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Development of a Self-Efficacy Scale for Teachers Who Teach Kids With Autism Spectrum Disorder

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DEVELOPMENT OF A SELF-EFFICACY SCALE FOR TEACHERS WHO TEACH
KIDS WITH AUTISM SPECTRUM DISORDER

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THESIS

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A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in
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ABSTRACT OF THESIS

DEVELOPMENT OF A SELF-EFFICACY SCALE FOR TEACHERS WHO TEACH
KIDS WITH AUTISM SPECTRUM DISORDER

This study aimed to measure teachers' self-efficacy for teaching students with autism
spectrum disorder (ASD). Teacher self-efficacy refers to the belief teachers hold about
their ability to affect student learning and has been shown to change teachers' motivation,
stress levels, and amount of given effort (Klassen, Tze, Betts, & Gordon, 2011).
Numerous studies have dealt with the measurement of this construct and developed
measures that assess teachers in different domains and populations; however, only one
study (Ruble, Toland, Birdwhistell, McGrew, & Usher, 2013) has attempted to measure
within the population of students with ASD. The purpose of the current study was to
develop and pilot a new measure, the Teacher Self-Efficacy for Autism Scale (TSEAS),
expand the construct to the target population, and provide sources of validity evidence.
Results indicated that the TSEAS represented a unidimensional scale and latent
correlation analyses suggested that the TSEAS has a positive correlation with a well-
known teacher self-efficacy measure and has a low, positive correlation with a job
satisfaction instrument. With continued refinement, the TSEAS can support others who
wish to measure this construct and future application of the methods employed in
building this scale can be applied to other scales with minor revisions.

KEYWORDS: Teacher self-efficacy, autism spectrum disorder, social cognitive theory,
validity, cognitive interviews

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April 25, 2016
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DEVELOPMENT OF A SELF-EFFICACY SCALE FOR TEACHERS WHO TEACH
KIDS WITH AUTISM SPECTRUM DISORDER

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Chapter 1: Introduction

According to the Centers for Disease Control and Prevention (2015), the number of students diagnosed with autism spectrum disorder (ASD) is increasing, as 1 in 68 children in the United States have ASD. When considering this statistic, it is important to contemplate the load that this is placing on educational systems within the United States, as teachers and schools attempt to digest emergent research and instill supports and strategies that reflect best practices for increasing numbers of students with ASD. Special Education teachers continue to be trained in the strategies and approaches that best serve students with exceptional learning needs; however, general education teachers are often left to navigate this process without sufficient training and knowledge (McKinney, 2015). White, Smith, Smith, and Stodden (2012) noted that this population of learners has become one of the most challenging groups to teach; therefore, investigating the diverse processes involved in teaching children with ASD is an important and relevant area of research due to the increasing numbers of students filling the classrooms that have an ASD diagnosis.

Before interventions are developed to train and support teachers in providing the optimal learning environment for students with ASD, it is important to understand the baseline level of skills held and the current beliefs possessed by teachers regarding their students. Assessing the skills and knowledge teachers possess in the classroom is clearly important; however, personal beliefs unique to individual teachers provide an even greater influence on teacher effectiveness (Bandura, 1997; Fives & Buehl, 2008; Pajares, 1996). Self-beliefs are present in all learning experiences, and play a lead role in guiding teacher behaviors (Fives & Buehl, 2008). According to prominent social cognitive

researchers like Bandura (1997), "Peoples level of motivation, affective states, and actions are based more on what they believe than on what is objectively true" (p. 2). This particular study will focus on one teacher belief, teacher self-efficacy.

Teacher self-efficacy is rooted in Bandura's (1997) idea of personal control. He refers to personal control as "the vastly enhanced human power to transform the environment" (Bandura, 1997, p. 2). Personal control is driven by an individual's belief in whether he or she can produce desired effects, which Bandura calls self-efficacy. Teachers' self-efficacy, specifically, refers to the belief that teachers hold about their ability to affect student learning. It has been shown to be associated with teachers' motivation, stress levels, job satisfaction, and amount of given effort (Bandura, 1997; Klassen, Tze, Betts, & Gordon, 2011). Teachers are guided by their self-beliefs in the decisions they make in the classroom, and the ways they interact with their students, as opposed to being guided exclusively by skills (Pajares, 1996).

When Klassen and his colleagues (2011) conducted a review of teacher self-efficacy research from 1998-2009, they found 218 empirical articles that covered a range of research on this construct. More recently, Kleinsasser (2014) reviewed 111 articles on teacher self-efficacy that were published in *Teaching and Teacher Education* between 1985 and 2014. Both reviews suggest that there has been a steady increase in teacher self-efficacy research. In Educational Psychology handbooks, the increased dissemination of teacher self-efficacy ideas is also obvious in the choice to include a chapter dedicated specifically to teacher beliefs in the 2006 *Handbook of Educational Psychology* edited by Alexander and Winne. More recently, the 2015 *Handbook of Educational Psychology* edited by Corno and Anderman includes a detailed review of teacher self-efficacy

research indicating that it is a "fertile area of research" (Anderman & Klassen, 2015, p. 403).

When reviewing the abundant new research in the area of teacher self-efficacy, it was noted that self-efficacy scales, in general, fail to show variability and require improvements in measurement techniques (Bandura, 1997; Klassen, et al., 2011; Pajares, 1996; Toland & Usher, 2015). Henson (2002) observed that self-efficacy scales are often adopted despite glaring psychometric problems, which gives the potential for incorrect results to be engrained in literature and leads to statistical conclusion validity threats. With the importance of this construct already identified in literature and obvious by the increase in studies published, there is apparent need for research that addresses these psychometric challenges. Attempts to sensitively measure teacher self-efficacy within the population of teachers who work with students who have ASD are also limited, with only two attempts found as of current review (Ruble, Toland, Birdwhistell, McGrew, & Usher, 2013; Segall & Campbell, 2014). Ruble and her colleagues (2013) included sensitive items specific to the population of interest, but targeted only Special Education teachers. Segall & Campbell (2014) assessed a wide range of teacher attitudes towards inclusion, specifically targeting students with ASD. Within this battery of items, six were specific to teacher self-efficacy. This study will present a new teacher self-efficacy scale with hopes to further explore beliefs about educating students with ASD. The scale produced by this study is called the Teacher Self-Efficacy for Autism Scale (TSEAS). Future application or the methods employed in building this scale can be applied to other self-efficacy scales with appropriate revisions as this field continues to develop.

Theoretical Framework

   This study is grounded in Bandura's (1986) social cognitive theory, which identifies the learner as an active participant who is "self-organizing, proactive, self-reflecting, and self-regulating" (Pajares & Usher, 2008, p. 392). In social cognitive theory, there are reciprocal interactions between the environment, behavior, and personal factors (see Figure 1). Bandura (1997) refers to these interactions as triadic reciprocal determination, and explains that the influence of each factor will vary depending on the circumstance. Personal factors can include internal elements such as habits of thinking, cognition, and feelings or moods. Self-efficacy is one such personal factor, and is the certainty that people have that they can execute particular behaviors (Bandura, 1997).
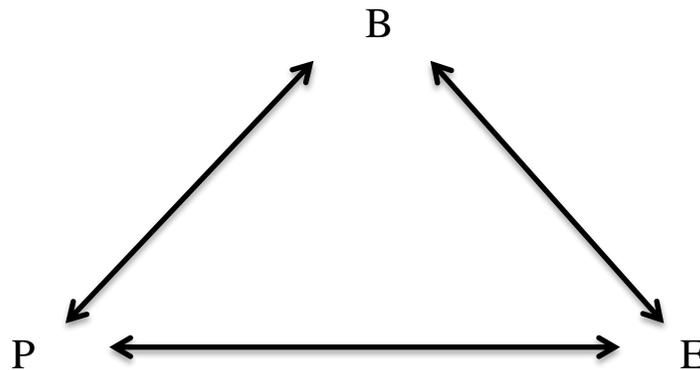
Figure 1. Representation of Bandura's (1986) triadic reciprocal determination. B = behavior; P = personal factors; E = environmental factors.

   It can be helpful to contrast social cognitive theory to Skinner's behavioral views of learning, where external events are given credit as the cause of changes in behaviors (Woolfolk, 2013). Behaviorism was the former dominant theory before introduction of the social cognitive theory, and is still an active theory in the educational setting. This prior behavioral approach was influenced by Skinner (1984) who believed that human

development and learning can be explained using a one-sided determinism: the environment influences human behavior. Social cognitive theory is different because it uses a triadic reciprocal determinism. Behaviors demonstrated by individuals are not only determined by environmental events or involuntary actions, but instead influenced by environmental factors as well as personal factors like thought and personality. Bandura (1997) and other social cognitive theorists would agree that environmental influences play an important role, but also accentuate the importance of influential personal factors (e.g., affect, personality, self-efficacy) as an interacting dynamic along with behavior and the environment. Bandura believes that personal factors are extremely influential and he says, "People are agentic operators in their life course not just on looking hosts of brain mechanisms orchestrated by environmental events" (Bandura, 1997, p. 5).

Social cognitive theory forms the foundation of this study because it focuses on teacher self-efficacy, a personal factor active in influencing behavior and choices in one's environment. For a teacher, a certainty in one's competence plays a major role in how he or she might set up the teaching environment and act within that environment (Pajares, 1996). Teacher self-efficacy influences motivational factors and a teacher's behavior because, according to social cognitive theory, an individual's self-perceptions of competence can influence aspects of motivation (i.e., self-regulation) and choices in behavior (Pajares, 1996). Bandura (1997) stated that teachers with a high sense of teacher self-efficacy "operate on the belief that difficult students are teachable through extra effort and appropriate techniques and that they can enlist family supports and overcome negating community influences through effective teaching," (p. 240). Knowing that students with ASD are sometimes the most difficult students to teach, it is clear that an

effective way of measuring teacher self-efficacy can lead to an understanding of which

teachers require further support in working with this population of learners (Jennett,

Harris, & Mesibov, 2003; Ruble, Usher, & McGrew, 2011). Ultimately, this theory

formed the structure and framework for this study.

Chapter 2: Review of Literature

Teacher Self-Efficacy

Teacher self-efficacy can be described as "teachers' belief or conviction that they can influence how well students learn, even those who may be difficult or unmotivated" (Guskey & Passaro, 1994, p. 628). People are guided by their self-beliefs in the decisions they make and ways they interact with others, as opposed to being guided solely by skills or capabilities (Pajares, 2002). Further, Bandura (1997) has identified how these self-beliefs influence behaviors like the amount of given effort to a task, time spent persisting in the face of obstacles, resilience with failures, and the amount of stress experienced. As demonstrated in the literature, teacher self-efficacy is an important factor in educational settings and deserves to be assessed carefully. High levels of teacher self-efficacy have been shown to be associated with positive teaching behaviors such as exceptional classroom organization, instruction, and clear expectations (Gibson & Dembo, 1985), minimized teacher stress or burnout (Brouwers & Tomic, 2001; Ruble et al., 2013; Schwarzer & Hallum, 2008), improved classroom management techniques such as an ability to execute transitions or promoting positive strategies to deal with challenging behavior (Brouwers & Tomic, 2001; Emmer & Hickman, 1991), and increased student achievement (Armor et al., 1976). Research in the area of teacher self-efficacy and job satisfaction shows that teachers with high levels of teacher self-efficacy report equally high levels of job satisfaction and are less likely to consider quitting the profession (Caprara, Barbaranelli, Steca, & Malone, 2006; Klassen, Al-Dhafri, Mansfield, Purwanto, Siu, Wong, & Woods-McConney, 2012; Klassen & Chiu, 2010).

Attention to population. Bandura (1997) requires researchers to consider teacher self-efficacy as a context-and subject-matter-specific construct (Pajares, 1996; Tschannen-Moran & Woolfolk Hoy, 2001). As he explained, "An efficacious personality disposition is a dynamic, multifaceted belief system that operates selectively across different activity domains and under different situational demands, rather than being a decontextualized conglomerate" (Bandura, 1997, p. 42). This scale developed herein is not domain specific, however, it is population specific in an attempt to assess a context-specific type of teacher self-efficacy. Teachers do not have global beliefs about teaching within different populations and domains; instead, context-specific teacher self-efficacy beliefs exist and can vary depending on personal beliefs. For this specific study, the newly created scale addressed the specific population of students with ASD, as teachers could have high efficacy beliefs for teaching general education students, but have low efficacy beliefs about teaching students with ASD, other disability populations. In order to ensure teachers participating in this study considered this specific population in item responses, I requested in the scale's preliminary instructions that each study participant think about a specific student with ASD. Including detailed preliminary instructions helps to establish the appropriate mindset of the participants, as recommended by Bandura (2006). Furthermore, the scale followed the example by Ruble et al. (2013) who attended to the measurement of teacher self-efficacy when working specifically with students with ASD by addressing the specific and sensitive needs of teachers who work with students who have ASD within item content.

Methods for measuring teacher self-efficacy. Self-efficacy has traditionally been measured through self-report scales where researchers ask participants to rate the

level of their certainty to accomplish a task (Pajares, 1996). Bandura (2006) recommended a standard methodology where participants read items that have different levels of task demands. The individual rates how certain she is in her ability to accomplish that task (the strength of their self-efficacy), and the items become a way to measure the latent construct of teacher self-efficacy (Bandura, 2006). Likert response formats are the traditional option for self-efficacy instruments, and also one of the most recognized formats for survey research (DeVellis, 2003, pg. 93). This approach for measuring self-efficacy was adopted for the TSEAS, although a four-point Likert-type response format was chosen over Bandura's (2006) recommended 0 to 100 response format (Toland & Usher, 2015).

Autism Spectrum Disorder (ASD)

The target population of this study is the general and special education teacher who works with children with ASD. Rising incident rates of ASD make research addressing all aspects of this population both timely and significant (White, Smith, Smith, & Stodden, 2012). Historically, the 1975 Education for All Handicapped Children Act and the 1986 PL99-456 made inclusive education the least restrictive environment for many children with special needs (Mastropieri & Scruggs, 2014). Therefore, the perceived efficacy of both the general education and special education teacher is important due to the increasing numbers of students with ASD who are being placed in both environments. Segall & Campbell (2014) noted that research into the variables related to general education placement decisions is warranted, as both positive and negative findings exist regarding inclusion attitudes for students with ASD. Attitudes and beliefs of staff members (i.e., teachers & principals) have found to be critical variables

correlated with appropriate implementation and positive outcomes (Horrocks, White, & Roberts, 2008; Segall & Campbell, 2014).

An ERIC research database review in September, 2015 revealed only 21 teacher self-efficacy scales for special education populations. Search terms used were "self-efficacy" (title search), "teacher or teachers" (title search) and "special education" (anywhere search). Among these 21 scales, only two were written for specific student populations, and both were targeted at special education teachers, not general education teachers (Hartmann, 2012; Ruble et al., 2013). Other scales found in the same search addressed various aspects of special education generally (Guo, Dynia, Pelatti, & Justice, 2014). As Tschannen-Moran and Woolfolk Hoy (2001) stated, "Teacher efficacy has been defined as both context and subject-matter specific. A teacher may feel very competent in one area of study or when working with one kind of student and feel less able in other subjects or with different students" (p. 10). This unique study is aimed at extending and improving scales in relation to the specific student population identified above as the additional ERIC research database review suggests that continued advancement in this area is both necessary and relevant.

Validity

As explained in the *Standards for Educational and Psychological Testing* (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014), various sources of evidence should be used to evaluate "the validity of a proposed interpretation of test scores for a particular use" (p. 13). This study will produce sources of evidence for validity in four different areas: evidence based on test content, response

processes, internal structure, and based on relations to other variables. Evidence based on

test content "can be obtained from an analysis of the relationship between the content of a

test and the construct it is intended to measure" (AERA, APA, & NCME, 2014, p. 14).

Bandura's (2006) work on the development of self-efficacy scales details an item-design

process that is replicated by many researchers wishing to ensure that items on their self-

efficacy measure reflect the appropriate construct. Evidence for this source of validity

typically includes details of a literature review and consultation with experts in the

scale's desired construct.

Evidence based on response processes refers to showing the equivalency between

the construct being measured and the responses provided by the study participants

(AERA, APA, & NCME, 2014, p. 15). This step is important as it aims to confirm that

participants understand the items in the same way that ensures that each time a new

participant answers the items on the scale, the same construct is being assessed.

Qualitative analyses such as cognitive interviews (Willis, 1999) are often used to provide

evidence of response processes. Next, evidence of the internal structure of a scale offers

an exploration of the relationships among items on the scale that aide in the interpretation

of the scale scores (AERA, APA, & NCME, 2014, p. 16). Previous studies have used

factor analytic methods to explore or confirm the internal structure of self-efficacy scales

(e.g., Ruble et al., 2013; Tschannen-Moran & Woolfolk Hoy, 2001). Finally, evidence

based on relations to other variables refers to the degree to which expected or unexpected

relationships are consistent within a given construct, as based on expectations identified

in literature (AERA, APA, & NCME, 2014, p. 16). This can be achieved by

demonstrating the correlational evidence between the construct of interest and other

constructs detailed in literature. In total, providing additional sources of evidence will

increase the validity of the scores that result from a scale. Numerous sources of evidence

should be established whenever possible.

Significance of the Present Study

This study adds to the field of teacher self-efficacy for teaching a targeted

population of students. By illuminating the process steps involved in building the TSEAS

and subsequently demonstrating preliminary psychometric characteristics, this study

provides future researchers with a new way to measure teacher self-efficacy when

teaching students with ASD. Future results from additional psychometric studies using

the TSEAS have additional implications for practice and research, as teacher self-efficacy

research has struggled to make the jump between practical application and research

(Klassen, et al., 2011). Once a degree of validity evidence is established, researchers can

use the TSEAS to identify specific aspects of teacher self-efficacy and consequently

inform areas where development could be imperative.

Purpose of the Present Study

The purpose of the present study was to develop the TSEAS for use as a measure

of teacher self-efficacy when teaching students who have ASD. Major steps in this

process included developing a measure that has validity evidence based on (a) test

content, (b) response processes, (c) internal structure, and (d) relations to other variables.

All of these sources of evidence were used to build up the degree to which TSEAS scores are reliable and valid. To meet the study purpose, two primary research questions were asked:

1. What is the underlying internal structure of items contained within the TSEAS?

2. Do scores on the TSEAS correlate with scores on other variables as expected?

To provide evidence of relations to other variables, the relationship of teacher self-efficacy when teaching students with ASD was examined with another indicator of general teacher self-efficacy. It was hypothesized that population-specific teacher self-efficacy scores measured with the TSEAS would be positively associated with scores of general teacher self-efficacy (Hartmann, 2012). A positive association was also hypothesized between the scores derived from the TSEAS and scores derived from job satisfaction measure, as previous studies showed significant positive relationships between these two constructs (Caprara, et al., 2006; Klassen, et al., 2012; Klassen & Chiu, 2010). Finally, to provide discriminant evidence, I hypothesized that a measure of self-regulation would demonstrate a nonsignificant (near zero) relationship when associated with scores derived from the TSEAS, as self-regulation has not been previously shown to be associated with measures of teacher self-efficacy.

The following hypotheses, therefore, guided this study in providing sources of convergent and discriminant evidence of validity:

H1: Scores on the TSEAS are significantly and positively associated with a measure of general teacher self-efficacy. If found, the relationship provides convergent evidence.

H2: Scores on the TSEAS are significantly and positively associated with a measure of job satisfaction. If found, the relationship provides convergent evidence.

H3: Scores on the TSEAS are not significantly associated with a measure of self-regulation. If found, the relationship provides discriminant evidence.

Chapter 3: Method

The method of the present study included initial scale development procedures and two primary analyses to establish validity evidence for scores on the TSEAS.

Initial Scale Development Procedures

Items included in the final draft of the TSEAS went through a rigorous examination in order to ensure common errors were avoided and items reflected the construct of interest. This was done to build evidence for the test content. Bensen and Clark (1982), Kline (1986), DeVellis (2012), and Thorndike and Thorndike-Christ (2010) provide clear guidelines for item writing that were followed closely throughout the process. The process included a detailed literature review, consultation with experts, and repetitive item writing. Throughout the item writing process, I consulted items from both Tschannen-Moran and Woolfolk Hoy's (2001) teacher self-efficacy instrument and the Autism Self-Efficacy Scale for Teachers (ASSET) by Ruble et al. (2013). The following is an explanation of the steps I went through when selecting, adapting, and writing a pool of items for the TSEAS. Following this process I conducted cognitive interviews (Willis, 1999; Willis & Artino, 2013) to further provide evidence of response process validity.

Literature review. Initially, a review of literature was conducted in order to ensure that an "appropriate, reliable, and valid instrument does not already exist" (Bensen & Clark, 1982, p. 791). Because the new scale was planned to measure teacher self-efficacy when working with a student in the general education class that has ASD, only one scale met these requirements. The search was extended to see if current scales could be easily adapted for the population of interest. An extensive review of literature was conducted to determine the appropriate item format based on current research in the field

of self-efficacy, as well as current research in the area of scale development. A Likert-type response format is the most commonly used format in teacher self-efficacy research, and was decided on as the item-response format for the TSEAS.

Item writing. Next, a list of behaviors was written and translated into statements (items) by considering what tasks went into the job of teaching. Looking at current scales being used in teacher self-efficacy, I modified this list and ensured current literature was considered. The content of the items within the TSEAS were based primarily on two current scales within self-efficacy research. Tschannen-Moran and Woolfolk Hoy's (2001) Teacher Sense of Efficacy Scale (TSES) was identified as a leading scale due to the large number of citations from the time of publication. Items from the TSES can be seen in Appendix A. I used the factor structure that was found in the TSES, which is a three-factor structure including self-efficacy of classroom management, self-efficacy of instruction, and self-efficacy of student engagement, to guide item writing. In addition, the ASSET (Ruble et al., 2013) was consulted to provide a model of a similar scale used to measure the same population as the TSEAS would be measuring. Items were pulled and adapted from both scales and Bandura's (1997) self-efficacy theory was consulted to ensure the items had a theoretical foundation. Following this process step, 21 items existed in the initial pool of items.

Consultation with experts. To ensure that the population of interest was being represented in a specific and literature-driven way, experts in the field of ASD and self-efficacy were consulted about the items on the TSEAS. Experts were asked for advice in grounding the items in theory and relevant literature. Initially, 10 individuals were contacted by means of an e-mail using addresses provided by other School and

Educational Psychology professors of known experts in each field. Of the 10 individuals e-mailed, six replied to the e-mail and the resulting feedback was used to make changes to the current draft of the TSEAS. Opinions of the six experts were provided through a multi-item electronic survey I developed to assess expert opinion of the TSEAS and seek areas of improvement. Specifically, selected response and open-ended questions within the survey captured information about clarity and content of items within the TSEAS. Respondents replied using a 4-point Likert-type response format that ranged from 1 (*strongly disagree)* to 4 (*strongly agree).* Participants were asked to assess each item as "an important component of teacher self-efficacy when teaching a student with autism" and address the wording by responding to an item that read, "The wording of this question is clear and unlikely to result in ambiguous interpretation." The survey was developed and managed within Qualtrics.

At the time of the electronic survey, the item pool consisted of 21 items. When assessing item content, 8 items were identified as requiring a change or deletion. When studying item clarity, 13 items were recognized as requiring a change or deletion. Experts were asked to provide additional comments or specific concerns and feedback that were not addressed previously in the TSEAS. Some verbatim quotes are available in Appendix B. In total, 12 items were reworded and one was deleted on the basis of the experts' recommendations leading into the cognitive interview process. Eleven demographic items were added to the beginning of the TSEAS. These items contained questions on gender, primary teaching subject, experience working with students with ASD, certification in Special Education, race, teacher grade level, school context, years' experience, highest level of education achieved, and age.

Cognitive interviews with teachers. This phase of the project consisted of two rounds of teacher cognitive interviews on the 20 items currently in the item pool. The goal of this phase was to ensure that items corresponded to actual perceptions and experiences of teachers who have worked with students who have ASD. This was done to provide evidence about the response processes for the TSEAS. Certified K-12 teachers (n = 10) were recruited through a convenience sample. Cognitive interviews were conducted face-to-face by a trained interviewer and included introductory verbal scripts and relevant scripted probes for each item (Willis, 1999). The interviewers utilized verbal probing to determine comprehension, retrieval, decision and response processes. Members of the research team were trained in these techniques, consistent with recommendations by Willis (1999) and Willis and Boeije (2013). I transcribed all interview sessions to identify key issues from the dialogues. The qualitative method of cognitive interviewing, although detailed extensively in current psychometric literature (e.g., Beatty & Willis, 2007; Reeve et al., 2011), is not commonly taken advantage of in teacher self-efficacy research. By detailing the process of scale development, this project hopes to encourage best practice when future teacher self-efficacy scales are constructed.

Item adaptation procedure. Throughout all of the above steps, specific items were deleted or adapted because of the reasons that are outlined below. By closely following guidelines by Kline (1986), items were written with great precision and specificity.

- *Items should not be endorsed by all.* Therefore, an item that stated, "Generate teaching activities for this student" was found to be too easy as all teachers tend to

endorse that item. This item would not provide me with any information as individual differences would be absent.

- *Items cannot carry multiple meanings.* When an item carries multiple meanings, it requires editing because each subject will consider the item a different way. For example, an item that reads, "Use visual structure (pictures) to increase independence" could apply to a variety of different teaching strategies. This item carries too many multiple meanings and was deleted.

- *Items should provide maximal individual differences.* By using Bloom's taxonomy (1965), I considered the level of expertise required for each item. I desired to ensure that the items carried a mix of levels so that some items were difficult to endorse and others were easier to endorse. For example an item was reviewed that reads, "Describe the implications for intervention based on this student's characteristics of autism." The word "describe" is a low level task according to the taxonomy. The word "describe" was then changed to "apply," which is a higher-level task.

- *Items should not be too vague or ambiguous.* Thus an item that stated, "Teach this student academic skills" was considered too general. Kline (1986) stated that items should refer to specific rather than general behavior. Academic skills can refer to a number of different concepts. Therefore, this item was deleted to ensure all items were specific rather than general.

- *Items should be avoided that appear to be socially desirable.* Social desirability is a major concern with self-reporting scales. Therefore, I attempted to remove all items that appeared to carry social desirability. Specifically, an item such as

"Increase opportunities for learning" was removed because it could be considered undesirable to be a teacher that cannot increase student opportunities for learning.

- *Items are redundant.* Within the TSES, one item stated, "How well can you respond to defiant students?" In addition, another item stated, "How much can you do to calm a student who is disruptive or noisy?" These items were redundant and were reduced to one item. Fewer items provide less cognitive burden to participants.

- *Items should be age appropriate.* Items were deleted if they were not relevant to the population. Each item on the ASSET was considered; however, many items were not age appropriate and were not easily generalizable or adaptable to all general education and special education teachers. Therefore, these items were eliminated. For example, one item asked the participant to "Assess this student's play skills." Because the population of the TSEAS is elementary through high school, this was not an age appropriate item and was deleted.

As consistent with recommendations by DeVellis (2012), the insights gained from the conceptual definition of the construct, literature review, expert evaluations, and cognitive interviews informed final item inclusion. The cumulative process resulted in a 14-item TSEAS (see Appendix C). A Likert-type response format was included that ranged from 1 (*not certain at all)* to 4 (*very certain*) following suggestions by Toland and Usher (2015).

Participants

With the process steps completed, a useable sample of 134 teachers participated in the pilot administration of the study (M_{age} = 37.81, SD = 12.18; 81% female). Inclusion

criteria required that teachers at least partially complete items on each measure, therefore a total of 217 teachers led to the valid sample of 134, as 83 participants who partially completed the demographic questions and none of the primary measures were not used. Respondents were selected through snowball sampling in which known teachers and administrators were asked to recruit additional members through social media, list serves, public e-mail lists, and primarily word-of-mouth. The targeted participants for this study included K-12 teachers across the United States, Australia, Canada, and New Zealand; however, the majority of participants were teachers from the United States. The sample included teachers with a range of experience and education, and both general education and special education teachers were targeted (see Table 1). Self-reports indicated that 92% of the sample were White teachers, 3% were Black or African American teachers, 2% identified as Asian teachers, and 3% self-identified as another ethnic group. Teachers indicated their primary teaching role with 38% indicating elementary education, 20% indicating high school, 12% indicating Special Education, and 30% indicating a subject such as physical education, music, or art as their primary teaching role.

Table 1
Description of Teachers' Within the Study

Characteristic	*n*	%
Gender		
Male	25	18.7
Female	109	81.3
Ethnicity		
African American	7	5.2
Asian	8	5.8
Caucasian	125	93.3
Native American/Alaskan Native	3	2.2
Pacific Islander/Hawaiian/Samoan	5	3.7
Other	3	2.2
Country		
United States of America	120	89.6
Australia	14	10.4
Primary Teaching Role		
Special Education	24	17.9
Elementary Education (Grades K-5)	46	34.3
Middle School Education (Grades 6-8)	11	8.2
High School Education (Grades 9-12)	26	19.4
Art Education	4	3.0
Music Education	11	8.2
Physical Education	7	5.2
Other	5	3.7

Measures

In order to show that evidence exists to support relations to other variables,

relationships were evaluated between teacher self-efficacy and variables that are related

and to a lesser degree not related to this construct. The variables chosen for this study

were job satisfaction, self-regulation, and general teacher self-efficacy, and all three

constructs are supported by current literature. Research in the area of teacher self-efficacy

and job satisfaction shows that teachers with high levels of teacher self-efficacy report

equally high levels of job satisfaction and are less likely to consider quitting the

profession (Caprara, Barbaranelli, Steca, & Malone, 2006; Klassen, Al-Dhafri,

Mansfield, Purwanto, Siu, Wong, & Woods-McConney, 2012; Klassen & Chiu, 2010).

As job satisfaction is gained from day-to-day classroom activities such as working with

children, (Cockburn & Haydn, 2004) day-to-day interactions with students with ASD

could have a significant effect on job satisfaction (Klassen et al., 2012).

Self-regulation was chosen because it demonstrates a construct that is different

from the construct of teacher self-efficacy. Another measure of general teacher self-

efficacy not specific to the population of students with ASD was also chosen to serve as

evidence that the new scale is measuring a similar, but unique construct when compared

to general teacher self-efficacy (Hartmann, 2012).

Teacher self-efficacy. The TSEAS is a 14-item scale I designed to measure

teachers' certainty in their own abilities to carry out specific teaching tasks with children

with ASD. Items from the TSEAS can be seen in Appendix C. Items were modified from

the TSES developed by Tschannen-Moran and Woolfolk Hoy (2001). The items on the

TSES correspond to primary teaching tasks and reflect the three content areas (classroom

management, student engagement, and student instruction) that the make-up the TSEAS

(Tschannen-Moran & Woolfolk Hoy, 2001). During TSEAS scale development, the

ASSET, developed by Ruble et al. (2013) was also reviewed and used as a guide during

item writing. The response format is a 4-point Likert-type response format ranging from

1 (*not certain at all*) to 4 (*very certain*). Scores are summed with higher scores indicating

higher levels of teacher self-efficacy when working with students that have ASD.

Additional measures. In addition to the newly developed teacher self-efficacy

scale (TSEAS), teachers' responses were recorded on three different scales for the

purpose of providing sources of evidence that could be used in evaluating the validity of

the TSEAS scores. Coefficient omega (ω; McDonald, 1999) was used to offer a robust estimation of the score reliability for each scale, as Cronbach's coefficient alpha has been seen as an over or underestimation of reliability (Peters, 2014; Sijtsma, 2009). A unidimensional structure was also explored for each scale in the current sample using exploratory factor analysis and previous studies using the same scale are reviewed.

One additional scale included a 14-item job satisfaction scale called the Brayfield Rothe Job Satisfaction Index (Brayfield & Rothe, 1951) as modified by Warner (1973) with a 5-point Likert-type response format that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Items from this scale can be seen in Appendix D. This instrument has been used readily when the researchers are interested in measuring the feelings and emotions resulting from a participant's current teaching position (Voris, 2011). Sample reliability for the job satisfaction scores was ω =.98, 95% CI (.96, .99). The factor structure of the job satisfaction measure has been shown to be unidimensional when utilized in previous studies with teachers (Moorman, 1993; Voris, 2011). An exploratory factor analysis of this scale suggested a unidimensional solution exists for the current sample with all loadings above .53.

The second instrument used in this study was the Self-Regulation Scale (SRS; Schwarzer, Diehl, & Schmitz, 1999), a 10-item scale that ranged from 1 (*not at all true*) to 4 (*exactly true*). Items from this scale can be seen in Appendix E. Inconsistencies about the factor structure of this measure exist in the literature; therefore, only the results of this sample will be reported. An exploratory factor analysis of the self-regulation scale for the current sample suggested first a two-factor structure; however the second factor was comprised of the negatively worded items and thus was declared an artifact. The

negative items were not dropped at this time, and a unidimensional solution was determined to be the underlying structure of the SRS within this sample (ω = .95, 95% CI [.90, .98]).

Finally, a similar teachers' sense of efficacy scale that is not specific to the population of teachers who teach students that have ASD (Tschannen-Moran & Woolfolk Hoy, 2001) was utilized consisting of 12 items on a 9-point Likert-type response format that ranged from 1 (*nothing*) to 9 (*a great deal*). Items from this scale can be seen in Appendix A. The TSES includes content that covers three areas representative of teacher's work (i.e., student engagement, classroom management, and instructional practices). Sample reliability for the teacher self-efficacy scale was ω = .94, 95% CI (.92, .98). The factor structure of this measure has been shown to reflect both a three-factor structure and a unidimensional when utilized in previous studies with teachers (Tschannen-Moran & Woolfolk-Hoy, 2001). An exploratory factor analysis of the TSES in the current sample structure demonstrated that a unidimensional solution exists with all loadings above .53.

Procedure

Following the approval from the Institutional Review Board, data was collected from the battery of measures using an online survey format. The generated Qualtrics link was anonymous, and there was no incentive in exchange for completing this study. Data collection lasted three months. Participants initially completed a demographic section to report age (in years), number of years teaching, gender, and race/ethnicity. Following the demographic section, a three-minute video was shown to ensure that all participants were thinking about their students with ASD, with the goal to prevent teachers from

participating who did not know what ASD was (Sadiq, 2014). Then, participants were asked a range of questions that included the measures discussed previously. All measures and items appeared in a randomly assigned order to each participant to prevent scale order effects and to minimize item-ordering effects. The mean time of participation was 14.41 minutes per teacher. At the end of the survey, the teachers were thanked for their participation and the results were automatically recorded.

Data Analyses

Two major analyses were conducted within this section of the study to evaluate the scores derived from the TSEAS and answer the two primary research questions. To address the first question regarding the internal structure of the TSEAS an exploratory factor analysis was performed. An exploratory factor analysis was chosen because the nature of the items is not entirely known at this time, due to the novelty of the TSEAS, and this was the first attempt to examine the internal structure of the TSEAS. The analyses involved in an exploratory factor analysis incorporate three major steps including (a) a determination of whether or not the data is suitable for factor analysis, (b) a decision about the number of factors to be extracted, and (c) selection of the rotational method, if necessary (Williams, Brown, & Onsmann, 2012). Therefore initially, the 14-item TSEAS was examined for factorability, or the suitability of the respondent data for factor analysis. Factorability was determined by studying the Kaiser-Meyer-Olkin measure of sampling adequacy, Bartlett's test of sphericity, and a correlation matrix. The Kaiser-Meyer-Olkin measure of sampling adequacy assesses whether or not items from the sample are adequate for being grouped into factors and ranges from 0 to 1, with a value of 0.50 considered borderline and minimally suitable for exploratory factor analysis

(Costello & Osborne, 2005; Tabachnick & Fidell, 2007; Williams et al., 2012). Bartlett's test of sphericity aims to be significant ($p < .05$) to be considered suitable for exploratory factor analysis, and provides adequate support for conducting a factor analysis on the data (Williams et al., 2012). Finally, examination of a correlation matrix was used following recommendations by Henson and Roberts (2006) and who suggest inspecting the correlation matrix for correlation coefficients over .3.

Following assessment of factorability, steps were taken to extract and rotate, if necessary, the factors of the TSEAS. To determine how many factors to extract, both Cattell's (1966) scree procedure, Horn's (1965) parallel analysis (k = 1,000), and previous research and theory were utilized. Parallel analysis, or the comparison of actual eigenvalues to random order eigenvalues, was conducted to provide an additional measure of extraction determination due to the subjective nature of the scree procedure (Williams et al., 2012). Factors were extracted with the robust maximum likelihood estimator (MLR). If results suggested more than one factor to extract, then a direct oblimin rotation was used to help with the interpretation of the factor structure (Henson & Roberts, 2006). This rotation method was used because the factor structure has not yet been examined and the factors could be assumed to be correlated, and the latent correlational structure of the scale is only supposed. Once a solution was determined items with factor loadings greater than .50 were described as loading on that factor. Factors are defined by the items that load most heavily on it (DeVellis, 2012) and must be interpretable with possible operationalized and descriptive definitions using current literature and theory (Williams et al., 2012).

The second major analysis was a correlational analysis to provide sources of convergent and discriminant evidence. These sources of evidence are intended to assess the same or similar constructs as well as a measure purportedly of a different construct. The correlational analysis assessed the correlation of the TSEAS with a measure of teacher self-efficacy, a measure of job satisfaction, and a measure of self-regulation. As each of the scales consists of multiple items and each are assumed to be explained by a latent variable (e.g., TSEAS, teacher self-efficacy, job satisfaction, and self-regulation), each was treated as a latent variable and then correlated with each other. As a result correlations are not based on observed scores, but latent variable correlations among the measurement models that represent each construct. All analyses were conducted in M*plus* version 7.2 (Muthén & Muthén, 1998-2012) and IBM SPSS Statistics 22.0.

Chapter 4: Results

Internal Structure

   The 14-item TSEAS was subjected to an exploratory factor analysis which determined that a unidimensional solution could represent the set of items in the sample data after analysis of other solutions were deemed not interpretable. First, factorability results indicated that it was appropriate to explore the data using an exploratory factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was .853, which is above the recommended value of .5 (Williams et al., 2012). Bartlett's test of sphericity was 683.84 and was statistically significant ($p < .001$) demonstrating exploratory factor analysis is appropriate for use. A Pearson's correlation matrix (see Table 3) was examined and all items correlated at least .3 with at least one other item, suggesting reasonable factorability. The communalities were all above .3, further confirming that each item shared some common variance with other items. Therefore, according to the evidence provided above the data was determined appropriate for exploratory factor analysis.

   After determining factorability, the data were explored to determine the number of factors to extract. Results from the scree procedure (Figure 2) and Horn's (1965) parallel analysis (see Figure 2 & Table 2) both indicated that two factors could possibly be extracted from the set of items in this sample. Specifically, an inspection of the scree plot in Figure 2 shows two factors above the scree, and the parallel analysis results show the number of actual eigenvalues above the mean parallel analysis values to also be two.

Table 2

TSEAS Parallel Analysis Results (K = 1,000)

Factor	Actual	Mean	95th
1	5.43	1.60	1.73
2	1.67	1.45	1.54
3	1.05	1.34	1.42
4	0.97	1.24	1.31
5	0.80	1.16	1.21
6	0.68	1.08	1.13
7	0.64	1.01	1.06
8	0.56	.94	0.99
9	0.47	.87	0.92
10	0.45	.80	0.86
11	0.41	.74	0.79
12	0.36	.67	0.73
13	0.28	.60	0.67
14	0.25	.52	0.59

Table 4 provides the structure coefficients and pattern loadings from the two-factor oblimin rotated solution. Looking at the factor structure coefficients and pattern loadings for the two-factor results it is clear that the majority of the items loaded heavily onto factor 1 with factor loadings greater than .50 and thus define factor 1. Item 10 loaded heavily onto factor 2. Items 9, 13, and 14 have cross loadings, which means these items fail to load heavily on one factor. The items that demonstrated cross loadings or the item that loaded onto factor 2 tended represent noise or error as opposed to an interpretable factor (Henson & Roberts, 2006). Henson and Roberts (2006) cautioned researchers to use reasoned reflection along with the empirical data writing, "The meaningfulness of latent factors is ultimately dependent on researcher definition" (p. 396). Because of the lack of convincing items for factor 2, interpretability of the two-factor solution, and cross-loadings, a unidimensional solution was inspected. Table 5 presents the factor loadings from the unidimensional solution. Collectively, all items load

on the general factor with loadings exceeding .5 except for items 10 and 14. Although

these items could be removed, it was determined that because of the relatively small

sample size doing so at this time may be premature. This general factor can be

meaningful labeled "ASD Teacher Self-Efficacy." Overall, the exploratory factor

analysis suggested that a unidimensional solution underlies responses on the TSEAS.
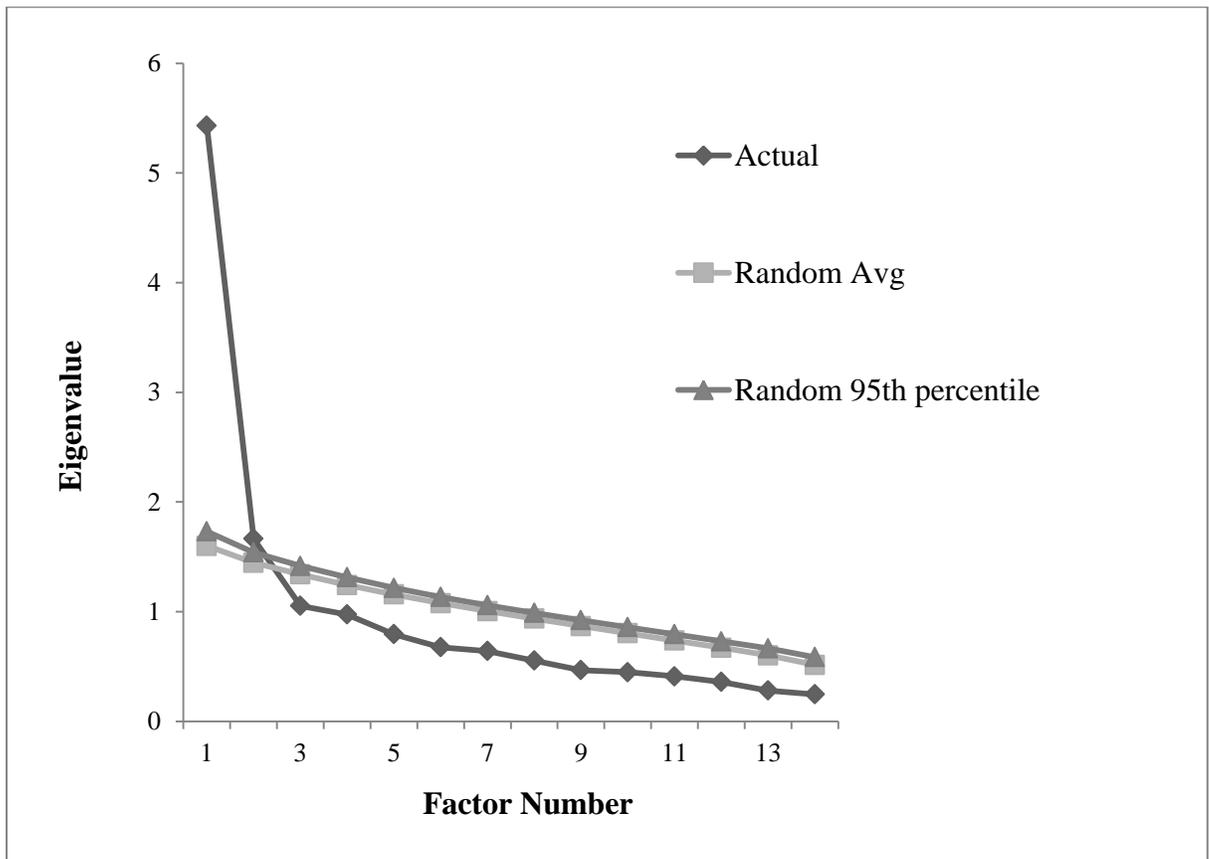
Figure 2. Scree plot of actual eigenvalues and random eigenvalues from parallel factor analysis
for TSEAS

Table 3

TSEAS Pearson Correlations Among Items

	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14
I1														
I2	.65													
I3	.47	.48												
I4	.56	.41	.40											
I5	.54	.50	.46	.33										
I6	.29	.37	.31	.45	.45									
I7	.34	.37	.41	.34	.43	.39								
I8	.42	.42	.28	.29	.41	.35	.22							
I9	.37	.34	.23	.23	.25	.08	.28	.23						
I10	.23	.04	.11	.12	.13	-.04	.05	.12	.49					
I11	.56	.49	.50	.44	.55	.34	.49	.44	.29	.15				
I12	.42	.43	.47	.33	.44	.35	.54	.33	.41	.07	.54			
I13	.34	.23	.37	.31	.25	.24	.21	.31	.24	.47	.26	.19		
I14	.23	.12	.18	.22	.18	.11	.18	.22	.25	.24	.20	.20	.47	

Table 4

TSEAS Factor Pattern Loadings and Structure Coefficients Based on a Two-Factor Oblimin Rotated Solution

Item	Factor 1	Factor 2
1 Motivate	.80 (.84)	.38 (.13)
2 On Task	.80 (.79)	-.04 (.21)
3 Behavior	.67 (.69)	.06 (.27)
4 Relationship	.70 (.71)	.06 (.27)
5 Consequences	.76 (.75)	-.03 (.21)
6 Expectations	.67 (.63)	-.11 (.10)
7 Routines	.72 (.70)	-.08 (.14)
8 Comprehension	.48 (.56)	.27 (.42)
9 Differentiation	.35 (.50)	.50 (.60)
10 Accommodate	-.11 (.18)	.95 (.91)
11 Social	.78 (.77)	-.03 (.21)
12 Transition	.74 (.72)	-.06 (.17)
13 IEP	.27 (.45)	.60 (.68)
14 Collaborate	.17 (.32)	.48 (.53)

Note. Pattern loadings are reported first without parentheses and structure coefficients are reported with parenthesis.

Table 5

TSEAS Factor Loadings for Unidimensional Solution

Item	Factor 1
1 Motivate	.84
2 On Task	.77
3 Behavior	.69
4 Relationship	.71
5 Consequences	.74
6 Expectations	.61
7 Routines	.68
8 Comprehension	.60
9 Differentiation	.58
10 Accommodate	.38
11 Social	.76
12 Transition	.70
13 IEP	.56
14 Collaborate	.41

Relations to Other Variables

Next, correlations among the latent variables were estimated to examine the correlation of this new measure with an existing scale of teacher self-efficacy and two additional existing scales measuring job satisfaction and self-regulation. Table 6 shows the latent variable correlations for the study. As predicted, scores from the TSEAS were significant and positively related to scores derived from the TSES ($r = .49$, $p < .001$). The significant correlation between the TSEAS and the TSES suggest that these scales are describing related, but unique constructs. Scores on the TSEAS were also significantly related to scores on the self-regulation scale ($r = .35$, $p < .01$), but not significantly related to scores on the job satisfaction measure ($r = .23$, $p = .08$). Scores on the TSES were not significantly correlated to scores on the self-regulation scale ($r = .20$, $p = .09$), but did demonstrate a significant correlation with the job satisfaction measure ($r = .28$ $p < .05$).

Table 6
Latent Variable Correlations for Variables in the Study

Variable	TSEAS	[95% Confidence Interval]	TSES	[95% Confidence Interval]	Self-Regulation	[95% Confidence Interval]
TSEAS						
TSES	.49***	[.14, .84]				
Self-Regulation	.35**	[.07, .62]	.20	[-.10, .50]		
Job Satisfaction	.23	[-.10, .55]	.28*	[-.03, .59]	.33***	[.01, .65]

Note.*$p < .05$. **$p < .01$. ***$p <.001$.

Chapter 5: Discussion

The purpose of this study was to develop a new teacher self-efficacy scale that would be appropriate for assessing the self-efficacy of teachers who teach students with ASD. The bank of items written for the TSEAS was based on current teacher self-efficacy scales, expert reviews in the area of autism spectrum disorder and teacher self-efficacy, and cognitive interviews with teachers. The 14-items that resulted were a reflection of the sources of these combined efforts to avoid construct irrelevance, to include items that would be understood by all teachers, and to avoid construct underrepresentation thus including the breadth of test content necessary to accurately measure the underlying latent construct. Inspection of the option response functions for items showed categories not being used consistently, which is likely to occur due to the numbers of items and low frequency counts. As with any self-report scale, certain challenges exist when relying on self-report scores and many of these challenges could have an effect on the nature of responding. These issues include, but are not limited to, acquiescence, extreme responding, and social desirability responding (DeVellis, 2012). Self-report measures like the TSEAS come with a potential susceptibility of social desirability, or a tendency for teachers to respond according to what he or she feels is socially acceptable. Research has shown that "when people err in their self-judgments, their efficacy beliefs typically exceed their behavior" (Bandura, 1997, p. 46).

Due to the brevity of the TSEAS and underrepresentation concerns, all items of the TSEAS were presently retained and results reported above are reflective of the 14-item measure. An analysis at the item-level data was briefly completed, and it is recommended that a closer look is given to each of the items in future studies to ensure

that all items are performing as expected and appropriately reflecting the continuum of the latent construct using modern psychometric methods such as item response theory (De Ayala, 2009; DeVellis, 2012). Specifically, future work should focus on Item 14 that reads, "Collaborate with a Special Educator." Because teachers were included in this study from a wide range of subjects, grades, and areas of expertise, this item may have been interpreted differently depending on the teacher answering the survey. Further inspection of this item came after flagging the item during the exploratory factor analysis, as it contained a low factor loading of .41 for the unidimensional solution.

This study aimed to provide validity evidence for scores derived from the new TSEAS. The exploratory factor analysis showed a unidimensional solution represents the TSEAS. This finding demonstrated that a single construct underlies the items contained within the TSEAS, which is consistent with the research by Tschannen-Moran and Woolfolk Hoy (2001). Further validation with larger and more diverse samples will help to support this finding, and use of a confirmatory factor analysis is suggested in the future. These results allow for total scores to be reported from the TSEAS, with knowledge that all items have a single construct (teacher self-efficacy when teaching students with ASD) running through them.

Another major part of this study was conducted to determine the relationship of TSEAS scores with assorted variables hypothesized to be related or unrelated to the latent construct. Findings were consistent with expectations. It was hypothesized that the strongest relationship would exist between the TSEAS and the TSES due to the shared construct of teacher self-efficacy; this result was found. Initially, it was assumed that this relationship should be higher; however, upon further reflection, a moderate, but positive

relationship seems more appropriate as the items on the TSEAS are specific to a

population of students with ASD and the TSES is not specific to a population of students.

This result is promising as it supports the need for population-specific teacher self-

efficacy instruments, as previous focus has been primarily on domain-specific teacher

self-efficacy instruments. This study shows that teacher differ in their self-belief to teach

students in general, when compared to teaching students with ASD. This difference could

also be attributed to previous personal or professional experience with students with

ASD, which was not measured in this study.

Further, it was predicted that scores resulting from the TSEAS would demonstrate

a positive correlation with a measure of job satisfaction and a non-significant correlation

with a measure of self-regulation. The findings revealed that a significant relationship

existed between the scores from the TSEAS and scores from scales of self-regulation

instrument. This finding was not predicted, as self-regulation and teacher self-efficacy are

two unrelated constructs. However, this result could be attributed to the high levels of

teacher self-regulation potentially needed to successfully teach a student with ASD. The

correlation between self-regulation and teacher self-efficacy for teaching students with

autism should be further explored in future studies. Finally, results indicated that a non-

significant correlation exists between the TSEAS and scores from a job satisfaction

measure. This result was not expected, as job satisfaction has been shown to be related to

measures of teacher self-efficacy. However, the non-significant result could be

understood as items on the job satisfaction scale were not population specific. If teachers

were asked to answer job satisfaction items specific to teaching students with ASD, the

expected result may be found. Future studies should consider utilizing measures that are

entirely population-specific to ensure participants are answering items the same way, regardless of the construct being measured. Overall, the results were as hypothesized or reasonable and plausible, but more sources of evidence should be gathered in the future to further support evidence for validity of the scores that result from the TSEAS. These sources can include population-specific measures across the range of instruments used and additional modes of measurement such as teacher observation or expert reviews.

Teacher self-efficacy is context and subject matter specific (Tschannen-Moran & Woolfolk Hoy 2001). Bandura (1997) stated, "In social cognitive theory, an efficacious personality disposition is a dynamic, multifaceted belief system that operates selectively across different activity domains and under different situational demands, rather than being a decontextualized conglomerate." (p. 42). By providing a domain for an instrument, the researcher ensures that each participant is thinking about a specific subject, student, or population instead of thinking about self-efficacy as a global trait. An initial consideration was to focus on a population and a domain; however, concern with adequate numbers of participants forced a focus only on the population, leaving out the specific domain. It is recommended that future teacher self-efficacy scale development studies continue focus on both target populations and target domains, to ensure a more accurate representation of the construct desired. Addressing both at the same time is less realistic, as sample size could be a concern. A meta-analysis revealed that teacher domain-specific teacher self-efficacy studies have been increasing in recent years (Klassen et al., 2011). Klassen and his colleagues (2011) found that teacher self-efficacy researchers have "been responsive to the proffered advice, with significantly more qualitative and mixed methods, domain-specific, international, and collective efficacy

research conducted than in the preceding 12 years" (p. 38). However, this study demonstrates that population-specific measures should receive attention alongside domain-specific measures, as teachers vary in their self-belief when provided with a target population.

Another limitation of the current study is the lack of random sampling. Without random sampling, external validity is limited. However, random sampling in the field of teacher self-efficacy is rare, as diverse methodologies that use randomized field trials and other experimental methods are noted to be infrequent when counted within meta-analyses (Klassen et al., 2011). Therefore, it is suggested that future studies focus on diverse methodologies and experimental research to expand the construct and inform researchers and practitioners.

This study has implications in several areas. One paramount implication is the now existence of a teacher self-efficacy measure, specific to the population of teaching students with ASD. This measure is appropriate for general education teachers across the age groups. By creating and providing validity evidence of a new teacher self-efficacy measure, this research hopes to continue to add to the availability of such measures for use in the educational domain. A teacher self-efficacy measure could be informative in making professional development decisions, addressing areas of perceived incompetents, and improving teacher practice. Teacher self-beliefs are likely to have significant impact on teacher's decisions and further research on the amount of impact teacher self-efficacy has along with other influencing factors is recommended to strengthen the influence of this construct and assert the practical application of measuring this construct.

In summary, findings suggest that future studies can focus on further validation for additional samples using this new scale, with hopes to continue refining the scale for use within this field and eventual use as practical tool for determining areas of perceived strength and areas of perceived weakness for a teacher who works with students with ASD. This study utilized a sample size of 134 teachers. When compared to other studies of similar nature in the field of special education, this reflects a large sample size and should be commended, as soliciting responses from teachers is a challenging task. However, in order to conduct in-depth item analyses and which will increase confidence in parameter estimates the inferences made, future studies should aim for larger samples, when possible. Alternative response formats should also be considered, as this study utilized the traditional and most commonly used Likert-type response format. Alternative formats should be explored to determine if there is a better alternative available for measurement of this important construct. For example, future research should consider comparing the Likert method of single-response to a ranking task using forced-choice method (see Maydeu-Olivares & Brown, 2010). Likert response formats are the traditional option for self-efficacy instruments, and also one of the most recognized formats for survey research (DeVellis, 2003, pg. 93). However, forced choice format includes items presented in a way that forces participants to choose between similarly attractive options (Brown, 2010). Many problems exist when a research attempts to use single-response format, many of which are ameliorated in the forced-choice format.

Given the high reported stress levels of teachers and high burnout levels of educators, implications of the validation of the TSEAS include guiding the design and implementation of professional development that specifically reflect teacher beliefs

measured accurately by the TSEAS. This scale could measure a teacher's belief in his or her capacity to execute appropriate teaching behaviors necessary to produce specific performance attainments when teaching students with autism spectrum disorder. By measuring where teachers feel the greatest and least self-efficacious when teaching students with ASD, administrators can take steps to increase feelings of self-efficacy improving beliefs of personal capabilities to teach this population of learners and the educational experience for these students. Future studies should continue to focus on the validation of this measure with a larger and more diverse sample to continue providing more evidence towards the reliability and validity of scores derived from this new self-efficacy scale, the TSEAS. Continued research on scales such as the TSEAS can help to improve the educational experience for all students by gaining an understanding of what a teacher believes and how it may change the way she teaches. Quoted by Barry (2010), educational author Harry K. Wong stated, "It's not rocket science –the better the teacher teaches, the better the student learns" (p. 2). Until one can accurately measure all aspects of effective teaching including personal factors like teacher self-efficacy, we cannot expect to improve student learning.

Appendix A

Teacher Sense of Efficacy Scale (TSES)

This questionnaire is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below. Your answers are confidential.

Nothing	Very Little	Some Influence	Quite a bit	A great deal

1. How much can you do to control disruptive behavior in the classroom?
2. How much can you do to motivate students who show low interest in school work?
3. How much can you do to get students to believe they can do well in school work?
4. How much can you do to help your students' value learning?
5. To what extent can you craft good questions for your students?
6. How much can you do to get children to follow classroom rules?
7. How much can you do to calm a student who is disruptive or noisy?
8. How well can you establish a classroom management system with each group of students?
9. How much can you use a variety of assessment strategies?
10. To what extent can you provide an alternative explanation or example when students are confused?
11. How much can you assist families in helping their children do well in school?
12. How well can you implement alternative strategies in your classroom?

Appendix B

Verbatim Quotes Derived From the Expert Review Process

1. I also think you could combine "motivate student" and "improve interest on a topic" into one statement like: Motivate this student when he or she shows low interest on a topic. Or "motivate this student to keep on task on difficult assignments" could be a more specific one for "sustain attention." (Expert, 2015)

2. I wonder if you want to focus on self-efficacy for teaching children with autism very specifically on this scale, in which case you might delete some of the more generic items that apply to teaching all children. (Expert, 2015)

3. Do you want to consider removing items that all teachers would say yes to? This is a mistake many self-efficacy researchers make. (Expert, 2015)

Teacher Self-Efficacy for Autism Scale (TSEAS)

Please rate how certain you are that you can do the following tasks with regard to one particular student with autism. While completing this activity, please have one current or past student with autism in mind when ranking each of the following statements. If you have not taught a student with autism, please consider how certain you are that you can accomplish the following tasks in the occasion that you might have a student with autism in your class.

Not certain at all	A little certain	Somewhat certain	Very certain

1. Motivate this student when he or she shows low interest on a topic
2. Keep this student on task during difficult assignments
3. Resolve a disruptive behavior
4. Sustain a positive student-teacher relationship
5. Provide meaningful experiences
6. Make expectations clear about classroom behavior
7. Establish routines to keep activities running smoothly
8. Gauge student comprehension.
9. Differentiate instruction when appropriate
10. Accommodate assessments when necessary
11. Facilitate appropriate social interactions with peers
12. Manage transition times
13. Address student's individual education plan (IEP) goals
14. Collaborate with special educator (SPED)

An Index of Job Satisfaction

Please rate how certain you are that you can do the following tasks with regard to one particular student with autism. While completing this activity, please have one current or past student with autism in mind when ranking each of the following statements. If you have not taught a student with autism, please consider how certain you are that you can accomplish the following tasks in the occasion that you might have a student with autism in your class.

Strongly disagree	Disagree	Undecided	Agree	Strongly agree

1. My job is interesting enough to keep me from getting bored
2. My friends seem more interested in their jobs than I am.
3. I consider my job pleasant
4. I am often bored with my job
5. I feel satisfied with my job
6. Most of the time, I have to force myself to go to work
7. I definitely dislike my work
8. I feel happier in my work than most other people
9. Most days I am enthusiastic about my work
10. Each day of work seems like it will never end
11. I like my job better than the average worker does
12. My job is uninteresting
13. I find real enjoyment in my work
14. I am disappointed that I ever took this job

Appendix E

Self-Regulation

The following questions are about your self-regulation. Please respond by clicking the response choice that is most true of you.

Not at all true	Barely true	Somewhat true	Completely true

1. I can concentrate on one activity for a long time, if necessary.
2. If I am distracted from an activity, I don't have any problem coming back to the topic quickly.
3. If an activity arouses my feelings too much, I can calm myself down so that I can continue with the activity soon.
4. If an activity requires a problem-oriented attitude, I can control my feelings.
5. It is difficult for me to suppress thoughts that interfere with what I need to do.
6. I can control my thoughts from distracting me from the task at hand.
7. When I worry about something, I cannot concentrate on an activity.
8. After an interruption, I don't have any problem resuming my concentrated style of working.
9. I have a whole bunch of thoughts and feelings that interfere with my ability to work in a focused way.
10. I stay focused on my goal and don't allow anything to distract me from my plan of action.

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Woolfolk, A. (2013). *Educational psychology*. Boston: Pearson.

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EDUCATION

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Master of Science in Educational Psychology   **May 2016**
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University of Kentucky (Lexington, KY)
Advisor: Dr. Michael D. Toland
Thesis: Development of a Teacher Self-Efficacy Scale for Teachers Who Teach Kids
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Bachelor of Science in Education   **Dec 2010**
Eastern Kentucky University (Richmond, KY)
Majors: Elementary Education & Deaf and Hard of Hearing P-12 Education
Minor: Special Education

RESEARCH INTERESTS

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Autism Spectrum Disorder, Teacher Self-Efficacy, Applied Psychometrics, International
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RESEARCH EXPERIENCE

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Research Lab Member, Applied Psychometrics Strategies Lab   **Aug 2014 –**
University of Kentucky
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Graduate Research Assistant   **March 2015 –**
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TEACHING EXPERIENCE
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Madison County School District (Richmond, KY)
Substitute Teacher   **Jan 2011-Aug 2011**

Yarrabah School (Melbourne, Australia)
Special Education Teacher   **Aug 2011- June 2014**

Madison Integrated Learning Center (Richmond, KY)
Co- Founder & Multi-Age Classroom Teacher   **Aug 2014 –**

University of Kentucky College of Education (Lexington, KY)
Instructor of Record   **Aug 2014-May 2015**

CONFERENCE PRESENTATIONS
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Love, A. M. A. (2015, March). Alternative approaches to the measurement of teacher
self-efficacy for teaching children with autism. Poster presented at the 2015
Spring Research Conference, Louisville, Ky.

Love, A. M. A., Toland, M. D., & Tombari, A. K. (2015, August). Clarification on
Gelman's approach for dividing by two standardizations. Poster presented at the
2015 American Psychological Association Convention, Toronto, Canada.

Love, A. M. A., Toland, M. D., Chen, X. Y., Findley, J. A., McCrea, B. L., & Usher, E.
L. (2016, August). Preliminary scale development of a teacher self-efficacy scale
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Love, A. M. A., Findley, J. A., Campbell, A. E., Wakefield, J. R., Lockett, K. L., Usher,
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Paper presented at the 2016 Spring Research Conference, Lexington, Ky.

HONORS
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University of Kentucky College of Education Student Nominated Award: Teacher Who
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Note. References and extended vita available upon request