1	1	1	0	0	1	0	0	0	0	4	0
Morrier, 2011	1	0	0	1	0	0	1	0	0	0	3	0
Sciuchetti,2016	1	1	1	0	1	1	0	0	0	0	5	0
Seymour, 2017	1	1	1	0	1	1	0	0	0	0	5	0
Stahmer, 2009	1	1	1	0	1	1	0	0	0	0	5	0
Williams, 2011	0	1	1	0	1	1	0	0	0	0	4	0
Sum	18	18	18	8	16	18	7	1	1	0		0

three components. The authors of the five studies did not meet the components for multivariate PostHoc tests applied, and univariate follow ups explained. But Alhossein (2016), Brock and colleagues (2014), Corona and colleagues, (2017) also did not also meet one more component, confidence intervals of the effect sizes are reported.

Three studies (Herzog, 2011; Callahan, Henson & Cowan, 2008; Locke, 2016) met six components. Herzog (2011) Locke and colleagues (2016) described, presented, and discussed descriptive statistic procedures, and analysis was related to the research questions. They also met assumption of statistical analyses, described statistical analysis, selected appropriate statistical analysis, and selected analysis that was appropriate to the type of data.

Half of the studies (Bain, Brown & Jordan, 2009; Alotaibi & Almalki, 2016; Stahmer & Aarons, 2009; Loiacono & Allen, 2008; Sciuchetti, McKenna & Flower, 2016; Cahill, 2015; Seymour; 2017; Borders, Bock & Szymanski, 2014; Hess, Morrier, Heflin & Ivey, 2008; Williams, Fan, & Goodman, 2011) met four or five criteria for the standard. Authors of all studies did not meet the following components; Statistical analysis described, Effect sizes are reported, Confidence intervals of the effect sizes are reported, Multivariate PostHoc tests applied, Univariate follow ups explained. For example, Hess and colleagues did not meet the components for Statistical analysis described, Statistical analysis appropriate, Effect sizes, Confidence intervals of the effect sizes, Multivariate PostHoc tests applied, Univariate follow ups explained.

One study (Morrier, Hess & Heflin, 2011) met only three out of ten components. For example, Morrier and colleagues although there was not clearly defined research questions, all of the analyses conducted were related to the variables of the teachers characteristics. For example, the first analysis the authors conducted was an independent sample t-test between the teachers

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who reported best practice use and those who did not. However, the type of statistical analyses the authors conducted were not appropriate for the purpose of the study. Moreover, the authors did not state or present the assumptions of the independent sample t-tests, ANOVA, or the multiple regressions. Many of the statistical analyses used in this paper were not appropriate. The authors should have used MANOVA instead of conducting several multiple regressions.

The authors of 18 of the 19 studies met the components for Descriptive statistic described, Analysis related to RQ, Assumptions are met, and Analysis is appropriate to the type of data. For example, Morrier, Hess & Heflin (2011) described, presented, and discussed descriptive statistics clearly. The authors used descriptive statistics and percentages when describing the sample. For example, means were used to describe the students' mean age (9.45 years, ranging from 3–19 years old), and also standard deviations were used to describe the variability of the variables (such as teachers' years of experience, SD = 5.842). In addition, percentages were used to describe the variables (e.g., approximately 88% of students were male). In addition to describing and presenting the descriptive statistics, the authors also discussed the means, standard deviations, and percentages (e.g., "teachers provided data for 57% of the school districts in Georgia, representing all regions of the state"). However, the authors should not have used the mean when reporting the class size statistics ("The mean total class size was 12.64 students, with a range from 3 to 39 students"), instead they should have reported the median since the mean was not a representational value in this case. In other words, there is a great deal of variation in the class sizes of the sample. In addition, the authors used descriptive statistics and percentages when describing the sample. For example, means were used to describe the students' mean age (9.45 years, ranging from 3–19 years old), and also standard deviations were used to describe the variables.

All studies failed to meet the component for Univariate follow ups explained. Also, authors of all studies but one study (Alotaibi,2015) did not meet the criteria for Confidence intervals, which are important for determining the degree to which the reported effect sizes are different from 0 (Krezmien, 2016). Authors of all but one study (Hendricks, 2011) failed to meet the component for Multivariate PostHoc tests applied, which are important when there are multiple dependent variables as well as independent variables in the study. Authors of more than half of the studies did meet the component for Effect sizes reported, which is important for demonstrating the practical importance of the findings (Krezmien, 2016).

Standard 8: Implication & Limitation

The purpose of quality survey research in special education is to make useful recommendations to improve the outcomes of students with disabilities. Authors should clearly identify the implications and describe the significance of the studies and the effect of the results within the context of prior research (Odom et al., 2005 & Krezmien, 2016). On the other hand, the researchers should explain the limitations of their research (Thompson et al., 2005 & Krezmien, 2016). Limitations may include problems with research design, sampling procedures, threats to internal and external validity, and any other limitations (Krezmien ,2016). This standard includes two components: (1) Implication, (2) Limitation. These criteria were based on Krezmien, 2016.

Table 8 displays the components for standard 8. Most of the studies discuss the implications and limitations of their studies. All studies but only one (Alotaibi, 2016) met the component for "limitations clearly identified".

For example, Morrier et al (2011) described the limitations of their studies clearly "there is an obvious attrition rate among the participants through training toward teaching licensure.

Additionally, the researcher noted the predominance of females in respondent groups and recommend inclusion of student respondents that offer a balanced representation of males and

Table 8: Implication and limitations

Main Author	Implications are clearly described	Limitations are clearly identified	Sum	Met Criteria
Alhossein,2016	1	1	2	1
Alotaibi, 2015	1	1	2	1
Alotaibi, 2016	0	0	0	0
Bain, 2009	0	1	1	0
Borders, 2014	0	1	1	0
Brock,2014	1	1	2	1
Cahill, 2015	0	1	1	0
Callahan, 2008	1	1	2	1
Corona, 2017.	1	1	2	1
Hendricks, 2011	0	1	1	0
Herzog, 2011	0	1	1	0
Hess, 2008	0	1	1	0
Locke, 2016	0	1	1	0
Loiacono, 2008	1	1	2	1
Morrier, 2011	0	1	1	0
Sciuchetti, 2016	1	1	2	1
Seymour, 2017	1	1	2	1
Stahmer, 2009	0	1	1	0
Williams, 2011	0	1	1	0
Sum	8	18		8

females." Williams et al (2011) also provided a clear description of the limitations of their study. For example, the authors listed three weaknesses for the study: "First, the small sample of participants must be considered. A second limitation is that the results might also be subject to bias. First, the threat of nonresponse error (Schonlau et al., 2002) exists because many eligible participants did not complete the survey whereas others chose not to participate at all. Response rates are considered to be important because higher response rates often result in larger samples, thereby reducing the likelihood of error. A third limitation to this study is in regard to the statistical methods employed. A final limitation involves the breadth and scope of the interventions that were included in the survey." Alotaibi (2016) was the only one who did not discuss the limitations, though he did describe the implications.

Less than half of the studies met the component for implications. For example, Alhossein (2016) described the implications of his study clearly: "1) it should increase knowledge of EBTPs for pre- and in-service teachers. 2) Teacher preparation programs should offer courses that give students opportunities to learn these practices and implement them with real students. 3) School districts should provide training sessions that help teachers to learn about EBTPs and how to identify and use these practices. 4) Professionals and authorities need to use the Internet to develop trustworthy websites to disseminate EBTPs in order to increase teachers' knowledge and use of EBTPs."

Summary of Findings for All standards:

Table 9 displays the summary of findings for all standards. Even though several studies were able to meet the components for each of the eight quality standards, none of the 19 studies meet all eight quality standards.

Table 9: Summary of Findings for All Standards

Main Author	Standards								Standards Met
	1	2	3	4	5	6	7	8	
Alhossein,2016	3/4	4/5	4/9	2/4	3/4	6/8	7/10	2/2	1/8
Alotaibi, 2015	3/4	5/5	8/9	4/4	2/4	5/8	8/10	2/2	3/8
Alotaibi, 2016	3/4	3/5	0/9	3/4	4/4	6/8	5/10	0/2	1/8
Bain, 2009	2/4	4/5	5/9	2/4	2/4	4/8	5/10	1/2	0/8
Borders, 2014	2/4	4/5	4/9	1/4	2/4	4/8	5/10	1/2	0/8
Brock,2014	3/4	4/5	6/9	3/4	1/4	6/8	7/10	2/2	1/8
Cahill, 2015	3/4	5/5	7/9	2/4	4/4	4/8	5/10	1/2	2/8
Callahan, 2008	3/4	4/5	2/9	1/4	1/4	7/8	6/10	2/2	1/8
Corona, 2017	3/4	2/5	4/9	2/4	3/4	6/8	7/10	2/2	1/8
Hendricks, 2011	3/4	5/5	5/9	2/4	4/4	7/8	8/10	1/2	2/8
Herzog, 2011	3/4	4/5	6/9	2/4	2/4	6/8	6/10	1/2	0/8
Hess, 2008	3/4	4/5	7/9	3/4	4/4	6/8	4/10	1/2	1/8
Locke, 2016	3/4	4/5	2/9	2/4	4/4	8/8	6/10	1/2	1/8
Loiacono, 2008	3/4	2/5	2/9	2/4	2/4	4/8	4/10	2/2	1/8
Morrier, 2011	2/4	4/5	9/9	3/4	4/4	6/8	3/10	1/2	2/8
Sciuchetti, 2016	4/4	4/5	5/9	1/4	2/4	4/8	5/10	2/2	2/8
Seymour, 2017	4/4	4/5	6/9	4/4	2/4	6/8	5/10	2/2	3/8
Stahmer, 2009	2/4	4/5	6/9	2/4	4/4	5/8	5/10	1/2	1/8
Williams, 2011	2/4	4/5	1/9	4/4	4/4	3/8	4/10	1/2	2/8
Studies That Met Standard	2/19	3/19	1/19	3/19	8/19	1/19	0/19	8/19	

Note. Indicators are numbered as follows: 1 = Research Basis; 2 = Sampling; 3 = Participants; 4 = Settings; 5 = Data Collection; 6 = Variables; 7 = Statistical Analysis; 8 = Implications and limitations. All numbers that are in bold and in italics represent a study that met the criteria for that specific indicators.

Two (Alotaibi; 2015; Seymour, 2017) out the 19 studies met all components for three

quality standards. Both authors met all criteria for the standard of setting and the standard of

implications and limitations, and Alotaibi met the standard of sampling, while Seymour met the

standard of research basis. However, Seymour did not meet half of the components for statistical

analysis. For example, the author did not describe statistical analysis used in the study, report

effect size and confidence intervals, apply multivariate PostHoc tests, or explain univariate

follow ups.

Five (Morrier et al, 2011; Sciuchetti et al, 2016; Cahill, 2015; Hendricks,2011; Williams

et al, 2011) out of the 19 studies met the components for two quality standards. Four of these met

the standard for data collection, while one study (Sciuchetti et al, 2016) did not. Cahill (2015)

and Hendricks (2011) met the standard for sampling. Morrier et al, (2011) met the standard for

participants. Williams et al, (2011) met the standard for setting. Sciuchetti et al (2016) met the

standards for research basis and implication and limitations. However, four studies met only five

or fewer of the components for the standard of statistical analysis while one (Hendricks, 2011)

met only five out of nine of the components for the standard of participants.

Nine (Alhossein, 2016; Brock,2014; Callahan, 2008; Alotaibi, 2016; Corona, 2017;

Stahmer, 2009; Loiacono, 2008; Locke, 2016; Hess, 2008) studies met only one standard.

Alhossein, (2016), Brock (2014), Callahan (2008), Corona (2017), Loiacono, (2008) met the

standard for implication and limitation. Alotaibi (2016), Stahmer (2009), Locke (2016), and Hess

(2008) met the standard for data collection. However, the authors of nine studies had a problem

with describing the participants. For example, Alotaibi (2016) met none of the nine components

for the participants. Callahan (2008), Loiacono (2008), Locke (2016) met only two out nine. The

remaining studies met either four or six components. In addition Brock (2014), Callahan (2008),

and Loiacono, (2008) had serious issue with data collection. The authors did not describe instrument administration and did not report validity and reliability for the instruments. Alotaibi (2016), Stahmer (2009), Loiacono (2008), and Hess (2008) met five or fewer out of ten components for statistical analysis.

Three (Herzog, 2011; Bain, 2009; Borders, 2014) studies met none of the eight standards. Two of these met only half or fewer of the components for all standards. Herzog (2011) did not meet half of the components for setting, data collection, and implications and limitations. The author met only six of nine components for the participants and six of ten components for the statistical analysis.

<u>**Conclusion**</u>

I reviewed 19 studies on teachers' knowledge of evidence based practices for students with autism spectrum disorders. Of those, I found that most did not meet the standards for research basis, sampling, participants, setting, variables, and statistical analysis. I was most concerned that none of the studies met the ten components for statistical analysis standard. The studies concluded with a range of findings about knowledge, implementation, and training on evidence based practice for educating individuals with autism spectrum disorders. Most of the findings showed that teachers in the US and KSA had moderate or high knowledge and use of some of EBPs for students with ASD, and there was a positive relationship between knowledge and implementation of EBPs. However, the limitations of the research methods for the most of these 19 studies make me unable to accept this finding with confidence.

Based on the studies that I reviewed, there was a need for a methodological review process in order to provide a robust body of research regarding teachers' knowledge and implementation of evidence-based practices for students with ASD. There is a critical need for

training in evidence based practices for teachers to be aware of and knowledgeable about scientifically based practices that improve students with ASD outcomes. So, researchers in this field must identify specific standards for survey research to support the conducting and publication of rigorous research (Krezmien, 2017), because examining teachers knowledge and use of EBPs for students with ASD will help in planning for professional development, and in reviewing university based teacher preparation program to prepare teachers to work effectively with students with ASD.

Findings

I analyzed the discussion sections from the 19 studies to identify the key findings across the articles. I used a modified form of content analysis to analyze the findings. I copied the key findings from each article and pasted the findings (meaning unit) for each article into a cell in a single column of an Excel spreadsheet. Then, I reduced the findings into condensed meaning units that were more global in description. For example, if an article stated that two thirds of the participants valued university coursework as the best source for preparation to work with ASD, the condensed meaning would be most participants valued university coursework for ASD preparation. Finally, I reduced the condensed meaning units into categories. For example, when condensed unit was that there were no differences in the use of EBP by teachers in public schools or in segregated public schools for students with ASD, the category was no difference in EBP use by school type. I then combined the findings across the studies into 10 discrete categories, and combined the categories into four themes. This process allowed me to synthesize the findings in a systematic manner.

Theme 1. General Attitudes Toward Students with ASD

Many of the studies examined attitudes toward students with ASD. Six of the studies (Alhossein, 2016; Brock, 2014; Callahan et al., 2008; Alotaibi & Almalki, 2016; Stahmer et al., 2009; Seymour, 2017) found positive attitudes toward adopting and implementing EBPs with students with ASD, and of these six studies, one study (Seymour, 2017) reported teachers, school staff, or parents of students with ASD had positive attitudes towards including children with ASD in regular classroom. For example, Seymour (2017) reported that 64% of the teachers in Pennsylvania believed that students with ASD are participating with their typical peers more often. Seymour also found that Pennsylvania teachers used a variety of evidence-based practices, such as modeling, schedules, antecedent Package, and self-management, and that all of these were available in their schools. Brock et al. (2014) found that special education teachers had positive attitudes and greater confidence on implementing EBPs and training on ASD than general education teachers. Alotaibi & Almalki (2016) found that most teachers of students with ASD believe the influence of Information and Communication Technology (ICT), which refers to applications and devices used in communication, is useful in supporting the teaching process, learning process, and social interaction skills of students with ASD.

Each of the six studies that examined general attitudes toward students with ASD met criteria for just 3 or fewer of the standards. This severely limited the extent to which we can accept the findings of the associated studies. The methodological shortcomings of these studies were fairly extensive, and they failed to meet this current study's criteria for participant descriptions or sampling procedures. The failure to adequately describe the sample or sampling procedures makes replication impossible and limits the generalizability of the findings. Additionally, none of the articles met the criteria for the variable description or statistical

procedures. The failure to clearly describe the variables and to fail to utilize the correct statistical procedures results in findings that are difficult to interpret. As a result of the methodological shortcoming of these articles, we have little verifiable information about educator attitudes towards students with ASD.

Theme 2. Knowledge of EBPs

Several studies investigated teachers' knowledge on EBPs. Authors of three studies (Alhossein, 2016; Hendricks, 2011; Alotaibi, 2015) reported information about educator knowledge of EBP. The authors reported that teachers had an average knowledge and use of EBPs for students with ASD. For example, Alhossein (2016) concluded that special education teachers in Saudi Arabia had medium knowledge and use of EBPs. Hendricks (2011) found that teachers of students with ASD have low to intermediate levels of knowledge of autism and effective instructional practices, and also low to intermediate levels of implementation of EBPs. Alotaibi (2015) found that elementary school teachers are more likely to consider themselves as more knowledgeable and more frequent in their use of ABA strategies than secondary teachers. Authors of two studies (Alotaibi, 2015; Alhossein, 2016) found that teachers of students with ASD are more knowledgeable on some EBPs than other practices. For example, Alotaibi (2015) found that teachers of students with ASD in Saudi Arabia were more knowledgeable on extinction strategy than behavior contract strategy. Alhossein (2016) concluded that most of special education teachers in Saudi Arabia had average knowledge but low use of peer-mediated and self-mediated interventions. The author also found that teachers of students with special needs have knowledge of and make use of some practices more than others. For example, modeling, rehearsal, and feedback were the most known and used EBTPs.

However, all three studies that examined teachers' knowledge on EBPs met criteria for only three or fewer of my quality standards**.** Alhossein (2016) met only the implication and limitations indicator. Alotaibi (2015) met the sampling, setting, and implications and limitations indicators. Hendricks (2011) met the standards for sampling and setting. It is difficult to accept the findings of these studies due to their methodological shortcomings. The authors failed to meet the criteria for most of the indicators. Their failure to describe the participants and data collection limit interpretability the data and prevent replication. As a result of the methodological shortcoming of these studies, we have little verifiable information about teachers' knowledge of EBPs for students ASD.

Theme 3. Characteristics of Teachers

A number of studies examined characteristics of teachers and their impact on knowledge and implementation of EBPs (Alhossein, 2016; Alotaibi, 2015; Cahill; 2015; and Herzog, 2011). For example, Alhossein (2016) and Alotaibi (2015) found that female teachers were more prepared and more knowledgeable on EBPs than male teachers. Alhossein (2016) stated that female teachers were more knowledgeable on EBPs than male teachers. According to Alhossein "This finding could be important since there is single-gender education in Saudi Arabia, with female teachers educated in separate colleges and teaching in separate schools. This might suggest that female teacher education programs pay more attention to EBPs and might have in-service programs allocated to improving female teachers in this area." Alotaibi (2015) also found that female teachers were superior to male teachers in ABA knowledge scores.

Educational level, years of experience, and the type of school have no impact on teachers' knowledge on EBPs (Alhossein, 2016; Herzog, 2011). Alhossein (2016) found that educational level and years of experience of the teachers of students with special needs had no

relationship with their knowledge on EBPs. Herzog (2011) concluded that there was no significant differences between the regular public school teachers and separate public school teachers in implementing EBPs.

Teachers with adequate qualifications are likely to use EBPs with their students with ASD (Cahill, 2015; Hendricks, 2011). For example, Cahill (2015) found that teachers with a master's degree were more likely to use some of the evidence-based interventions with their students with ASDs. Hendricks (2011) found that teachers of students with ASD had a variety of qualification and experience. This study also found those teachers had intermediate knowledge and implementation of EBPs.

However, the authors of these studies that examined the relationship between the characteristics of the teachers and knowledge and use of EBPs met only three or fewer of my quality standards. Herzog (2011) met none of the eight quality standards, and Alhossein (2016) met only one. Cahill (2015) and Hendricks (2011) met only two standards. These methodological shortcomings severely limit our ability to accept the findings of these studies. The failure to define dependent and independent variables and other variables in the study limits the accuracy of the data and certainly limits the accuracy of the findings. In addition, the failure to select the right and appropriate statistical analysis test that related to the research question leads to inaccurate results. As a result of the methodological shortcomings of these studies, we have little verifiable information about characteristics of teachers and the relationship between teacher knowledge and implementation of EBPs.

Theme 4. Types of Training

Some of the studies examined the type of training that teachers received on ASD or EBPs. Two studies found that teachers with training on ABA were more likely to implement

EBPs in the classroom than teachers without training in ABA (Herzog, 2011; Loiacono et al., 2008). For example, Herzog (2011) "the highest levels of teacher training were reported to be in ABA methodology and data collection procedures and the lowest levels of teacher training were in the areas of assistive technology, naturalistic learning techniques, and determining the validity of an intervention." Loiacono et al. (2008) found that the majority of special education teachers in New York state (88.76%) did not receive ABA training.

Three studies found that workshops in ASD and EBPs are more beneficial than other training methods. Brock, Huber, Carter, Juarez & Warren 2014; Morrier, Hess & Heflin, 2011; Herzog, 2011). For example, Brock and colleagues found that teachers and administrators perceived workshops to be markedly more beneficial than one-to-one coaching or a college course. Morrier and colleagues found that most teachers trained through full or half day workshops to implement EBPs for students with ASD. Herzog (2011), in exploring the source of teacher training in ASD and EBPs, found that job learning experiences and formal workshops were the most frequent sources.

Authors of three studies concluded that there was a less positive attitude on training on EBPs for children with ASD (Sciuchetti, McKenna & Flower, 2016; Cahill, 2015; Brock, Huber, Carter, Juarez & Warren, 2014). For example, Sciuchetti and colleagues found that teachers rely on their professional peers and internet to identify and access EBPs, but few teachers rely on professional development as a source of information about EBP. Cahill (2015) states almost half of the teachers had not received any training in ASD. Brock and colleagues (2014) found "teachers from rural areas were less interested in avenues of training requiring them to travel long distances (e.g., on-campus college course; national conference), but they were also less

interested in avenues of training that required little or no travel (e.g., online college course; printed materials) relative to teachers from other geographic regions."

Some studies reached the conclusion that teachers with less training on ASD and EBPs were not confident in their skills for implementing EBPs in classroom (Brock et al. 2014; Sciuchetti, et al., 2016; Cahill, 2015). For example, Brock and colleagues (2014) concluded "practitioners were generally not highly confident in their ability to implement and address many evidence based practices related to students with ASD."

Two studies concluded that university preparation programs had less impact than other forms of training on whether teachers for used EBPs with their students with ASD (Morrier, Hess & Heflin, 2011; Herzog, 2011). For example, Morrier et al. (2011) found few teachers implementing strategies for students with ASD that they learned in university preparation programs. On the other hand, Herzog (2011) found that over two thirds of the participants received college or university level coursework in ASD and related methodology.

However, the authors of the six studies that examined the type of training on ASD or EBPs met only two or fewer of my quality standards. Herzog (2011) met none of the quality standards. Loiacono and colleagues (2008) and Brock and colleagues (2014) met only one standard. Morrier et al (2011), Sciuchetti and colleagues (2016), and Cahill (2015) met two quality standards. This limits the ability of researchers to accept the findings of these studies. There were many fundamental weaknesses in the methodologies of the six studies, including failure to meet the criteria of sampling procedures, setting, variables, data collection, and statistical analysis. The failure to describe the sampling procedure prevents other researchers from replicating the study, and limits researchers' ability to generalize the findings. Also, failure to describe the setting precisely limits readers' ability to understand the situation of the

educational setting and limits readers' ability to compare the setting with other settings. Additionally, failure to define the variables of the study and failure to describe data collection precisely, and failure to choose the correct statistical procedures results in findings that are difficult to interpret. As a result of the methodological shortcomings of these studies, we have little verifiable information about the type of training teachers received on ASD and EBPs.

Summary of Findings from a Methodological Perspective

The 19 studies included a number of important findings, but all had serious issues with their research methods. Three studies met none of my quality standards, nine studies met only one standard, five studies met two standards, and two studies met three standards. For example, none of the 19 studies met the criteria for statistical analysis, one study (Morrier, 2011) met the criteria for participants, one study (Lock, 2016) met the criteria for the variables, two studies (Sciuchetti, 2016; Seymour, 2017) met the criteria for research basis, three studies (Hendricks, 2011; Cahill, 2015; Alotaibi, 2015) met the criteria for sampling, and three studies (Alotaibi, 2015; Seymour, 2017; Williams, 2011) met the criteria for the setting. This means that all 19 studies did not meet the recommended criteria for most standards. This shortcoming reveals a need to establish more methodologically robust research in the field.

Rational

The main purpose of the current study is to conduct a survey study on examine teachers' knowledge on evidence-based practices for students with ASD. The second purpose is to ensure that the study will meet the standards for quality survey research in order to develop a more robust body of literature on improving the quality of education and life for individuals with ASD.

CHAPTER 3

METHOD

Research Questions

The current study was guided by three research questions:

1. What do SA teachers of students with ASD know about evidence-based practices?

2. Is there a relationship between knowledge of evidence-based practices and (a) Gender, (b) Position, (c) Years' experience teaching students with ASD, (d) Number of students with ASD taught, and (e) Region?

3. Is the survey of education of ASD a reliable and valid tool?

Research Design

I used a survey research design to answer my research questions. Survey research is a discrete research methodology that involves carefully designed questions or statements delivered by paper, internet, phone, mail, or in person (Carey, Harris, Lee, & Aluede, 2017; Krezmien, Lauterbach, Harrington, & Yakut, 2017). There are three stages in the survey research process: (a) survey development, (b) sample selection and survey administration, and (c) data analysis and reporting. Survey development involves item development, coordination of items into a survey, and conducting reliability and validity testing of the survey. Sample selection and survey administration are related to the identification of a sample, the sample recruitment process, and the administration of the survey. Data analysis and reporting involves the use of appropriate inferential statistics to interpret the responses from the sample and reporting the findings in a comprehensive and cohesive manner (Krezmien et al. 2017). The survey was designed to explore the knowledge that Saudi Arabian teachers of students with ASD have about evidence-based practices for students with ASD. The findings from the survey helped to identify strengths

and limitations in the teacher knowledge base, and helped me to identify the types of training that are needed to ensure that teachers of students with ASD in Saudi Arabia are prepared to implement EBP with students with ASD.

Participants

The participants in this study were in-service teachers of students with ASD in Saudi Arabia in public schools and autism centers. I contacted educational leaders in Saudi Arabia with experience in ASD, and learned that there are only about 500 teachers of ASD in the country. This is a very small population, so I attempted to recruit participation from all 500 teachers identified by the Ministry. I collected information about the participant's gender, region, teacher position, nationality, educational level, years of experience in general, years of experience teaching students with ASD, number of ASD students taught, grade/type of classroom taught, and training in ASD & EBPs.

My final sample included 183 participants including 132 teachers of students with autism, 11 Educational Supervisors on autism, and 26 other school professionals (which included special education teachers, psychologists, and social workers). Additionally, there were eight participants who were identified as "other" category, which included two parents of children with autism, a university teaching assistant, three university students in a teacher preparation program, a public relations professional, and one who identified as "None". There were additionally six people who did not identify their profession. More than half of the participants were female (N=104) 56.8%. The level of education for the majority of the participants was a bachelor degree (81.4%). Years of teaching experience of the participants ranged from 1-3 years to 10 years and more. Approximately 42% of the participants had 1 to 3 years of teaching experiences, 23.5% had 4 to 6 years of teaching experiences, 17% had 7-9 years of teaching

experience, and 12% had 10 years and more of teaching experience. The largest fraction, (N=75)

41% of the participants, taught between 1 to 5 students with ASD. 20.8% (N=38) taught 21

students with ASD and more, 15.3% (N=28) taught between 6 to 10 students, and 10.4% (N=19)

taught between 11 to 15 students. The specific details of the sample are provided in the Table 10.

Table 10: Demographic Information of the Participants (n= 183)

Demographic variables	Sample N (%)
Gender	
Male	75 (41.0)
Female	104 (56.8)
Missing	4 (2.2)
Current Position	
Teacher of students with ASD	132 (72.13)
Education Supervisor on ASD	11 (6.0)
Other	26 (14.2)
Missing	6 (3.3)
Years of Experiences	
1-3 years	77 (42.1)
4-6 years	43(23.5)
7-9 years	31 (16.9)
10- years and more	22 (12)
Missing	10 (5.5)
Level of Education	
Bachelor Degree	149 (81.4)
Master Degree	19 (10.4)
Doctorate Degree	3 (1.6)
Missing	12 (6.6)
Education Setting	
Public School	109 (59.6)
Private School	61 (33.3)
Missing	13 (7.1)
Region	
Makkah	45 (24.6)
Jazan	42 (23.0)
Riyadh	33 (18.0)
Qassim	20 (10.9)
Madinah	9 (4.9)
Baha	8 (4.4)
Eastern Province	6 (3.3)
other	14 (7.6)
Missing	6 (3.3)

Setting

The survey was distributed to teachers of students with ASD across the country. There are 13 different regions in Saudi Arabia and each region has a capital and governorates, which are further divided into sub-governorates. Table 10 shows that the 13 regions include Jawf, Najran, Tabuk, Asir, Northern Borders, Eastern Province, Bahah, Madinah Qassim, Riyadh, Jizan, Makkah, and Hail. The highest rate of respondents came from four regions: Makkah (24%), Jizan (23%), Riyadh (18%), and Qassim (11), the lowest rate came from Jawf (.5%), Najran (1.1), Tabuk (1.6%), Asir (2.2%), and Northern Border (2.2%).

Sampling Procedures

In-service teachers of students with ASD in public schools were recruited by contacting the Ministry of Education of Saudi Arabia to receive permission for conducting the current study. There were 500 teachers of students with ASD in Saudi Arabia. I recruited all of the current teachers for this survey. I recruited teachers of students with ASD in public schools from the department of education in each region across the country. The teachers of ASD who teach in private schools or centers specializing on educating students with ASD were recruited from the list provided by the Ministry of Labor and Social Development.

Instrumentation

The current study used the "EBP in ASD Education Survey." The survey was author-developed, and was based on a systematic review of research on evidence based practices used with children and adults with ASD (National Autism Center, 2015; Odom et al, 2003; Wong et al, 2015; Iovannone, Dunlap, Huber & Kincaid, 2003). I worked with two special education faculty members with experience developing surveys and with experience in autism research.

One of the faculty members has widely published on EBP for students with ASD. The survey consisted of three main sections.

The development of the survey was a lengthy and recursive process. The first step in the development of the survey was identifying the evidence-based practices and reviewing other surveys to identify items that were valid and reliable and related to my research questions. I then created the scenarios that were real cases taken from single case design research and adopted to be appropriate to my survey. The scenarios focused on behaviors of children with autism spectrum disorders including communication and language deficits, social behavior deficits, and challenges behaviors. I then developed seven interventions for each scenario. The faculty members advised me to mix the interventions between EBPs and non-EBPs, and an effective and non-effective EBPs. Of the seven interventions, there were four EBPs, and three were non-EBPs. Participants were instructed to check only on the EBPs that were effective and suitable to deal with the associated behavior problem. Then, I created a matrix and included all common used evidence based practices for individuals of ASD and common used non-evidence based practices according to the literature review. I asked teachers to check the only evidence-based practices for individuals with ASD.

I developed a format of open-ended questions, then closed ended questions, then matrix for a purpose. The teachers begin with and open-ended question in which they were asked to list or explain the practices that believe may work with the student in the scenarios. The participants were required to answer these open-ended questions and were not allowed to skip items or return to them. I put the questions in this order because if the closed ended questions and matrix come first, they may help teachers to answer open ended questions. The survey includes the following sections;

Section 1. The first section is dedicated to demographic information and participant definitions of ASD and EBP. The survey includes questions about age, gender, highest level of education, experience teaching students with ASD, type of training received in ASD or EBPs, and type of school.

Section 2. The second section of the survey includes three vignettes that describe a student with autism. One of the vignettes describes a student with a communication problem, one describes a student with a social skills problem, and one describes a student with a challenging behavior problem. Each vignette is followed by an open-ended question that asks the respondent to describe an evidence-based practice that would be effective for the students described in the vignette. The open-ended question is followed by a list of evidence-based practices and non-evidence-based practices related to the problem behavior described in the vignette. The participant is asked to check the evidence-based practice or practices that would be effective for the associate problem behavior (e.g., communication, social skills, challenging behavior).

Section 3. The third section is item that lists approximately 43 evidence-based practices and non-evidence-based practices used with students with ASD. The participant will be asked to check any of the evidence based practices for individuals with ASD.

<u>**Translation Process**</u>

I used the back-translation technique based on across-cultural translation that is widely used in many research studies. I worked with two faculty members who are experts in the area of special education and who speak and write in English fluently to ensure that the survey translation was accurate. I translated the original English version into Arabic myself and sent the translated version to one of the experts to check the translation. The expert is a professor at the department of special education in King Khaled University in Saudi Arabia, who received

master's and Ph.D. Degrees from a university in the USA and has a number of publications in the English language. The survey was then translated back into English version by another professor in the same department who graduated from a university in England, and who has also published several studies in English. I reviewed the two English versions of the survey (the original one and back-translated one) with two Ph.D students who are studying special education in the U.S. I subsequently made changes to the Arabic version based on the feedback from the two faculty members and two Ph.D students.

Variables

I included both criterion variables and predictor variables in this study.

Criterion Variables

For each of the three behavior categories (communication, social skills, challenging behavior) I created a score of the number of correctly identified items in the associated closed ended questions (part B). There are seven items for each behavior category, so each participant will have a score from 0 to 7 for each category. So, if a participant correctly identified the three EBPs by checking the associated item, and correctly identified the four non-EBPs by not checking the associated item, the participant would receive a score of 7. If a participant correctly identified one of the EBPs and incorrectly marked three of the four non-EBPs, the participant would receive a score of 2 (one correctly marked EBP and one correctly unmarked non-EBP). I ended up with three criterion variables, a communication score, a social skills score, and a challenging behavior score

Predictor Variables

I included six predictors in my analyses including: gender, position, years experience teaching ASD, level of education, education setting, and region. I decided not to include total

teaching experience because there is no reason to suspect that total experience teaching students

without disabilities would be relevant to teacher knowledge of EBP for ASD. In Saudi Arabia,

typical school teachers rarely encounter students with ASD in the course of their work, and they

are not expected to develop any experience or knowledge of ASD during that time.

Survey Administration Plan

I used a web based survey for several reasons. First, the majority of the population in the

KSA now uses the Internet. According to Internet World Stat (2016), there are 20,813,695

Internet users in Saudi Arabia, 64.7% of the population. Most of the teachers are internet users,

and all teachers have access to the internet through their work. All teachers in Saudi Arabia have

official electronic mail addresses supplied by the Ministry of Education, and used to receive

regulations and other important information. So, email is the fastest and easiest way to reach

teachers. The increase in internet use in the country, and the consistent use of email by Saudi

teachers, makes internet surveys the best way to reach participants, and the most effective way to

ensure high response rates with this proposed sample.

Survey Administration Procedures

I have developed an electronic version of the survey in Qualtrics. Survey administration

procedures involved several steps described below:

I designed an invitation letter, which was the first contact with the respondents inviting

them to participate in the survey. The letter included the purpose of the study, as well as

information about myself in case they wished to contact me or my adviser about the study. I used

my official university email. I included the subject of the survey to encourage teachers to

participate (Kaplowitz et el, 2011). I expressed the importance of their participation in helping

me to understand the educational environment for children with ASD in Saudi Arabia. I also

included an explanation of the anticipated time required to complete the survey per prior best

practice (Kaplowitz et al, 2011).

I contacted one of the special education leaders in the Ministry of Education who was a

specialist in Autism, and who was a supervisor for a number of teachers of students with ASD

across the country. I sent an email to him in order to explain my study. I asked him if he could

send the link to other supervisors, and if each supervisor could send the survey to the teachers

who they supervised who worked with students with ASD. The special education leader agreed

to share the survey with his colleagues and the teachers of students with ASD.

I also contacted special education departments in some regions by phone or email. I

explained the study and asked them to share the survey with their teachers of students with ASD.

All of them agreed to collaborate with me by sharing the link with teachers and encouraging

them to participate in the study.

I also sent an email or Twitter messages to the private schools for special education needs

that included students with ASD, and to autism centers. I requested that they send the survey to

teachers of students with ASD. Most responded positively, but some did not respond to my

emails and Twitter messages.

I also contacted a number of teachers of students with ASD by email, WhatsApp, Twitter,

or Facebook. I asked teachers to respond to the survey and share it with other teachers. Most of

the teachers agreed to participate in the study and also agreed to share the link with colleagues in

their schools or with other teachers of students with ASD in other schools.

 I sent two follow-up reminders. The first reminder was sent one week after sending the

link to the participants. In this email, I included a warm reminder message about participation in

the survey, and included the link to the survey. The second reminder was sent one week after the

first reminder and includds the same message with the link. A final email was sent to all respondents who completed the survey to thank them for participation in the survey.

Data Analysis

I employed a number of analyses to interpret the survey data. First, I analyzed the reliability of the survey using Chronbach's Alpha reliability test. Chronbach's Alpha is the most appropriate design because it yields an average of all possible Split Half estimates.

I created sum scores for each of the three criterion variables: (1) Communication, (2) Social Skills, and (3) Challenging Behavior by adding the scores of each of the items within a set of questions. This gave me three scores, one for each criterion. As there are only seven items per set, I also conducted reliability estimates for each of the three criterion variables. Although these reliability coefficients were lower than the overall reliability coefficient, they help with establishing the overall reliability of the instrument. Finally, I created a total EBP score by using the sum of the scores for each of the three criterion variables.

I created a single sum score for the 43 items in Part Three. In this section, participants are asked to identify the EBPs from a list of EBPs and non-EBPs. If a participant correctly identifies an EBP, the item scored as a 1. If they did not identify the item, it was scored as a 0. Similarly, if a participant incorrectly identifies a non-EBP as an EBP, the item was scored as a 0. If the participant correctly leaves a non-EBP not identified as an EBP, the item was scored as a 1. All scores were summed to create a criterion variable which I called Total EBP Identification, whicon h was a scale of 0 to 43. A 0 would indicate that a participant failed to identify the EBPs and inaccurately identified all non-EBPs as an EBP. A 43 would indicate that a participant correctly identified all EBPs and correctly identified all non-EBPs as non-EBPS.

Quantitative Analyses

I conducted descriptive analyses of the data to understand how the participants scored in general and by subgroup. I examined frequencies for each of the Communication, Social Skills, Challenging Behavior, and Overall EBP scores. I created histograms for each set of scores and examine the overall distribution. I examined frequencies and the histograms for the subgroups (Gender, position, years experience teaching ASD, number of students with ASD taught, region) to explore differences and similarities in distributions by subgroup. The descriptive data helped me to understand the data closely and helped in my interpretation of the inferential analyses.

I employed three separate multiple regression analyses (one for each criterion) to analyze differences in responding by the predictors. For each analysis, I included gender, position, years experience teaching students with ASD, and region as predictor variables. Since I conducted multiple tests on the same sample, I employed Bonferroni's correction to utilize the correct p-value. Because I conducted three separate tests, Bonferroni's correction results in a corrected p-value of (0.05 / 3) of 0.017.

I also employed a multiple regression analysis to analyze the third part of the survey. Total EBP Identification was the criterion and gender, current position, years experience teaching students with ASD, and region were as predictor variables.

Qualitative Data Analysis

The definition of EBP

I used a modified content analysis to analyze participant responses to the question "What is Evidence Based Practice." This analysis helped me to identify the extent to which participants can report an accurate understanding of what an evidence based practice is. First, I copied the answer of each participant and pasted it (meaning unit) into a cell in a single column of an excel

spreadsheet. Then, I reduced the answers into condensed meaning units that are more global in description. For example, if a participant states that EBPs means "I must use teaching strategies written in textbooks and recommended by experts," the condensed meaning will be "The participant stated that EBPs are the strategies recommended by experts in textbook." Finally, I reduced the condensed meaning units into categories. For example, when the condensed meaning unit is "EBP means an intervention that number of studies showed it was effective to improve a skill for students with ASD," the category will be "EBPs are the interventions that research shows to be effective." I then combined the answers across all answers of the participants into several categories. Then I combined the categories into a smaller number of themes. This process allowed me to synthesize the responess in a systematic manner.

Analysis of Effective Practices Data

I analyzed open-ended questions (Communication, Social Skills, Behavior) to assess knowledge of teachers of students with ASD on EBPs for teaching communication, social, and behavior skills to students with ASD. First, I reduced the meaning unit to a condensed meaning unit. In other words, I removed unrelated information from the responses and retained only information related to the practice. After I developed condensed meaning, I reduced the remaining meaning into codes. Then I rated the code as 1 if the code was an EBP, 0 if the code was not an EBP, or 2 if the participants wrote more than one EBP. For example, if a reduced meaning unit was "I would utilize PECS to help the students to develop communication skills," I reduced the language to the code "PECS." Then I rated the code as a 1 because the code was an EBP. A participant could include more than one EBP, and thereby get multiple codes of "1."

I used a modified content analysis process to reduce the open-ended responses to concrete and discrete categories. This process helped me remove non-essential information from

responses by reducing the meaning unit to a condensed meaning unit. I eliminated any language

related to an intervention or a practice. I removed language about anything unrelated to an

intervention or practice (e.g. "it is important to consider the age of the student"). After I

developed condensed meanings, I reduced the remaining meanings into codes. For example, as

mentioned above, if a reduced meaning unit was "I would utilize PECS to help the students to

develop communication skills" I reduced the language to the code "PECS." Then, two

researchers training in evidence-based practices for students with ASD looked at each of the

codes, and determined if it was an EBP by comparing it to a pre-existing list of EBP for the

related behavior (i.e., Communication, Social Skills, Challenging Behavior). The researcher

rated the code as a 1 if the code was an EBP, or a 0 if the code was not EBP. If the researcher

rated the code as a 1, he would name the EBP from the list that they are identifying as the EBP

from the code. Table 11 shows an example of the way that a code would be rated.

Table 11: Example of Rating of EBP codes

Code	Rating	Associated EBP
I teach him through PECS	1	PECS
The best method is applied behavior analysis.	1	ABA
Word and image everyday	0	
Train the normal individuals how to treat with the case of Khalid and how to participate him in the playing and conversation	1	Peer-mediated instruction
He needs behavior modification and speech sessions.	0	

I examined the accuracy of the items descriptively, consistent with the analyses for the

three criterion variables. I looked at the percentages of the participants who identified EBPs, as

well as the percentages by subgroup (e.g. gender). Because these data were qualitative in nature,

I did not analyze them statistically, although I did look at the relationships between the ratings on the open-ended items and the scores for the associated criterion descriptively.

CHAPTER 4

RESULTS

Descriptive Statistics

One of the primary ways that I analyzed the data was through an examination of the means and distributions of scores for the quantitative items.

Teachers' Knowledge about Characteristics of ASD

Figure 1 shows the distribution of the accurately identified characteristics of autism by the participants. The figure shows that there was a broad range of accuracy. All of the participants correctly identified at least eight characteristics. Seventy-eight of the participants correctly identified fewer than half of the characteristics. None of the participants correctly identified all of the characteristics, and only one of the participants correctly identified 34 of the 35 characteristics. Only 11 of the participants were able to correctly identify 30 or more of the 35 characteristics.

Items 29 (Stuttering), 24 (Academic skills well below the average range), 19 (Persistent difficulties in reading, writing, arithmetic, or mathematical reasoning), 35 (A hoarse or raspy voice) were the items that had the highest percentage of participants who correctly identified them as not of the characteristics of ASD, with 85.2%, 70.5%, 71%, and 83.6% respectively. Items 11 (Limitation in interpersonal skills), 17 (Lining up toys), 23 (Rigid thinking patterns), nd 31 (Adverse response to specific sounds or textures) were the items that had the lowest percentage of participants who correctly identified them as characteristics of ASD, with 34.4%, 34.4%, 20.8%, 33.9%.

Histogram of the Number of Accurately Identified Characteristics of Autism
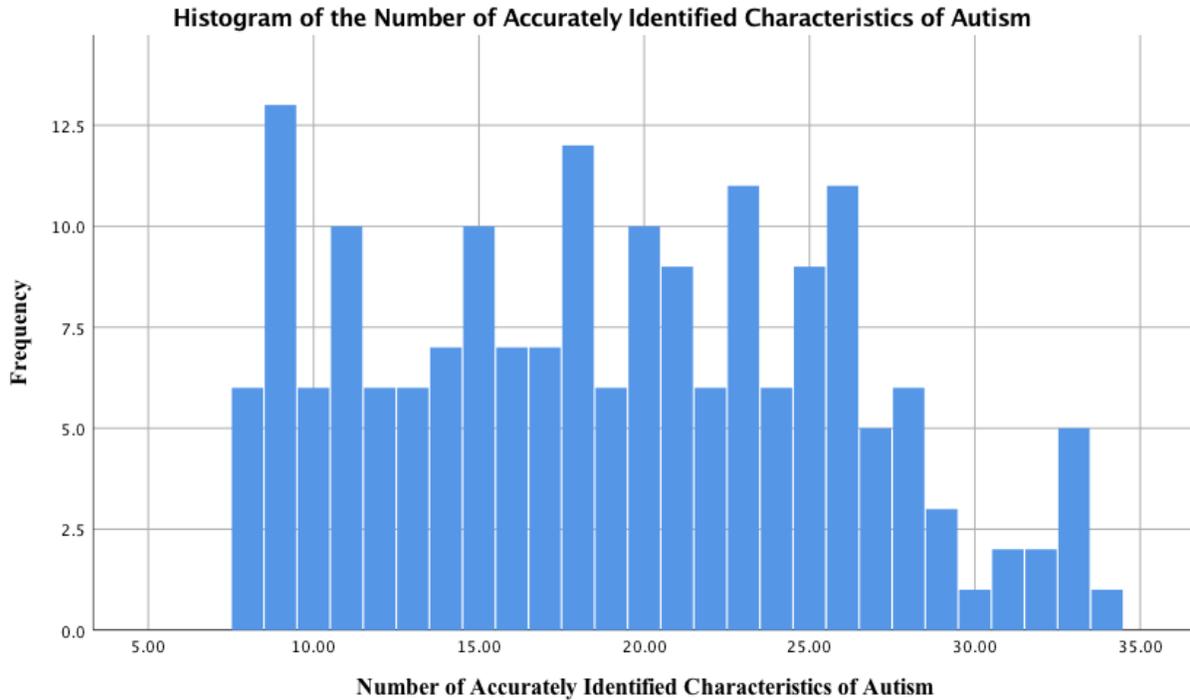
Figure 1: The number of accurately identified characteristics of ASD

Teacher's Knowledge about the Definition of EBP

Figure 2 displays the distribution of scores related to the definition of EBP. The most accurate definition of EBP was number (3) "Practices are effective for improving student outcomes as demonstrated through multiple high quality research studies." The findings in figure 2 show that more than half of the respondents (62%) accurately identified the correct definition of EBP. However, 21% selected number (1) "Practices that improved a student outcome in a high-quality research study," the item that was the closest to the correct answer. However, 12% selected number (2) "Practices used by teachers and other service providers in programs for learners with ASD," and 6% selected number (4), "Practices that have positive effects on students' outcomes."
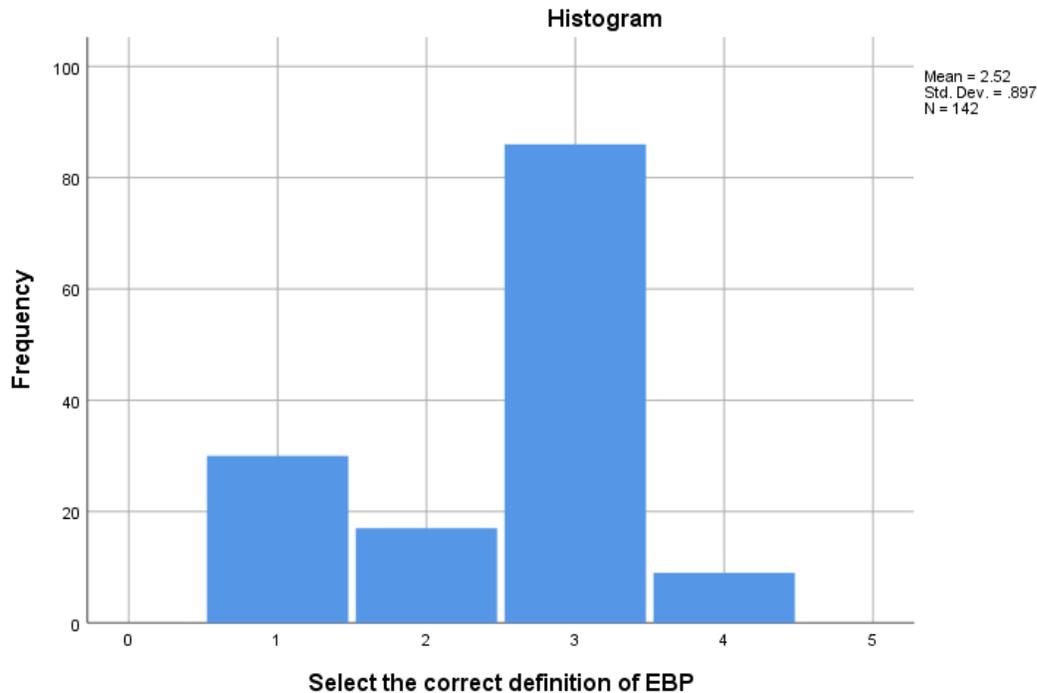
Figure 2: Selecting the correct definition of EBP

Teachers' Knowledge about EBP of Communication skills

Figure 3 shows the distribution of the accurately identified EBP and non-EBP of communication skills for individuals with ASD. The figure shows that there was a broad range of accuracy. Just over 18% of the participants correctly identified three or fewer of the EBPs for communication skills. Just over half (52.8%) correctly identified four of the EBPs, and 28.4% of the participants correctly identified five of the EBPs. Only seven participants identified 6 EBPs, and just one participant correctly identified all seven EBPs.

Three items, Picture Exchange Communication System (PECS), Floor Time, and Pivotal Response Training, were correctly identified by the highest percentage of participants, with 41%, 25%, 21.33% respectively. The items Discrete Trial Training, Facilitated Communication,

Histogram of the Number of Accurately Identified Communication Skills Interventions

Mean = 4.16
Std. Dev. = .859
N = 183
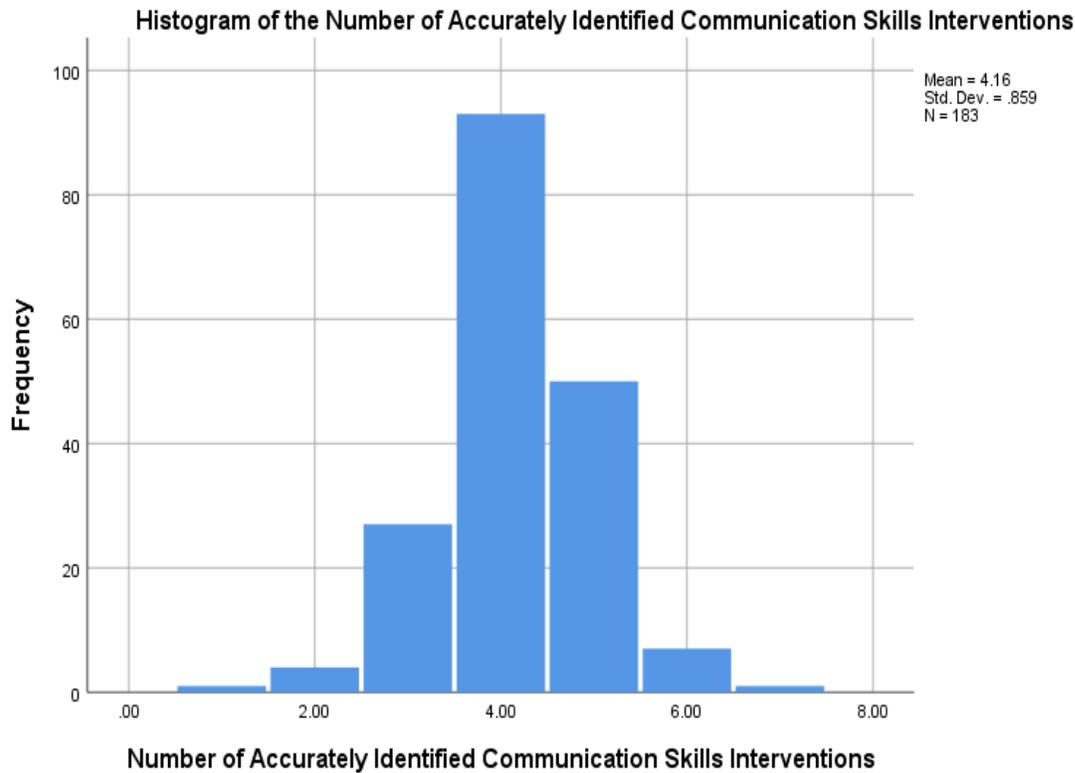
Figure 3: Number of accurately identified communication skills interventions

Extinction, and Music Therapy were correctly identified by the lowest percentage of participants, with 14.8%, 14.8%, 12%, and 8.7%.

Table 12 shows the percentage of communication EBP and ion-EBP items correctly identified. There were four EBP items and three Non-EBP items. There were a total of 163 correctly identified EBPs by the participants, meaning that just 22.3% of the EBPs were correctly identified. In contrast, there were 459 non-EBPs correctly identified by the participants.

Table 13 shows the percentage of participants who correctly identified EBPs and non-EBPs by the number of correctly identified items. More than 61% of the participants did not correctly identify any of the EBP items and 18.6 % of the participants correctly identified only one EBP.

Table 12: Percentage of Communication EBP and Non-EBP Items Correctly Identified

	# Items	Sum of Correctly Identified Items	% of Correctly Identified Items
EBP	732	163	22.27%
Non-EBP	549	459	83.61%

Only 6.6% of the participants correctly identified all four EBPs. In contrast, just 6.6% of the participants failed to correctly identify any of the non-EBPs, while 74.3% correctly identified all three of the non-EBPs.

Table 13: Percent of Participants Correctly Identifying EBPs and Non-EBPs by # of Items Correctly Identified

# of EBP Items Correctly Identified	% of Participants Correctly Identifying EBP Items
0	61.7
1	18.6
2	8.7
3	4.4
4	6.6
# of Non-EBP Items Correctly Identified	% of Participants Correctly Identifying Non-EBP Items
0	2.7
1	5.5
2	17.5
3	74.3

Teachers' Knowledge about EBP of Social skills

Figure 4 shows the distribution of the accurately identified EBPs and non-EBPs of social skills for individuals with ASD. The figure shows that there was a broad range of accuracy with respect to identification. The majority of the participants (82.1%) were only able to correctly identify three or fewer of the EBPs for social skills. Just 54.6% correctly identified two EBPs

and 10% correctly identified only one. Only 17.9% correctly identified four or more of the EBP

and none EBP for social skills, with just 3.8% able to correctly identify 6 practices.
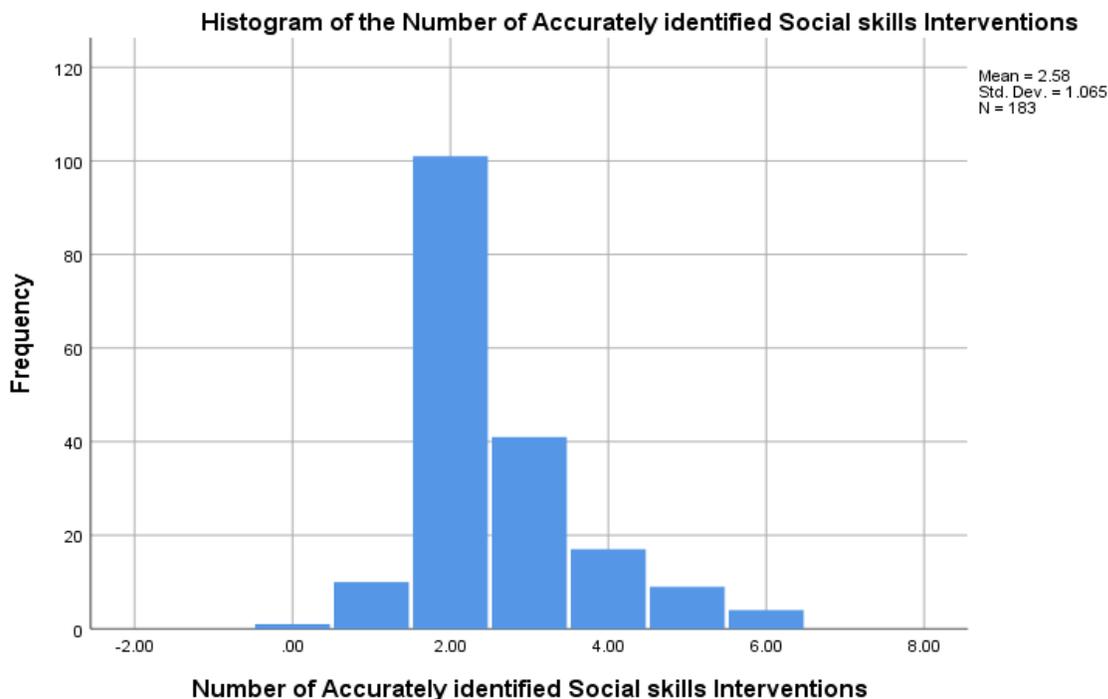
Figure 4: Number of accurately identified social skills interventions

Four items (Structured Play Group, Peer-Mediated Instruction and Intervention, Video-

Based Modeling, and Son-Rise Program) were the items that were correctly identified by the

highest percentage of participants, with 25.7%, 23.5%, 21.3%, and 19.7%, respectively. Three

items (Cartooning, Art Therapy, and Social Skills Training) were the items that were correctly

identified by the lowest percentage of participants, with 11.5%, 12.3%, and 19.0%, respectively.

Table 14 shows the percentage of communication EBP and non-EBP items correctly

identified. There were four EBP items and three non-EBP items. There were a total of 164

correctly identified EBPs by the participants, meaning that just 22.40% of the EBPs were

correctly identified. In contrast, there were 471 non-EBPs correctly identified by the participants,

meaning that 85.79% of the non-EBPs were correctly identified.

Table 14: Percentage of Social Skills EBP and Non-EBPs Items Correctly Identified

	# Items	Sum of Correctly Identified Items	% of Correctly Identified Items
EBP	732	164	22.40%
Non-EBP	549	471	85.79%

Table 15 shows the percent of participants who correctly identified EBPs and non-EBPs

by the number of correctly identified items. More than 61% of the participants did not correctly

identify any of the EBPs items and 18.6 % of participants correctly identified just one EBP. Only

6.6% of participants correctly identified all four EBPs. In contrast, 17.5% of the participants

correctly identified two out of the three non-EBPs, and 74.3% correctly identified all three of the

Non-EBPs.

Table 15: Percent of Participants Correctly Identifying EBPs and Non-EBP by # of Items

Correctly Identified

# of EBP Items Correctly Identified	% of Participants Correctly Identifying EBP Items
0	61.7
1	18.6
2	8.7
3	4.4
4	6.6
# of Non-EBP Items Correctly Identified	% of Participants Correctly Identifying Non-EBP Items
0	2.7
1	5.5
2	17.5
3	74.3

Teachers' Knowledge about EBP of Behavior Challenges

Figure 5 shows the distribution of the accurately identified EBPs and non-EBPs of behavior challenges for individuals with ASD. The figure shows that there was a broad range of accuracy with respect to the EBPs. More than half of the participants, 61.4%, correctly identified four of the EBPs and non-EBPs for behavior challenges, and 23.9% of the participants correctly identified five and six of the EBPs and non-EBPs. In contrast, just 14.7% of the participants correctly identified three or fewer of the EBP and non-EBP. Just 3 participants correctly identified only two of the EBPs and non-EBPs, and only one participant correctly identified only one EBP or non-EBP.

Histogram of the Number of Accurately Identified Behaviour Challenges Interventions

Mean = 4.11
Std. Dev. = .793
N = 183
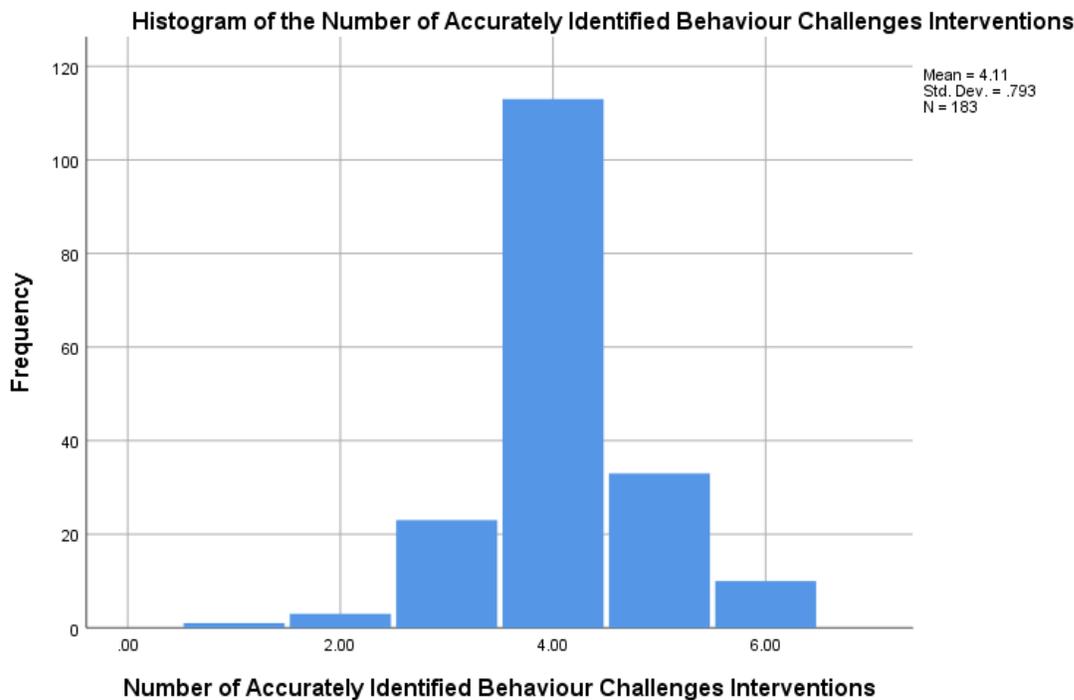
Figure 5: Number of accurately identified behavior challenges interventions

Four items (Functional Behavior Assessment, Functional Communication Training, Sensory Integration Training, and Visual Schedules) were the items that were correctly identified by the highest percentage of participants, with 26.2%, 20.2%, 17.5%, and 15.3 respectively.

Three items (Pet/Animal Therapy, Power Cards, and Offering Choices) were the items that were correctly identified by the lowest percentage of participants, with 9.3%, 9.8%, and 13.7% respectively.

Table 16 shows the percentage of behavior skills EBPs and non-EBPs items correctly identified. There were four EBP items and three non-EBP items. There were a total of 138 correctly identified EBPs by the participants, meaning that just 18.35% of the EBPs were correctly identified. In contrast, 482 non-EBPs were correctly identified by the participants.

Table 16: Percentage of Behavior EBP and Non-EBP Items Correctly Identified

	# Items	Sum of Correctly Identified Items	% of Correctly Identified Items
EBP	732	138	18.85%
Non-EBP	549	482	87.80%

Table 17 shows the percent of participants who correctly identified EBPs and non-EBPs by the number of correctly identified items. More than 61% of participants did not correctly identify any of the EBPs items, and 8.7 % of participants correctly identified two EBPs. Only 6.6% of participants correctly identified all four EBPs. In contrast, just 2.7% of the participants failed to identify any of the non-EBPs, while 74.3% correctly identified all three non-EBP items.

Teachers' Knowledge on Identification of EBPs & Non-EBPs for Individuals with ASD

Figure 6 shows the distribution of the accurately identified EBPs and non-EBPs for students with Autism Spectrum Disorders. All of the teachers of students with ASD in Saudi Arabia correctly identified at least 16 of 43 EBP and non-EBP. A majority of the participants (74.3%) correctly identified just 16 – 20 of the 43 EBPs and non-EBPs. Less than one quarter (24.4%) of the participants correctly identified between 21 – 30 EBPs and non-EBPs. One of the

Table 17: Percent of Participants Correctly Identifying EBPs and Non-EBPs by # of Items

Correctly Identified

# of EBP Items Correctly Identified	% of Participants Correctly Identifying EBP Items
0	61.7
1	18.6
2	8.7
3	4.4
4	6.6
# of Non-EBP Items Correctly Identified	% of Participants Correctly Identifying Non-EBP Items
0	2.7
1	5.5
2	17.5
3	74.3

participants correctly identified 31 EBPs and non-EBPs, and one correctly identified 40

out of 43 EBPs and non-EBPs.
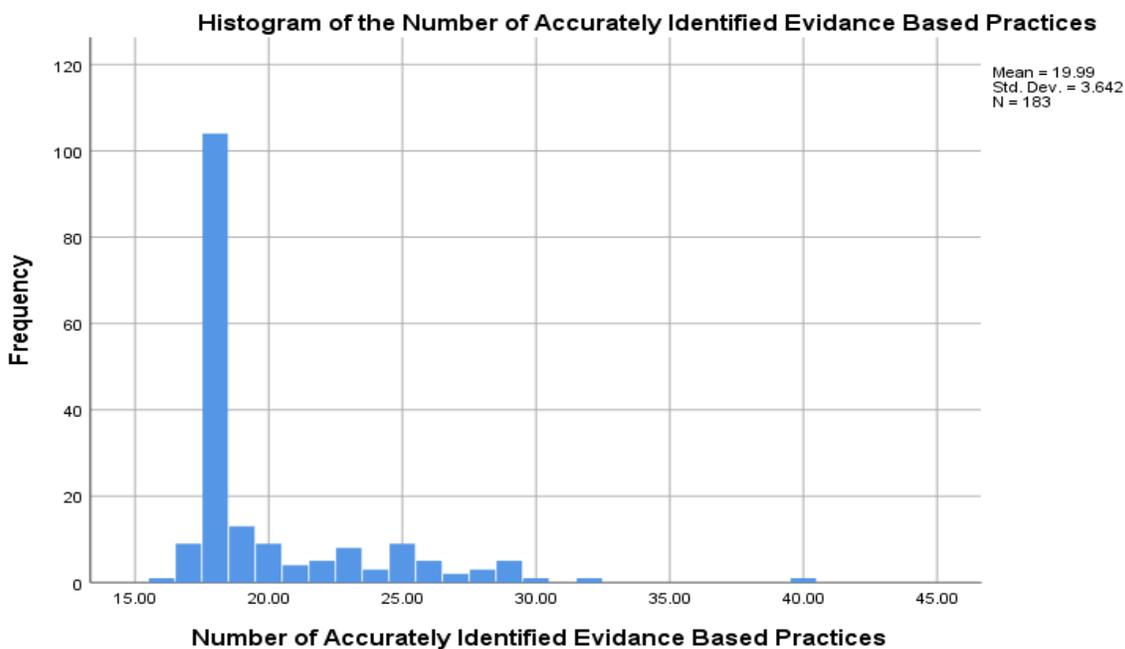
Figure 6: Number of accurately identified EBP

Eight items (Cognitive Behavioral Intervention, Picture Exchange Communication

System, Reinforcement, Video Modeling, Antecedent-Based Intervention, Modeling, Social

Narratives, Social Skills Training) had about 20% or more of the participants who correctly identified them, with 24.6%, 23.5%, 22.4%, 22.4%, 21.9%, 21.3%, 19.7%, and 19.7%, respectively.

Eight Items (Megavitamin Therapy, Van Dijk Curricular Approach, Feingold Diet, Fast ForWord, Vitamin, Herbal, Mineral, and Other Supplements, Scripting, Extinction, and Visual Supports) were correctly identified by 6% or less of the participants, with 2.2%, 2.7%, 3.3%, 3.8%, 4.4%, 5.5%, 6%, and 6%.

Table 18 shows the percentage of total EBPs and non-EBPs correctly identified. The number of correctly identified EBPs included 22 items and the sum of correctly identified items were 652, with 16.19% of the total number of EBP items identified correctly. In contrast, the number of correctly identified non-EBPs included 19 items and the sum of correctly identified items were 3159, with 90.85% of the total number of non-EBPs items identified correctly.

Table 18: Percentage of EBP and Non-EBP Items correctly identified

	N	# Items	# EBP / Non-EBP Items	Sum of Correct	% Correctly Identified
EBP	183	22	4026	652	16.19%
Non-EBP	183	19	3477	3159	90.85%

	# Items	Sum of Correctly Identified Items	% of Correctly Identified Items
EBP	732	652	16.19%
Non-EBP	549	3159	90.85%

Reliability

I used Chronbach's Alpha to establish the reliability of the survey. Chronbach's Alpha is a measure of internal consistency. The reliability analysis for the survey instrument showed a

Cronbach's alpha coefficient of .841 for the overall survey instrument, indicating a good

reliability score.

Correlations

Table 19 shows the findings from the Pearson correlation to determine how the five

criterion variables correlated with each other. The correlation among the Communication, Social

Skills, and Behavior items were relatively weak, suggesting clear real differences in the items'

capacity to measure the related domain. In other words, it appears that each item

(Communication, Social Skills, and Behavior) is distinct from each other item. The strongest

correlations were between those four items and Item 19, which included all EBPs. This is due to

the fact that each item is added up to become part of the Total Sum score. The largest correlation

was between Item 16 and Item 19 which suggested that knowledge of EBPs in the area of social

skills was the strongest predictor of overall EBP knowledge.

Table 19: The Five Criterion Variables Correlated with Each Other

	Communication SUM	Social Skill SUM	Behavior SUM	Total SUM
Charact. of Autism Communication	0.067	0.142	.206**	.294**
Communication SUM		0.121	.167*	.325**
Social Skills SUM			.200**	.595**
Behavior SUM				.312**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Multiple Regression Analyses

I used multiple regression analysis to determine differences in knowledge by the

predictors.

Characteristics of ASD and five predictors

I conducted a multiple regression analysis for the characteristics item and five predictors. Table 20 shows the analysis using Identification of Characteristics of Individuals with ASD as the criterion variable and Gender, Position, Number of Students with ASD Taught, Years' Experience, and Region as predictors. The model was significant (F-1.603, p = 0.024). However, post hoc analyses revealed no differences by the five predictors.

Table 20: Characteristics of ASD and five predictors

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5549.811[a]	111	49.998	1.603	0.024
Intercept	18259.112	1	18259.112	585.249	0
Gender	63.69	1	63.69	2.041	0.158
Region	460.031	11	41.821	1.34	0.226
Position	77.784	2	38.892	1.247	0.295
# ASD Students Taught	140.697	4	35.174	1.127	0.353
Years of Experience	159.25	3	53.083	1.701	0.177

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

EBP for Communication skills and five predictors

I conducted a multiple regression analysis for Communication Skills and five predictors. Table 21 shows the analysis using Identification of EBPs and Non-EBPs of Communication Skills for Individuals with ASD as the criterion variable and Gender, Position, Number of Students with ASD Taught, Years' Experience, and Region as predictors. The model was not significant (F-0.819, p = 0.817).

Table 21: EBP for Communication skills and five predictors

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	78.569	111	0.708	0.819	0.817
Intercept	887.117	1	887.117	1026.124	0
Gender	0.537	1	0.537	0.621	0.434
Region	10.26	11	0.933	1.079	0.394
Position	0.076	2	0.038	0.044	0.957
# ASD Students Taught	6.508	4	1.627	1.882	0.126
Years Experience	1.627	3	0.542	0.627	0.6

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

EBP for social skills and five predictors

I conducted a multiple regression analysis for Social Skills and five predictors. Table 22 shows the analysis using Identification of EBP and Non-EBP of Social Skills for Individuals with ASD as the criterion variable and Gender, Position, Number of Students with ASD Taught, Years' Experience, and Region as predictors. The model was not significant (F-0.801, p = 0.841).

Table 22: EBP for social skills and five predictors

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	120.977	111	1.09	0.801	0.841
Intercept	352.323	1	352.323	258.901	0
Gender	0.174	1	0.174	0.128	0.722
Region	13.27	11	1.206	0.886	0.558
Position	2.163	2	1.081	0.795	0.457
# ASD Students Taught	2.106	4	0.526	0.387	0.817
Years Experience	0.643	3	0.214	0.157	0.924

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

EBP for challenging behaviors and five predictors

I conducted a multiple regression analysis for Challenging Behavior and five predictors. Table 23 shows the analysis using Identification of EBP and Non-EBP of Behavior Challenges for individuals with ASD as the criterion variable and Gender, Position, Number of Students with ASD Taught, and Region as predictors. The model was not significant (F-1.073, p = 0.39).

Table 23: EBP for challenging behaviors and five predictors

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	65.916	111	0.594	1.073	0.39
Intercept	900.474	1	900.474	1626.663	0
Gender	0.005	1	0.005	0.009	0.924
Region	7.859	11	0.714	1.291	0.253
Position	0.158	2	0.079	0.143	0.867
# ASD Students Taught	3.071	4	0.768	1.387	0.25
Years Experience	4.949	3	1.65	2.98	0.039

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Over all EBP & Non-EBP and Five predictors

Finally, I conducted a multiple regression analysis for Overall EBP and non-EBP Knowledge and five predictors. Table 24 shows the analysis using Identification of Overall EBP

Table 24: Over all EBP & Non-EBP and Five predictors

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1710.787	111	15.412	1.363	0.097
Intercept	21716.541	1	21716.541	1921.176	0
Gender	12.67	1	12.67	1.121	0.294
Region	150.642	11	13.695	1.212	0.3
Position	7.503	2	3.752	0.332	0.719
# ASD Students Taught	61.554	4	15.388	1.361	0.259
Years Experience	38.002	3	12.667	1.121	0.348

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

and Non-EBP for Individuals with ASD as the criterion variable and Gender, Region, Position, Number of Students with ASD Taught, and Years' Experience as predictors. The model was not significant (F-1.363, p = 0.097).

<div align="center">**Qualitative Data Analyses**</div>

I used content analysis to analyze the open-ended items.

<div align="center">**Analysis EBP of communication skills**</div>

Only 87 of the participants responded to the item about using EBP for teaching communication skills for students with ASD. Most of the respondents (60) had a score of 1, four of the participants had a score of 2, and two of the participants had a score of 3.

Most of the responses (57) ranked as a 1 identified picture exchange communication system (PECS) as an EBP to teach communication skills for students with ASD. Many responses included only the abbreviation of the term in English or Arabic. Some responses included different terms such as "communication through pictures," "PECS Cards," or "PECS program." None of the responses included a description that specified implementation procedures relevant to a scientifically-validated PECS used to teach students with ASD.

Many individuals among the respondents with scores of 2 also identified TEACCH, Modeling, or Functional Behavior Assessment (FBA) as EBPs. Additionally, other participants identified Social Stories, Visual Support, Structured Play Group, or Reinforcement. However, none of the responses included any details related to the steps or the procedures of implementation for these evidence-based practices.

Some responses ranked as a 0 described instructional supports, some stated more social activities with typical students in school and community, and some stated intense speech and language sessions. Some of the responses mentioned several techniques to improve

communication and language skills in general, and some responses listed some ideas to improve

making request for the student with ASD.

Analysis EBP of social skills

Only 61 of the survey participants responded to the item about using EBP for teaching

social skills for students with ASD. Slightly more than half of the respondents (34) had score a 1,

and twenty-five (25) had score of a 0. Only two of the participants received a score of 2.

Fifteen of the responses included Peer-Mediated Instruction (PMI) to teach social skills

for the student in the scenario. Some participants used terms like "learning through peers," and

some participants used terms like "peers training." However, all responses named the practice

only, and provided little general information about the practice. None of the respondents

described how they might implement the PMI. Seven responses mentioned the use of structured

play group, five responses mentioned the use of modeling, four responses mentioned the use of

PECS, two mentioned the use of reinforcement, one response mentioned the use Discrete Trail

Training (DTT), and one response mentioned the use of visual supports.

Ten of the 25 responses ranked as 0 listed general techniques or strategies. Some of the

responses mentioned play with typical kids, some responses suggested more field trips, some

responses mentioned making friends without explaining how or describing the steps to help the

student.

Analysis EBP of Behavior Challenges

Only 53 of the respondents responded to the item about using EBP for teaching behavior

skills for students with ASD. Less than half of the respondents (23) had score of 1, and an equal

number had score of a 0. Only seven of the participants receive a score of 2.

More than half of the responses (13) named "reinforcement" to teach behavior skills for the student with ASD. However, most of the responses wrote the name of the practice only, such as "Reinforcement," "Positive Reinforcement," "Positive and Negative Teinforcement," and "Reinforcement and Punishment." Some responses provided brief information about the practice. For example, one participant wrote "Modify behavior through reinforcement or making him busy through solving task to avoid annoyance." Another participant wrote "Remove the matters causing bad behavior, follow the positive reinforcement." Two responses mentioned the use of ABA. Three responses mentioned the use of Peer-mediated instruction. Two responses mentioned the use of Extinction. One response mentioned the use of Modeling. One response mentioned the use of Structured Play Groups. One response mentioned the use of Task Analysis.

All responses (23) ranked as 0 included only general techniques or strategies, but none of them were EBPs. For example, one participant indicated "use of behavior modification techniques such as punishment and exclusion." Some of the responses mentioned the use of Over Correction Strategy. Some participants wrote "I do not know." One participant wrote "Sunrise program."

Seven responses identified two EBPs to improve behavior skills for students with ASD. For example, one response mentioned the use of "Peer-mediated instruction and Reinforcement," one response mentioned "Reinforcement and Modeling", one mentioned stated "Visual Schedules and mentioned," one response stated "Reinforcement and Functional Behavior Assessment," and two responses mentioned "ABA and Reinforcement." However, none of these responses included any details related to the steps or the procedures of implementing these evidence-based practices.

Analysis Definition of Evidence Based Practices

All participants were asked to define EBP. The purpose of the question was to examine the extent to which the Saudi teachers of students with ASD were knowledgeable about the concept of evidence based practices. A total of 60 participants (33%) provided definitions. I used content analysis to reduce the responses to the EBP definition item into codes consistent with the process recommended by Erlingsson and Brysiewicz (2017). I copied the definitions and pasted into cells in a single column of an Excel spreadsheet. Then, I reduced the meaning unit (the participant response) into one or more condensed meaning units by removing content of the response that was extraneous or that did not contribute to the meaning as it related to EBP. For example, one participant stated, "providing professional services as per the research results, scientific studies and experiments." This meaning unit was reduced to "research results, scientific studies, experiments."

After all of the meaning units were reduced, I then reduced the condensed meaning units into categories. I read each condensed meaning unit, and then reduced the meaning of that statement into a more global meaningful term. For example, the above condensed meaning unit was reduced to two discrete categories, "research studies" and "scientific evidence." This was a recursive process. As I developed a category, I typed the category name into a new column in the spreadsheet. As I developed new categories, I added new columns. Also, as I read each subsequent condensed meaning unit, I considered the prior categories as a reference, consistent with Erlingsson and Brysiewicz (2017). My analysis revealed five categories: (1) Other Non-Evidence Based, (2) Research Studies, (3) Scientific Evidences, (4) Proof or Prove, and (5) Don't Know.

Theme 1: Other Non-Evidence Based

Other Non-Evidence Based was a category that included responses that lacked any connection to scientific methods or empirically supported strategies or approaches. The responses of twenty-one participants were categorized as Other Non-Evidence Based. Some of these participants defined EBP as behavior modification strategies. For example, one participant wrote "The EBP is behavior modification strategies." While behavior modification could be an appropriate method to apply in certain situations, this could not be classified as an EBP. Some participants defined EBP as the result of work experiences. For example, one participant wrote "EBP are the practices resulted from the work experiences." Other teachers defined EBP as work and training based on theories. For example, a participant wrote "EBPs are following steps and procedures based on a theory" and another teacher wrote "EBPs are work and training."

Theme 2: Research studies

Research Studies was a category that included responses that defined the concept of EBP as the practices based on research studies. The responses of sixteen participants were categorized as Research Studies. Some of the participants defined EBP as the practices depending on research. For example, one participant wrote, "tTey are the practices depending on studies and researches until they agreed upon by experts about their validity, reliability and feasibility." Some participants defined EBP as the practices based on high quality studies. For example, one of the participants wrote, "the practices based on high quality studies with valuable results and evidences," another participant wrote "the practices based on research," and another wrote "teaching methods depending on scientific bases through the application of the studies."

Moreover, some participants wrote "EBP are the practices used based on the results of recent research." In addition, one of the participants defined EBP with more details. This

participant wrote "The implementation of certain program depending on studies and researches in a certain field such as medicine, now it is used in all academic and social and professional fields." Nother group of participants defined EBP as practices proven by experiments and research. For example, a participant wrote that "Strategies that have been proven effective in teaching and training people with ASD on a number of skills from birth to 22 years through the results of studies with a variety of approaches (semi-experiments and single case design)." Also, another participant wrote that "EBP are practices that have been proven to be effective through experimental studies."

Theme 3: Scientific Evidence / Evidence

Scientific Evidence/Evidence was a category that included responses that defined EBP as practices based on scientific evidence/evidence. The responses of sixteen participants were categorized as Scientific Evidence/Evidence. Some of these participants defined EBP as practices based on scientific approaches proved with evidence. For example, one participant wrote "Practices based on scientific grounds and proved effective," and another participant wrote "EBP means treating with students depends on scientific methods proved by studies." Also, a participant defined EBP as "the practices based on evidences by high quality studies." Another participant wrote that "practices: mean all skills and methods used with the children based on experiences, evidences and proofs." One of the participants wrote that "EBP means works and training depending on scientific theories and evidences," and another wrote "using the strategies and methods in order to develop or improve the behavioral performance of the individual, in condition that they are ensured using scientific approaches." Also, one participant defined EBP as "using strategies and methods based on the evidences reached through a study or an experiment," and another wrote "depend on scientific evidences, such practices are followed and

generalized after validity." Also, one of the teachers wrote "the work practices conformed with the proved scientific evidences."

Theme 4: Prove/Proof

Prove/Proof was a category that included responses that defined EBP as the practices that are proved to have benefits. The responses of twelve participants were categorized as Prove/Proof. For example, one of the participants wrote "the types used in the autism training where many studies and researches prove their benefit," and another participant wrote "Practices that have proven efficacy." Also, one participant defined EBP as "Practices proven that they are effective by scientific research," and another participant wrote "Practices that have been proven to be effective through studies." A number of the participants defined an EBP as the following: "treating with students depends on scientific methods proved by studies," "practices proved by experiments," "The practices that based on proofs," "depend on scientific bases, and prove their efficiency in the performance and improvement of the student," "the practices proving efficiencies or success through studies," and "practices or activities done as per the results or evidences proved by the recent researches and try applying such results on students with autism."

Theme 5: Don't Know

"Don't Know" was a category that included responses that reported no knowledge about the concept of EBP. The responses of eight participants were categorized as Don't Know. Four participants answered the definition of EBP question with the statement "Don't Know." Two participants used statements that indicated they don't know. For example, one participant wrote "I have no answer," and another participant wrote "No knowledge about the concept." One of the participants wrote "Don't understand the question," and another participant stated "ambiguous question."

CHAPTER 5

DISCUSSION

The purpose of this study was to investigate teachers' knowledge of EBP for students

with ASD in Saudi Arabia. Saudi Arabia has increasingly developed educational systems that are

inclusive of students with ASD, but teachers in the country still lack the infrastructure or training

systems necessary to adequately prepare teachers of students with ASD with essential knowledge

about ASD and about EBP for students with ASD. In contrast, training programs in the US have

developed a robust set of EBPs for supporting students with ASD across a range of domains. It is

unclear if these practices, developed in the US, have been adequately integrated into the

educational training programs in SA, or if they have become part of the standard instructional

practice for schools and programs serving students with ASD. Consequently, the educational

system in SA lacks sufficient knowledge about the training needs of teachers of students with

ASD as they relate to knowledge of and capacity to implement EBP in their schools and

programs. Developing this knowledge base is essential for adequately meeting the needs of

students with ASD in SA, and for adequately supporting the educators responsible for their

education.

I created a survey that was designed to measure participant knowledge of ASD and EBPs

used with students with ASD, as well as knowledge of specific EBPs used in contextual

scenarios for students with specific deficits across the communication, social skills, and behavior

domains. This study was the first of its kind in Saudi Arabia, and was also the only survey I

identified in SA or in the US that addressed this specific topic. I successfully recruited 183

school personnel responsible for teaching students with ASD in SA, which represented a sizable

proportion of the teachers of students with ASD in the region. I found that teachers of students

with ASD in SA lacked robust knowledge of EBP for students with ASD, although there was great variability in the knowledge of the participants. I found the knowledge of EBP of the majority of teachers of students with ASD across the country was limited. Also, I found no relation between the level of knowledge on EBP and some specific factors such as (a) gender, (b) position (c) years' experience teaching students with ASD, (d) number of students with ASD taught, and (e) Region.

Research Question 1

My first research question was: What do Saudi Arabian teachers of students with ASD know about evidence-based practices? First, I found low to moderate understanding of the concept of EBP by teachers of students with ASD in Saudi Arabia. My content analysis revealed superficial understanding of EBP, with short responses that lacked the depth of understanding that would be expected of teachers with a deep understanding of EBP and the use of EBP in real life settings. Teachers were better at correctly identifying the definition of EBP in the closed ended item, but the item itself included some terms that made the choice of the correct answer somewhat difficult to interpret. Most of the teachers could recognize the correct meaning from a variety of correct and incorrect definitions given to them, but those same teachers could not independently explain and write the correct definition of EBPs in the open-ended question. These findings were consistent with the limited existing research of Alhossein (2016) and Hendricks (2011). The failure of teachers of students with ASD to adequately define or even identify EBPs is a major concern for students with ASD in Saudi Arabia. This means the SA teachers are not well prepared to teach students with ASD, and are not qualified to work with them to improve their skills and meet their needs. The teachers may use non-EBP methods with their students, and these practices are unknown and not proven to be effective. If this situation continues, the

consequences for students will be catastrophic, because the students with ASD are not taught by the most effective practices, and this may lead to unclear outcomes or may even be harmful.

Second, I found teachers of students with ASD in Saudi Arabia had low to moderate knowledge about the characteristics of ASD. Teachers could identify some of the characteristics and non-characteristics of students with ASD, but in general, teachers were unable to distinguish between those characteristics. This is a serious problem, because it means that these teachers are unable to differentiate between the characteristics of students with ASD and the characteristics of students with other disabilities such as intellectual disabilities, learning disabilities, and communication and language disorders. If a teacher does not understand the differences between these disabilities, she or he will not be able to select the most appropriate services for the student, because understanding students with ASD is essential in order to teach them effectively. The teachers who reported they are specialists in teaching students with ASD must be knowledgeable about the characteristics of students with ASD in order to provide the right services for their students.

Third, I found teachers in Saudi Arabia had low knowledge about EBPs of communication skills for students with ASD. Teachers know a few EBPs of communication skills, but not with deep understanding of these EBPs. The practices most commonly identified were PECS and then Pivotal Response Training. The SA teachers of students with ASD had a very limited knowledge of the available EBPs for students with ASD. Of particular importance, I found that participants were generally able to identify non-EBPs for Communication problems, but unable to correctly identify the EBPs. This is a major problem because it indicates that these teachers are unable to link the best EBP to a student with a specific need. For example, not all students with communication skill deficits would benefit from PECS. But, the SA teachers of

ASD don't appear to know about other communication EBPs. So, we can assume that these teachers are implementing what they know (e.g., PECS) whether or not the intervention is appropriate or effective. This has major implications for SA students with ASD, who may not develop appropriate communication skills because their teachers lack the knowledge to support communication development through a variety of appropriate EBPs.

Fourth, I found SA teachers of students with ASD had very low knowledge of EBP of social skills for students with ASD. Of particular importance, I found that participants were generally able to identify non-EBPs for social skills problems, but unable to correctly identify the EBPs. Teachers did not know most of the EBPs supported by research to improve social skills for individuals with ASD. The majority of Saudi teachers failed to recognize or describe those EBPs. SA teachers have very limited knowledge in EBPs for social skills for students with ASD. Basically, the teachers will not be able to improve social skills of the students with ASD without knowing and understanding the effective practices that are proven by research to improve social skills. The teachers must have at least the minimum knowledge on EBPs for social skills, as well as adequate training in applying these practices in real life, to be able to teach students effectively. Limitation in knowledge and skills may lead to wasted time and efforts for both teacher and student. Also, if the teachers do not use the EBPs, they may use other unproven practices and this may lead to unexpected results.

Fifth, I found SA teachers had intermediate knowledge about EBP for challenging behavior for students with ASD. Teachers correctly identified a number of EBPs and non-EBPs for challenging behavior. I found that participants were generally able to identify non-EBPs for behavior problems, but unable to correctly identify the EBPs. However, very few teachers revealed full understanding of the EBPs by describing the components or the procedures of use

the practices. The lack of knowledge about a variety of EBPs to support students with behavior challenges represent a major problem for the students with ASD receiving services from the teachers surveyed in this study. Even the teachers who did know an EBP appeared to be familiar with just one or two EBPs for students with behavior challenges. Those interventions may not be the appropriate interventions for each specific student. As a result, it is possible that their students will continue to have behavior challenges because the interventions are not effective. If these behaviors are not changed, they can become patterned into permanent behaviors that will be extremely difficult to manage.

Sixth, I found teachers of students with ASD in Saudi Arabia were generally unable to differentiate between EBPs and non-EBPs for individuals with ASD. The majority of the teachers were only able to identify a limited number of EBPs even when the list of EBPs was provided to the teachers. This consistent finding indicates a major gap in the knowledge of teachers of students with ASD in Saudi Arabia. The findings indicate that the teachers need to develop a more comprehensive understanding of the various EBPs so that they can choose the best EBP for a specific student, and apply those various practices with fidelity. The SA teachers urgently need to receive students withtraining on identifying and applying EBPs to improve the education of ASD in Saudi Arabia. If the teachers do not receive adequate training, this problem will continue for years and may grow worse.

Finally, one of the potential explanations for the low knowledge of teachers regarding EBPs is that there is a lack of research about these practices in the Arabic language. Most of the participants in this study received their training in Saudi Arabia in Arabic. As a consequence, they may not have had the opportunity to read and review current research about EBPs. Most of

research articles are written in English, which is a barrier for most Saudi teachers of students with ASD who are interested in learning about new EBPs.

Research Question 2

With respect to research question 2: "Is there a relationship between knowledge of evidence-based practices and (a) Gender, (b) Position, (c) Years' experience teaching students with ASD, (d) Number of students with ASD taught, and (e) Region?" First, I found there were no differences in knowledge between teachers of students with ASD and educational supervisors of teachers of students with ASD. Even though the number of SA education supervisors who responded to the survey was small compared to SA teachers, the results revealed no differences in knowledge between the two groups. Teachers and supervisors had the same low level of knowledge of EBP for students with ASD. This means that SA education supervisors, who are responsible for guiding teachers to do a good job, also have limited knowledge on EBPs for students with ASD. The role of supervisors is to train teachers in new and recent teaching strategies and interventions to improve their teaching performance. If the supervisors do not have knowledge about the EBPs for students with ASD, how will they be able to train teachers? This will lead us to another important question: What are the criteria for selecting educational supervisors in the Ministry of Education in Saudi Arabia?

Second, the current study found no differences in knowledge between female teachers and male teachers. Both genders revealed low knowledge of EBPs. Interestingly, I had an assumption before beginning my study that SA female teachers would have a high level of knowledge on EBPs compared to male teachers, because some previous studies in Saudi Arabia found that female teachers had more knowledge of EBPs than male teachers (Alhossein, 2016 and Alotaibi, 2015). Female teachers and male teachers are trained separately in Saudi Arabia, so

there is a possibility that women may receive better training than men. However, the current study rejected my assumption, and the results showed that there were no differences between men and women teachers in knowledge of EBPs for students with ASD. This means teachers in both genders have a low level of knowledge of EBPs for communication, social, and behavior skills for students with ASD.

Third, with respect to research question 2, I found no differences on knowledge of EBPs between teachers based on experience in teaching students with ASD. This means teachers with more experiences on teaching students with ASD do not differ from those with no or few experiences working with ASD. This result was unexpected, because teachers with more teaching years experiences are generally supposed be more knowledgeable compared to teachers with fewer years of teaching experience, in part because they have a history of receiving in-service training, as well as attending many workshops and conferences. This should increase their knowledge and improve their skills in teaching students with ASD. However, my result is consistent with previous studies that showed years of experiences have no impact on teachers' knowledge of EBPs (Alhossein, 2016; Herzog, 2011)

I also found no differences in knowledge between teachers based on level of education. Teachers with higher degrees such as Master or Ph.D do not differ in their knowledge of EBPs from those teachers with only a bachelor's degree. This result was also unexpected. I expected teachers with a high level of education would have more knowledge on EBPs. The result is consistent with the study of Alhossein (2016) that found the level of education had no relationship with the knowledge of the teachers on EBPs. However, this result raises many questions. What is the role of special education graduate programs? What are the goals for such programs? One of the important goals for any graduate program is to increase knowledge and

skills for the students. If the teachers who received a master's or Ph.D degree had the same

knowledge and skills as teachers with only a bachelor's degree, then either there is no need for

such graduate programs, or there is something wrong with those particular graduate programs. I

believe the graduate programs in special education in Saudi Arabia must be evaluated and

reformed.

Finally, I found no differences in knowledge based on type of school. SA teachers who

are working with students with ASD in public school had the same level of knowledge of EBPs

compared to the teachers in private schools or centers for students with ASD. Private schools

often offer higher quality education compared to public school, because they employ highly

qualified teachers. I therefore assumed teachers of students with ASD in private schools would

have more knowledge of EBPs compared to teachers in public schools. My assumption was

incorrect. The results showed there were no differences based on the type of school. This result is

consistent with an American study (Herzog, 2011), which found there were no significant

differences between public school teachers and private school teachers in implementing EBPs.

Research Question 3

My third research question was: **"Is the survey of education of students with ASD a**

reliable and valid tool?"

Reliability of the survey

I used Chronbach's Alpha to establish the reliability of the survey. Chronbach's Alpha is

a measure of internal consistency. The reliability analysis for the survey instrument showed a

Cronbach's Alpha coefficient of .84. The high Cronbach's Alpha coefficient indicates strong

reliability.

The validity of the survey

I used a correlation test to examine the validity of the survey. Table 25 shows the findings from the Pearson correlation to determine how the five criterion variables correlated with each other. The correlation among the Communication, Social Skills, and Behavior items were relatively weak, suggesting clear real differences in the items' capacity to measure related domains. In other words, it appears that each item (communication, social skills, behavior) is distinct from each other item. The strongest correlations were between those four items and the item of Total SUM, which included all EBPs. This is due to the fact that each item is added up to become part of the Total Sum score. The largest correlation was between the item of social skills SUM and the item of total SUM, which suggests that knowledge of EBPs in social skills is the strongest predictor of overall EBP knowledge.

Table 25: the five criterion variables correlated with each other

	Communication SUM	Social Skill SUM	Behavior SUM	Total SUM
Charact. of Autism	0.067	0.142	.206**	.294**
Communication SUM		0.121	.167*	.325**
Social Skills SUM			.200**	.595**
Behavior SUM				.312**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Implications for Practice

The findings from this survey are troubling. It appears that the educators surveyed in this study lacked knowledge of the characteristics of students with ASD, and also lacked a comprehensive knowledge of EBPs for students with ASD. This suggests that these teachers may be unable to adequately support their students with ASD. This reveals a major need in the area of professional development and in the area of teacher training programs designed to support

teachers of students with ASD. In order to improve support for students with ASD in Saudi Arabian schools, it will be necessary to develop intensive and sustained professional development training. This training should include the following areas: characteristics of ASD, diagnostic methods of ASD, strategies to increase communication skills (modeling, prompting, visual supports, reinforcement, PECS), strategies to increase social skills (social narratives, natural environment teaching, video-modeling, structural play groups), strategies to deal with challenging behaviors (functional behavior assessment, visual schedules, functional communication training), how to measure progress, how to evaluate the effectiveness of practices, applied behavior analysis methodology, data collection procedures, determining the validity of an intervention, transition planning strategies, technological supports/accommodations, and career development strategies. The avenues of training should include the following: workshops hosted by professionals, organizations, agencies specialized in ASD, websites, printed materials, regional conferences, on-campus college courses, national conferences, online college courses, study groups, coaching, and webinars (Garet et al, 2001).

In order to better prepare pre-service teachers who plan to work with students with ASD, Saudi Arabian colleges of education need to do a better job of training teachers. Our findings provide a good opportunity for universities to improve their programs. In Saudi Arabia there are 28 universities offer undergraduate and graduate programs in special education. Some of the programs have independent paths focused on preparing teachers to work with students with ASD, and provide a variety of courses to improve teachers' knowledge and skills. The findings of our study show that directors of the teacher preparation programs need to review their courses and syllabi to ensure that they include the topic of EBPs and provide appropriate training as well. Courses should include explanations of all EBPs, as well as training in how to apply them in the

real world. Students should receive training in these practices during the program with feedback from a teacher who is experienced in teaching students with ASD and who has expertise in EBPs. The findings of the current study will be sent to the special education department in the Ministry of Education, and I will request that it be published in the Journal of the Ministry.

<u>**Implications for Future Research**</u>

There is a lack of studies on EBPs for students with ASD in Saudi Arabia. There are a few studies (Alhossein, 2016 and Alotaibi, 2015) done on teachers' knowledge on EBPs, but none of them focused on teachers of students with ASD. The SA researchers focused their studies on either examining teachers' knowledge and use on EBP for individuals of a disability other than ASD (Alhossein, 2016), or on investigating teachers' knowledge and use of one specific practice such as ABA (Alotaibi, 2015) or social stories (Alotaibi, 2016). The current study is the only one that has investigated teachers' knowledge in all EBPs for students with ASD. This study revealed that there is a need to conduct more research in this area. The findings show that teachers' knowledge of EBPs for students with ASD is low. These findings lead us to many questions;

1. Do current teachers get appropriate training on EBPs before and during their work with students with ASD?

2. Do current teachers of students with ASD use EBPs in their teaching?

3. What is needed to develop effective teacher training programs to prepare teachers of students with ASD to implement EBPs?

One of the most important questions that future research should address is, what training current have teachers of students with ASD received? Considering the low level of teacher knowledge of EBPs for students with ASD identified in this study, it is critical to identify the training needs of

current teachers with ASD. This knowledge can be used to help develop effective professional development programs for current teachers of students with ASD in Saudi Arabia.

Second, it is necessary to conduct research on the implementation of EBPs by current teachers of students with ASD. This study revealed a number of teachers who were able to identify and define EBPs for students with ASD. However, that does not mean that those teachers are implementing the EBPs in their classes, or that they are implementing the EBPs appropriately. Future researchers should conduct observational studies of teachers of students with ASD to determine the extent to which they are implementing EBPs appropriately. I propose a study to observe a number of teachers of students with ASD, with between 10 - 20 participants from different elementary schools in one region of Saudi Arabia. I will observe each teacher on three different occasions and on different days. Walter et al. (1998) suggested that using multiple observations for each participant in a study can support reliability. Each observation should be between 30-45 minutes, because the time of each class in regular school is 45 minutes, and 30 minutes for a special education class. The three observations for each teacher will help me to document the practices teachers use with the students with ASD. Also, I can use a checklist of EBPs that can help to document which EBPs (if any) were used. Moreover, I propose to take subsets of teachers who had high knowledge in EBPs, as well as other participants who had low knowledge, and to investigate areas such as their training, level of education, experience, and fluency in other languages. Then, I propose to use observation to compare between these teachers in order to get clear vision which EBPs they used in their classroom, and to see their students' behaviors and responses to these practices.

Finally, it will be important to study SA special education teacher professional development programs regarding EBPs for students with ASD. There are a growing number of

teacher preparation programs focused on students with ASD across a number of universities and departments of education. However, there is a lack of research on the content and the quality of these programs. A future line of research should focus on a systematic evaluation of teacher preparation programs designed for teachers of students with ASD in Saudi Arabia. It will be important to review the programs of study and the associated syllabi to understand the extent of training on EBPs as well as on the number and types of EBPs taught. This research can lead to a comprehensive understanding of the current teacher training on EBPs for students with ASD, and will identify gaps in their training that need to be addressed in order to prepare effective teachers of students with ASD.

<div align="center">

<u>Limitations</u>

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I faced several limitations within my research. The first limitation was the small size of the study population. There are only about 500 teachers of students with ASD in Saudi Arabia. Consequently, I had a limited pool of potential participants to recruit from. Although I was able to recruit an estimated 37% of the sample population, my sample was limited to 183 participants. A larger sample would have resulted in a higher confidence in the findings. Second, I was only able to survey 11 educational supervisors specializing in ASD, which prevented any group comparisons. Third, I had issues getting participants from some regions in Saudi Arabia. Lack of access to participants in some areas may limit the generalizability of the findings. There is a possibility that teachers from non-participating regions will have different characteristics and different knowledge compared to teachers from the participating regions.

A major limitation was that there were a number of participants who did not respond to some questions, especially open-ended questions. Failure to respond to open ended items is a typical problem in survey research, which is why I included both open-ended and rating items in

this survey. The survey had four open ended questions, and I got variable responses across the open-ended items, with some participants answering all of the open-ended items and other answering some. A percentage also failed to respond to any of the open-ended items. There were also some of the rating items that were not answered, creating a problem with missing data. The major problem with missing data was the reduction in sample size. Additionally, it is not possible to understand why the participants did not respond to specific items. Consequently, the ability to interpret the findings is somewhat limited. Also, I did not include special education teachers of students with other disabilities, or general education teachers, in this study. I only surveyed the knowledge of teachers of students with ASD. Consequently, the findings of the current study cannot be generalized to any other groups.

Finally, I didn't ask if the educators could read English, which may be important for accessing information about EBPs. In future studies, researchers should ask participants if they can read and access information in English.

Conclusion

Teaching students with ASD using EBPs is one of the most important components for a successful program educating students with ASD. In order to develop effective programs, it is critical to prepare teachers with the necessary knowledge and skills about the characteristics of ASD, as well as the EBPs designed to support students with ASD in areas of communication, social skills, and challenging behaviors. This study found that the knowledge of current teachers of students with ASD was limited. Saudi Arabian teachers of students with ASD had a low level of knowledge on Evidence Based Practices for students with ASD. The teachers in this study had only superficial knowledge of EBPs, and the knowledge they possessed was limited to a small number of EBPs. There are several explanations for this result. First, there are few training

programs specifically designed to teach EBPs to teachers of students with ASD. Second, there is a shortage of highly qualified professionals in the area of ASD to lead in-service and preservice training programs in Saudi Arabia. Third, there is a lack of ASD resources in Arabic to support teachers in learning about ASD and EBPs for students with ASD. Most ASD sources are written in English, and most SA teachers do not speak or read English well enough to utilize these resources. As a result, there is a growing number of teachers of students with ASD who lack sufficient knowledge of ASD and EBPs for ASD. Future research and training must focus on developing effective teacher training programs and intensive professional development to support the development of the knowledge and skills needed to support students with ASD in schools and community settings.

Appendix

AUTISM SPECTRUM DISORDER SURVEY (ASDS)

English □

Default Question Block

what is your gender?

Male

Female

what is your nationality?

Saudi

[_____]Other Nationality, please specified

In which region are you currently employed?

Asir

Bahah

Eastern Province

Hail

Jawf

Jizan

Madinah

Makkah

Najran

Northern Borders

Qassim

Riyadh

Tabuk

What is your current position?

Teacher of students with ASD

Education Supervisor on ASD

[   ] Other, please specified

Approximately how many students with ASD have you taught in your professional teaching experience?

1-5

6-10

11-15

16-20

20 or more

How many years of experience teaching in general?

1-3

4-6

7-9

10 or more

Please indicate the type of training you have received on teaching students with ASD?

University training

In service training by educational administration in the region.

Formal workshops by organizations or agencies specialized in ASD

Practical Experience

Self-Taught

What is your highest level of education?

Bachelor degree

Master's degree

Doctorate degree

Which of the following best describes the education setting in which you currently work?

Public school

Private school or center for students with ASD

Please indicate with a check mark which of the following characteristics for individuals with autism

Abnormal social skills

Lack of ability to engage in typical back-and-forth conversations

Limitation in general mental capacity, such as learning, reasoning, problem solving

Reduced sharing of interests, emotions, or affect

Failure to initiate or respond to social interactions.

Poorly integrated verbal and nonverbal communication

Limitation in academic skills such as language and literacy

Limitation in the ability to count and use money

Abnormal eye contact, body language, use of gestures

A lack of facial expressions and nonverbal communication

Limitation in interpersonal skills

Difficulties adjusting behavior to suit various social contexts

Difficulties in sharing or in making friends

Absence of interest in peers

Limitation in practical skills such as personal care, healthcare, personal safety

Simple motor stereotypes

lining up toys

Flipping objects

Persistent difficulties in reading, writing, arithmetic, or mathematical reasoning

Echolalia

Extreme distress at small changes

Difficulties with transitions

Rigid thinking patterns

Academic skills well below the average range

Limitation in greeting rituals

Need to take same route or eat same food every day

Strong attachment to or preoccupation with unusual objects

Excessively circumscribed or perseverative interests

Stuttering

Apparent indifference to pain/temperature

Adverse response to specific sounds or textures

Inability to say sounds clearly

Excessive smelling or touching of objects

Visual fascination with lights or movement

A hoarse or raspy voice

1. Please indicate with a check mark which of the following is a EBP

Practices that improved a student outcome in a high quality research study

Practices used by teachers and other service providers in programs for learners with ASD.

Practices are effective for improving student outcomes as demonstrated through multiple high quality research studies

Practices that have positive effects on students' outcomes

What is a scientifically supported practice?

Please try your best to answer each question. You may encounter questions that describe teaching contexts that you are not familiar with. Please do your best to imagine the teaching context and answer the question to the best of your ability. You may encounter descriptions of students that you may not be currently teaching or descriptions of students that you may never have taught. Please do your best to imagine the student and answer the question to the best of your ability.

Communication Skills.

John is an 8-year-old boy with autism. He is only able to say three words ("Mom", "Cat", "Eat"). He is able to follow some verbal directions. He has difficulty communicating his needs and wants. He has difficulty making requests. He is in a segregated classroom with four other students with developmental disabilities. His teachers want to increase his ability to communicate to demonstrate wants, needs, and to make requests (mand).Click to write the question text

Part (A)
Describe one or more evidence-based practices you would use to teach making requests for John?

Part (B)
The following interventions have been used with students with ASD in an attempt to improve communication. Please indicate with a check mark which of the following interventions are evidence-based practices for improving communication skills for students with ASD.

Extinction: The withdrawal or removal of reinforces of interfering behavior in order to reduce the occurrence of that behavior.

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Facilitated Communication: The use of a facilitator who holds the hand or arm of a student with autism in order to facilitate the student's use of a keyboard or communication board to communicate.

Pivotal Response Training: teaches communication skills, language, play, and social behaviors using motivation, responding to multiple cues, self-management, and self-initiations.

Music therapy: Engages a student in playing music and listening to music to improve social interactions and to reduce anxiety.

Discrete Trial Training: The implementation of repeated trials to complete a specific task or activity.

Picture Exchange Communication System (PECS): Teaching children to communicate in social contexts by giving a picture of a desired item to another individual in exchange for the item.

Floortime: Encourages adult structured and spontaneous play sessions to build relationship, social engagement, and complex thinking and problem solving in young children with ASD.

Social Skills

George, a 7-year-old boy diagnosed with autism, was placed in a second-grade inclusive classroom where he received instruction with 15 typical peers and 3 peers with other disabilities. George has limited verbal language and has significantly low academic performance. George has low levels of social interaction. During recess activities, he often follows peers, but does not speak to peers or participate in any activities with peers. George has screamed at peers and taken toys or materials from other students.

Part (A)

Describe one or more strategies you would use to increase George's social interactions?

Part (B)

The following interventions have been used with students with ASD in an attempt to improve social skills. Please indicate with a check mark which of the following

interventions are evidence-based practices for improving social skills for students with ASD.

Video-based Modeling: The use of videos that show a person engaged in the desired target behavior (model). The student learns to copy the modeled behavior. Correct demonstrations of the modeled behavior are reinforced with an appropriate reinforce.

Son-Rise program: utilizes high intensity intervention (i.e., 40 h per week) in play environments to improve social initiations and social responsiveness. A substantial component of the intervention protocol is to imitate the child's play, ritualistic, and stereotype behavior in order to develop and sustain attention.

Peer-mediated instruction and intervention (PMII): Teaches typically developing peers ways to interact with peers with autism in order to help them acquire new social skills by increasing social opportunities within natural environments. With PMII, peers are systematically taught ways of engaging learners with ASD in social interactions in both teacher directed and learner-initiated activities.

Cartooning: Involves drawing cartoons to display social interactions or thoughts of characters to help children with autism to develop social understanding and improve social skills.

Art therapy: Engaging a student with autism in artistic activities to improve and enhance the physical, mental, and emotional well-being of individuals with autism and improve social interactions.

Social skills training (SST): involves group or individual instruction designed to teach learners with ASD specific social skills through direct instruction, role playing, and practicing appropriate social behaviors.

Structured Play Group: involves small group activities characterized by their occurrences in a defined area and with a defined activity. The specific selection of typically developing peers to be in the group. A clear delineation of theme and roles by adult leading, prompting, or scaffolding as needed to support students' performance related to goals of the activity.
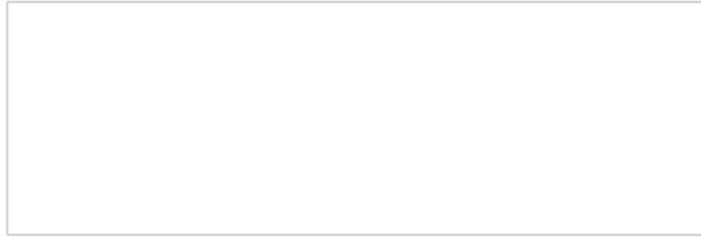
Challenge behaviors

Minsu is a 6-year-old child diagnosed with both intellectual disability and autism. In class, Minsu engages in disruptive behaviors that included crying, screaming, tantrumming, and hitting objects against the floor. He also occasionally bites, hits, and scratches peers. He seldom responds to requests from peers or adults.

Part (A)

Describe one or more strategies you would use to treat Minsu's challenging

behavior?

Part (B)

The following interventions have been used with students with ASD in an attempt to improve challenging behaviors. Please indicate with a checkmark which of the following interventions are evidence-based practices for improving challenging behaviors for students with ASD.

Functional Behavior Assessment: Systematic collection of information about an interfering behavior designed to identify functional contingencies that support the behavior. FBA consists of describing the interfering or problem behavior, identifying antecedent or consequent events that control the behavior, developing a hypothesis of the function of the behavior.

Pet/animal therapy: Uses supported interactions with animals such as a Dogs, Cats, Rabbits, or Horses to change the emotions and feelings of a student with ASD and to improve his or her challenging behaviors.

Offering Choices: Providing students with autism with choices of activities that include preferred activities and teaching them to make choices in order to precede the occurrence of a disruptive behavior.

Visual Schedules: Any visual display that supports the learner engaging in a desired behavior or skills independent of prompts. Examples of visual supports include pictures, written words, objects within the environment, arrangement of environment or visual boundaries, schedules, maps, labels, organization system, and timelines.

Sensory Integration Training: A form of occupational therapy in which special exercises are used to strengthen the individual's central nervous system organize sensations from the environment and from within the body to make adaptive responses necessary for learning and for behavioral regulation.

Power cards: it is a visually based strategy used to connect an appropriate behavior or a skill to an individual's special interest.

Functional Communication Training: Uses assessment results to determine the function of challenging behavior, then teaches the person a socially appropriate way to get their wants/needs met using an easier behavior that serves the same function.

Please Check Evidence-Based Interventions from the List Below

Antecedent-Based Intervention

Facilitated communication

Cognitive Behavioral Intervention

Rapid prompting method

Discrete Trial Teaching

Son-rise

Exercise

Auditory Integration Training

Extinction

Fast Foreword

Scripting

Video Modeling

Self-Management

Social Narratives

Functional Behavior Assessment

Cartooning

Functional Communication Training

Floor time

Modeling

Van Dijk Curricular Approach

Naturalistic Intervention

Pet/animal Therapy

Parent-Implemented Intervention

Gentle teaching

Social Skills Training

Visual Supports

Structured Play Groups

Task Analysis

Peer-Mediated Instruction and Intervention

Power cards

Picture Exchange Communication System

Feingold Diet

Pivotal Response Training

Music Therapy

Prompting

Art Therapy

Reinforcement

Holding Therapy

Vitamin, Herbal, Mineral, and Other Supplements

Technology-Aided Instruction and Intervention

Megavitamin Therapy

Time Delay

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