Research in Autism Spectrum Disorders 7 (2013) 1151–1159

Contents lists available at SciVerse ScienceDirect

Research in Autism Spectrum Disorders

Journal homepage: http://ees.elsevier.com/RASD/default.asp

Preliminary Study of the Autism Self-Efficacy Scale for Teachers (ASSET)☆

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ARTICLE INFO

Article history:
Received 14 March 2013
Received in revised form 12 June 2013
Accepted 13 June 2013

Keywords:
Teacher self-efficacy
Autism spectrum disorders
Special education
Reliability
Teacher stress
Teacher burnout

ABSTRACT

The purpose of the current study was to evaluate a new measure, the Autism Self-Efficacy Scale for Teachers (ASSET) for its dimensionality, internal consistency, and construct validity derived in a sample of special education teachers ($N = 44$) of students with autism. Results indicate that all items reflect one dominant factor, teachers' responses to items were internally consistent within the sample, and compared to a 100-point scale, a 6-point response scale is adequate. ASSET scores were found to be negatively correlated with scores on two subscale measures of teacher stress (i.e., self-doubt/need for support and disruption of the teaching process) but uncorrelated with teacher burnout scores. The ASSET is a promising tool that requires replication with larger samples.

Self-efficacy refers to individuals' judgments of their capabilities to meet specific environmental demands (Bandura, 1997). According to social cognitive theory, when people feel that they are able to meet challenges, they put forth more effort, are more willing to persist and persevere, and are better equipped to cope (Bandura, 1997). In the domain of teaching, self-efficacy represents beliefs about one's capabilities to deliver content effectively, manage the classroom environment, and engage students successfully. Teacher confidence influences student outcomes through teacher behaviors and student learning (Bandura, 1997; Klassen, Tze, Betts, & Gordon, 2011). Self-efficacy is also related to psychosocial factors, such as job satisfaction, stress, and job burnout (Betoret, 2006; Klassen & Chiu, 2010; Schwarzer & Hallum, 2008).

Research on self-efficacy may be particularly salient for special educators who are prone to higher stress, burnout, and attrition compared to general educators (Awa, Plaumann, & Walter, 2010; Carlson & Thompson, 1995). These factors may be partially responsible for the nationwide shortage of special educators (Emery & Vandenberg, 2010; Kokkinos & Davazoglou, 2009), a shortage that influences student outcomes and that may be especially pronounced among teachers responsible for students with significant emotional and behavioral or learning problems (Billingsley, Carlson, & Klein, 2004; Boyer & Gillespie,

☆ This work was supported by Grant Numbers R34MH073071 and 1RC1MH089760 from the National Institute of Mental Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Mental Health or the National Institutes of Health.

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http://dx.doi.org/10.1016/j.rasd.2013.06.006

2000; Hastings & Brown, 2002). Recent research suggests that students with autism, in particular, may impose more stress on teachers when compared to other groups of students such as those with emotional or behavioral problems, attention deficit hyperactivity disorder (ADHD), or cognitive disabilities (Coman et al., 2012; Jennett, Harris, & Mesibov, 2003; Kokkinos & Davazoglou, 2009). For example, the characteristics associated with autism spectrum disorders (ASD), such as impaired social and communication skills as well as repetitive patterns of behavior impact all areas of learning and interactions with others, which might thereby lower a teacher's sense of efficacy for working effectively with such students (Ruble, Usher, & McGrew, 2011). Moreover, teachers of students with autism may experience increased scrutiny for program quality and outcomes and increased interactions with parents, teachers, and other treatment providers as research suggests a disproportionately higher rate of litigation concerning the education of children with autism compared to other disability categories (Zirkel, 2011).

Measures of teacher self-efficacy that have been used with special educators include the Teacher Efficacy Scale (TES, Gibson & Dembo, 1984) and Teacher Interpersonal Self-Efficacy Scale (TISES; Brouwers & Tomic, 2001). The original TES is a 30-item questionnaire and items are rated using a 6-point Likert-type scale ranging from 1 *(strongly disagree)* to 6 *(strongly agree)*. The TES is made up of two dimensions identified as personal efficacy and general efficacy. Personal efficacy taps into teachers' beliefs about their own ability to create positive student outcomes (e.g., "When any of my students show improvement, it is because I have found better ways of teaching them."). General efficacy taps into one's belief that education provided by *any* teacher can bring about positive change, regardless of environmental factors, such as family background, home environment, and parental influences (e.g., "The amount that a special education student will learn is primarily related to family background."). The second measure, TISES, is a 24-item questionnaire that assesses teachers' perceptions of their abilities to manage their classroom, elicit support from colleagues, and elicit support from their principal. Items are measured with a 6-point Likert-type scale ranging from *strongly disagree* to *strongly agree*.

We found only two studies of self-efficacy with a focus on teachers of students with ASD (i.e., Jennett et al., 2003; Ruble, Usher, & McGrew, 2010). The first report by Jennett et al. (2003) investigated whether TES scores differed based on levels of commitment to one of two specific teaching philosophies associated with educating students with autism (Treatment and Education of Autistic and Related Communication Handicapped Children [TEACCH] or Applied Behavior Analysis [ABA]). The findings showed that the Personal Efficacy scale scores correlated positively with commitment scores for both TEACCH ($r = .47$) and ABA ($r = .38$). General Efficacy scores correlated positively only with commitment scores for ABA ($r = .53$). The researchers found no differences in self-efficacy scores based on teachers' self-identified philosophical orientation (TEACCH vs. ABA). They also examined the concurrent associations between commitment to a teaching philosophy, age, undergraduate major, and teaching orientation (TEACCH vs. ABA) and found that only one variable, commitment to a teaching philosophy, significantly contributed to the explained variability in personal efficacy scores and general efficacy scores.

In a second study, Ruble et al. (2011) examined the associations between TISES scores and scores on variables related to three of the four sources of self-efficacy hypothesized by Bandura (1997): mastery experience, represented by the number of years teaching students with autism; social persuasions, represented by administrator support; and physiological and affective states, represented by teacher burnout. The authors found a negative association between scores of teacher self-efficacy (for classroom management) and burnout scores, but no linear associations were observed between self-efficacy and years of teaching or administrator support.

The lack of between-group differences in reports of self-efficacy measured with the TES and the failure to find expected linear associations in studies of self-efficacy using the TISES may be partially explained by a measurement issue described by Klassen et al. (2011) in their in-depth review of teacher self-efficacy research conducted from 1998–2009. They reported that general self-efficacy measures lack the sensitivity required to detect relationships between self-efficacy and those task-specific skills teachers are required to perform. Both the TES and the TISES are measures of general self-efficacy associated with teaching, but neither assesses teachers' beliefs in their efficacy to perform specific skills, such as those they would need in teaching students with autism. Moreover, Klassen et al. noted that the second dimension of the TES, general efficacy, may not represent the construct of self-efficacy at all because of its focus on others rather than the self. This shortcoming has led to a call for more focused research on the measurement of teacher self-efficacy.

Given the measurement limitations identified by previous researchers about the instruments used to assess teacher self-efficacy (e.g., Klassen et al., 2011), particularly when used with teachers of students with ASD, the purpose of the current study was to create and evaluate a more specific and, we hope, sensitive measure called the Autism Self-Efficacy Scale for Teachers (ASSET). Specifically, we sought to evaluate the dimensionality, internal consistency, and validity of scores derived from the ASSET in a sample of special education teachers. We then repeated our analysis using a reduced response set. We hypothesized that self-efficacy scores measured with the ASSET would be negatively associated with scales reflecting teacher stress because the subscales were most closely associated with teaching a specific student with autism. We also hypothesized low or near zero associations between ASSET scores and scores from subscales of general teacher burnout because burnout items were not specific to the student with autism (cf. Betoret, 2006; Klassen & Chiu, 2010; Schwarzer & Hallum, 2008).

1. Method

1.1. Participants

Our sample included 44 special education teachers from two mid-southern states in the US who were currently teaching at least one student with autism, and one randomly selected student with autism from each teacher's caseload. The teacher's mean class or caseload size was 12.4 students (SD = 5.3). All but one teacher was female. The mean number of years teaching was 11.3 (SD = 8.2), and the mean number of years teaching students with autism specifically was 3.4 (SD = 16.2). Half of the teachers held a bachelor's degree, 43% held a Master's degree, and 7% of teachers did not indicate their degree. Half of the teachers came from schools located in small towns (less than 75,000 residents), and half came from schools situated in larger cities (more than 75,000 residents). The study was approved by the institutional review board, and informed consent was obtained by the participants.

1.2. Design and procedure

Participants were recruited through a multi-step process as part of a larger randomized controlled study examining the impact of a consultation and coaching intervention with teachers of students with autism on child outcomes (Ruble, McGrew, Toland, Dalrymple, & Jung, 2013). Once enrolled, participants were randomly assigned to either the control group (n = 15) or one of the two experimental conditions, face-to-face (n = 14) or web-based (n = 15) coaching groups. Data were collected at baseline and at completion of the experiment, but for the purposes of this study we focus solely on baseline responses.

1.3. Measures

1.3.1. Self-efficacy

The ASSET is a 30-item self-report measure intended to assess the beliefs of special education teachers about their ability to carry out their professional tasks associated with teaching students with autism. Teachers were specifically asked to rate their efficacy to conduct various assessment, intervention, and classroom-based practices particular to the needs of students with ASD. The items that make up the ASSET were based on a self-report questionnaire used for statewide teacher training in ASD in one Southern state. The questionnaire assessed teacher content knowledge and skills (i.e., efficacy) in areas specific to best practices for educating students with ASD as defined by autism trainers in the state's department of education and by best practices outlined by the National Research Council (2001; e.g., "Describe the implications for intervention based on this student's characteristics of autism"; "Provide opportunities for communication in the classroom throughout the day for this student"; and "Teach this student social interaction"). Teachers completing the ASSET items were asked to rate, on a scale from 0 (*cannot do at all*) to 100 (*highly certain can do*), their self-efficacy to perform a variety of tasks with a particular student with ASD in their classroom. A 100-point rating scale was used based on Bandura's (2006) instructions for creating self-efficacy scales. The mean score across items was then calculated, with higher scores reflecting higher self-efficacy. A copy of the ASSET is provided in Appendix A.

1.3.2. Stress

Part B of the Index of Teaching Stress (ITS; Abidin, Greene, & Konold, 2004) was used to assess teacher perceptions of the impact of interactions with their student with autism on teacher level of distress. Part B is composed of 43 self-report items rated on a 5-point Likert-type scale ranging from 1 (*never distressing*) to 5 (*very distressing*) and consists of four subscales: self-doubt/needs support (19 items), loss of satisfaction from teaching (12 items), disrupts teaching process (6 items), and frustration working with parents (6 items). The mean score across items within each subscale was calculated, with higher scores reflecting greater levels of distress. The internal consistency of ratings based on previous research has shown the scale reliability estimate (coefficient a) to be .96 (this is the total scale and is singular) and the subscale reliability estimates for the four domains ranging from .84 to .95 (Greene, Abidin, & Kmetz, 1997; Greene, Beszterczey, Katzenstein, Park, & Goring, 2002). Subscale sample reliability estimates are provided in Table 1 and discussed in Section 2.

1.3.3. Burnout

The Maslach Burnout Inventory (MBI; Maslach, Jackson, & Leiter, 1997) is a 22-item self-report measure used to assess physiological and affective states of teacher burnout. Teachers rate how often they experience the feeling indicated by each item using a 7-point Likert-type scale ranging from 0 (*never*) to 6 (*every day*). The MBI is designed to assess the following three aspects of burnout: emotional exhaustion (being emotionally overextended: 9 items); depersonalization (cynicism and overly detached response to other people: 5 items); and personal accomplishments (self-evaluation of productivity or capability: 8 items). Scores are reported as a total score from each of the three subscales. The subscale internal consistency estimates from prior research has (a) ranged from .72 to .89 (Maslach, Jackson, & Leiter, 1997).

1.4. Data analysis

Several analyses were conducted to evaluate the psychometric properties of ASSET scores. First, items were assessed for univariate and multivariate normality by examining skewness and kurtosis. Second, using M*plus* 6.1 (Muthén & Muthén, 1998–2010), we conducted an exploratory factor analysis using a maximum likelihood extraction method that produces maximum likelihood standard error estimates and a chi-square statistic that are robust to non-normality (MLR) and able to account for missing data. To determine the number of factors to extract, we first inspected a scree plot. Then, we conducted a

Table 1
Descriptive statistics for items on the ASSET (and ASSET-6pt) and factor pattern loadings (λ) and communality coefficients (h^2) from Robust Maximum Likelihood Factoring (N = 44).

Item no.	*M*	*SD*	*Range*[a]	*Skew*	*Kurtosis*	λ	h^2
1	71.02 (2.29)	21.15 (1.82)	20–100	−.52 (−.12)	−.58 (−1.45)	.71 (.72)	.50 (.52)
2	80.91 (3.11)	13.99 (1.40)	50–100	−.86 (−.90)	.18 (.22)	.62 (.65)	.38 (.42)
3	70.00 (2.11)	17.39 (1.65)	40–100	−.12 (−.03)	−1.16 (−1.38)	.70 (.66)	.49 (.44)
4	76.59 (2.73)	17.41 (1.66)	40–100	−.69 (−.60)	−.65 (−.93)	.78 (.76)	.61 (.58)
5	82.84 (3.34)	16.47 (1.66)	50–100	−.85 (−.90)	−.42 (−.30)	.83 (.82)	.69 (.67)
6	78.52 (2.98)	20.05 (1.84)	30–100	−.85 (−.56)	−.28 (−1.13)	.86 (.85)	.74 (.72)
7	81.34 (3.23)	17.58 (1.65)	30–100	−1.07 (−.87)	.57 (−.31)	.89 (.87)	.79 (.76)
8	75.57 (2.64)	16.50 (1.57)	40–100	−.64 (−.53)	−.52 (−.85)	.80 (.77)	.64 (.59)
9	80.23 (3.09)	15.66 (1.44)	30–100	−.99 (−.60)	.99 (−.68)	.70 (.70)	.49 (.49)
10	60.23 (1.41)	20.17 (1.44)	0–90	−.57 (.46)	.31 (−1.27)	.53 (.66)	.28 (.44)
11	68.30 (1.95)	17.15 (1.58)	30–100	−.12 (.15)	−.79 (−1.22)	.59 (.61)	.35 (.37)
12	77.16 (2.81)	17.20 (1.60)	40–100	−.71 (−.47)	−.32 (−.86)	.54 (.59)	.29 (.35)
13	72.39 (2.39)	17.60 (1.51)	20–100	−.80 (−.15)	.86 (−.95)	.74 (.72)	.55 (.52)
14	73.07 (2.48)	18.12 (1.59)	20–100	−.71 (−.19)	.36 (−1.00)	.81 (.78)	.66 (.61)
15	76.70 (2.73)	15.77 (1.53)	40–100	−.44 (−.33)	−.46 (−.62)	.75 (.77)	.56 (.59)
16	83.30 (3.41)	16.14 (1.50)	40–100	−1.04 (−.79)	.54 (−.40)	.70 (.70)	.49 (.49)
17	82.61 (3.30)	14.20 (1.42)	50–100	−.62 (−.65)	−.38 (−.30)	.74 (.75)	.55 (.56)
18	76.93 (2.73)	17.02 (1.72)	50–100	−.41(−.42)	−1.02 (−1.00)	.76 (.77)	.58 (.59)
19	76.82 (2.75)	15.67 (1.54)	40–100	−.53 (−.44)	−.45 (−.72)	.74 (.75)	.55 (.56)
20	68.30 (1.91)	16.32 (1.60)	40–100	−.03 (.08)	−1.22 (−1.39)	.71 (.70)	.50 (.49)
21	69.43 (2.11)	18.02 (1.59)	30–100	−.41 (−.01)	−.55 (−1.23)	.69 (.65)	.48 (.42)
22	63.86 (1.75)	20.93 (1.63)	20–100	−.18 (.49)	−.52 (−.88)	.35 (.39)	.12 (.15)
23	77.84 (2.93)	19.54 (1.61)	10–100	−1.37 (−.66)	2.19 (−.59)	.52 (.59)	.27 (.35)
24	85.57 (3.66)	17.09 (1.58)	30–100	−1.54 (−1.32)	1.88 (.69)	.39 (.42)	.15 (.18)
25	79.77 (3.05)	17.98 (1.64)	30–100	−.95 (−.64)	.31 (−.65)	.51 (.49)	.26 (.24)
26	69.66 (2.07)	14.12 (1.30)	30–95	−.64 (−.07)	.27 (−.64)	.68 (.67)	.46 (.45)
27	63.98 (1.64)	17.90 (1.50)	20–95	−.29 (.45)	−.47 (−1.01)	.65 (.65)	.42 (.42)
28	67.95 (2.05)	19.48 (1.66)	20–100	−.50 (.18)	−.39 (−1.12)	.73 (.74)	.53 (.55)
29	72.05 (2.32)	18.37 (1.60)	20–100	−.81 (−.30)	.22 (−1.23)	.70 (.72)	.49 (.52)
30	72.61 (2.41)	19.96 (1.76)	20–100	−.58 (−.18)	−.42 (−1.34)	.63 (.64)	.40 (.41)

Note. Values in parentheses are for ASSET-6pt items.λ = factor pattern loading; h^2 = communality coefficient.
[a] The range for all items on ASSET-6pt was 0–5 except for item 10 which was 0–4.

parallel factor analysis using permutations of the raw data and inspected how many eigenvalues exceeded the mean and 95th percentiles, via O'Connor's (2000) SPSS macro. To determine if ASSET consisted of one dominant factor, we used Gorsuch's (1983) criterion that the ratio of first eigenvalue to second be at least 3:1. We also considered the interpretability of the factor solution. Finally, factor pattern/structure coefficients were inspected.

Sample internal consistency of teachers' ratings on the total ASSET, MBI subscales, and ITS subscales was estimated by computing Cronbach's coefficient α and 95% bootstrap CI (Marso, nd; http://www.spsstools.net/Syntax/Bootstrap/BootstrapCIforCronbachAlpha.txt) based on 2000 bootstrap samples. Finally, validity evidence was assessed by estimating the relationship between ASSET scores and subscale scores from MBI and ITS using Pearson correlations. Convergent evidence was provided when a specific hypothesized correlation had a strong absolute relationship with subscale scores on the MBI and ITS. Because we had a priori hypotheses that ASSET scores would be negatively correlated with ITS scores and have low correlations with MBI scores, one-tailed significance tests were performed. All correlations were tested at the 5% significance level: the critical value was $r \geq |.25|$.

There were no missing data for any of the ASSET items used in this study, but missing data existed for some items or entire subscales on the ITS and MBI subscales. Specifically, one case responded to 3 of 19 items on ITS self-doubt/need support and 6 of 12 items on ITS loss of satisfaction, but not to any of the items on the other two ITS subscales. For the MBI subscales, missing data at the subscale level ranged from 2 (4.55%) to 5 (11.36%) cases, but those with missing data on a subscale were not always the same person. Given the bias and uncertainty with item mean imputation and person mean imputation (see Enders, 2010, p. 51), we addressed the missing data problem for correlations among variables, means, and standard deviations using the MLR estimator in M*plus*, while item-level imputation (m = 20) as implemented in SPSS version 20 was used to estimate reliability coefficients. During the imputation phase, all variables in the data set were used to help provide estimates for missing data (Enders, 2010, p. 269).

We also conducted additional analysis for the need to keep the 100 point scale. This question was pursued because an initial inspection of the response choices (i.e., 0–100) used by all respondents across all ASSET items showed that several respondents did not use the full 0–100 rating scale system. Almost no one used values below 50 with most using 50 as the low anchor. Accordingly, we collapsed all scores between 0 and 50 into zero to establish a new base. For scores above 50, there was little variability or fine grain use of the scale within each of the decades (e.g., 51–60, 61–70). Most participants tended to use values at the endpoints of a decade (e.g., 60, 70), with a few also using the midpoint (e.g., 55, 65) and almost no one using any other value (e.g., 51, 52, .56, 57, etc.). Thus, we collapsed all values within each decade into a new single category (51–60 = 1, 61–70 = 2, etc.).

This process resulted in the following recoded responses: 0–50 to 0, 51–60 to 1, 61–70 to 2, 71–80 to 3, 81–90 to 4, and 91–100 to 5. This produced a 6-point ordinal categorical variable for each item. Based on the recategorization, we also reanalyzed the dimensionality, reliability, and correlations of our data using the revised 6-point scale for ASSET items (ASSET-6pt).

It is important to note that we considered using a Rasch rating scale analysis to determine the optimal number of rating categories, but given the small sample size ($n = 44$) and large number of items on the ASSET, we opted to work within a classical test theory framework for all analyses. The preliminary steps within these analyses follow closely with those taken within a Rasch analysis, (see Smith, Wakely, De Kruif, & Swartz, 2003; Toland & Usher, 2011, for similar applications of Rasch analysis to self-efficacy items) and those recommended by Wright and Linacre (1992) for combining and splitting categories.

2. Results

Preliminary descriptive statistics and tests for normality were calculated on the item level responses for the ASSET and ASSET-6pt; total scores on the ASSET and ASSET-6pt; and subscale scores from the ITS and MBI subscales. The overall mean score on the ASSET was 74.5 (*SD* = 12.1, *Skewness* = −0.59, *Kurtosis* = −0.15, *Range* = 46.3–94.3), and the mean score on the ASSET-6pt was 2.58 (*SD* = 1.11, *Skewness* = −0.39, *Kurtosis* = −0.38, *Range* = 0.17–4.50). Table 1 provides a summary of the item-level statistics (min, max, mean, standard deviation, skewness, kurtosis) for the ASSET and ASSET-6pt. West, Finch, and Curran (1995) recommended describing a variable as reflecting a fairly univariate normal distribution if absolute values of skewness < 2 and kurtosis < 7 are observed. According to these guidelines, all ASSET and ASSET-6pt items and the total ASSET and ASSET-6pt scores had absolute values of skewness and kurtosis reflective of a normal distribution. Similarly, Mardia's multivariate test for kurtosis was not statistically significant for either the ASSET items, 956.37, $p = .78$, or the ASSET-6pt items, 945.19, $p = .26$. However, Mardia's test for multivariate skewness was statistically significant for both the ASSET items, 711.28, $p = 0.006$, and the ASSET-6pt items, 687.23, $p < .001$. In addition, a plot of the Mahalanobis distance statistic onto each observation's ordered X^2 percentile value within the sample showed ASSET items were not approximately multivariate normal because the plotted points fell away from a 45° line (see Marcoulides & Hershberger, 1997). The same was found for ASSET-6pt items. Based on the large and statistically significant multivariate skewness value and graphical plot for multivariate normality, each set of ASSET items and ASSET-6pt items collectively likely do not reflect a multivariate normal distribution.

In addition, univariate skewness and kurtosis statistics for scores on all three MBI subscales and ITS subscale scores for self-doubt/need support and disruption for teaching met the guidelines put forth by West et al. (1995) for reflecting univariate normality. However, ITS subscale scores for loss of satisfaction and frustration with parents had absolute values of skewness > 2 and absolute value of kurtosis of approximately 6, which indicate that these two subscale scores may not be reflective of univariate normality. As a result, we estimated the factor structure of the ASSET items, ASSET-6pt items, and correlations among variables using an MLR estimator given its ability to be robust to non-normality and handle missing data as observed on the MBI and ITS subscales.

2.1. Dimensionality of ASSET

For our data, the Kaiser-Meyer-Olkin measure of sampling adequacy was .78 for both ASSET and ASSET-6pt items, indicating that ASSET items can be grouped into a smaller set of underlying factors. Also, Bartlett's test of sphericity was statistically significant for ASSET items, $X^2(435) = 1465.6$, $p < .001$, and ASSET-6pt items, $X^2(435) = 1449.01$, $p < .001$, indicating that there was support for conducting a factor analysis among the ASSET and ASSET-6pt items. As such, dimensionality was examined using factor analysis. In our sample the dominant first factor explained 49.24% (eigenvalue of 14.77) of the variability in ASSET items followed by 8.61% (2.58) for the second factor. Similarly, the dominant first factor explained 49.87% (eigenvalue of 14.96) of the variability in ASSET-6pt items followed by 8.61% (2.58) for the second factor. Six eigenvalues were greater than one for both ASSET and ASSET-6pt. To completely understand the data, we inspected two- to six-factor solutions using both rotated orthogonal and nonorthogonal solutions, but no meaningful interpretations could be derived from these rotated solutions using either set of items. Therefore, based on an inspection of the scree plot, parallel analysis using the mean and 95th percentiles, ratio of first eigenvalue to second, interpretability of the solutions, and conceptual expectations of a unidimensional construct, it was determined that the ASSET items and ASSET-6pt items can be best explained by one dominant common factor.

The factor pattern loadings and corresponding communality estimates for ASSET items and ASSET-6pt items on the one-factor solution are both presented in the last two columns of Table 1. Factor pattern/structure coefficients for items on the ASSET ranged from .35 to .89, and ASSET-6pt pattern coefficients ranged from .39 to .87. All pattern coefficients were considered to be substantial with no overlap in item content. In addition, all coefficients exceeded Comrey and Lee's (1992) minimum criterion for acceptable factor loadings of .32 (i.e., explaining 10% of the variance). Although the criterion is considered subjective, all items have meaningful value on the factor itself. These preliminary analyses indicate that the 30 items of the ASSET and ASSET-6pt each reflect one dominant factor, and that explained variability and factor loadings were similar for both approaches.

Table 2
Reliability, means, standard deviations, and Pearson correlations of scores for the ITS, MBI, ASSET, and ASSET-6pt (N = 44).

Measure	α[a]	95% CI[b]	M[c]	SD[c]	1	2	3	4	5	6	7	8
1. ASSET	.96	[.93, .98]	74.48	11.97	.99**	−.35**	−.15	−.28*	−.13	−.04	.05	−.11
2. ITS self-doubt/need support	.95	[.90, .98]	1.78	0.76	−.39**	–						
3. ITS loss of satisfaction	.94	[.85, .97]	1.62	0.69	−.20	.84**	–					
4. ITS disruption of teaching	.89	[.75, .97]	2.13	0.90	−.32*	.87**	.87**	–				
5. ITS frustration with parents	.91	[.79, .96]	1.47	0.76	−.17	.59**	.69**	.60**	–			
6. MBI emotional exhaustion	.90	[.81, .93]	2.15	1.02	−.06	.49**	.35*	.38**	.29*	–		
7. MBI depersonalization	.47	[.12, .65]	0.50	0.62	.05	.33**	.37**	.44**	.27*	.46**	–	
8. MBI personal accomplishment	.86	[.78, .98]	5.00	0.81	−.07	−.28*	−.44**	−.27*	−.28*	−.44**	−.23	–

Note. ASSET = Autism Self-Efficacy Scale for Teachers (0–100 response scale); ASSET-6pt = ASSET using a 6-pt scale (0–5 response scale); ITS = Index of Teaching Stresss; MBI = Maslach Burnout Inventory; values in the lower diagonal are correlations using the original ASSET 0–100 pt scale; values in the upper diagonal are correlations using the ASSET-6pt scale. ASSET-6pt α = .96, 95% CI [.94, .98], M = 2.58, SD = 1.10.

[a] Item-level multiple imputation (m = 20) as implemented in SPSS version 20 was used to estimate coefficient alpha for missing item level data observed only on ITS and MBI subscales.

[b] 95% CI (confidence interval) are based on Marso's (nd) SPSS macro (http://www.spsstools.net/Syntax/Bootstrap/BootstrapCIforCronbachAlpha.txt) for producing bootstrap CIs using 2000 bootstrap samples.

[c] The adjusted mean and standard deviation was determined by dividing the subscale mean and standard deviation by the number of items on the subscale.

* $p < .05$, one-tailed (critical value is $|r| \geq |.25|$).

** $p < .01$, one-tailed (critical value is $|r| \geq |.35|$).

2.2. Internal consistency

The first column of Table 2 provides the estimated internal consistency reliability from each measure used in this study along with 95% bootstrap CIs. All sample reliability estimates (α) were above .85, with lower bounds of the confidence intervals of at least .75, except for the MBI subscale depersonalization, which was .47. The reliability estimates based on the ASSET items and ASSET-6pt items were both .96.

2.3. Validity evidence

Table 2 shows the linear correlations (r) between scores on the four subscales of the ITS, three subscales of the MBI, ASSET, and ASSET-6pt. Consistent with our hypothesis, ASSET scores and ASSET-6pt scores were negatively correlated with all ITS subscale scores, but were statistically significant only for the self-doubt/need for support and disruption of teaching subscales. Although the associations between ASSET and ASSET-6pt scores and ITS subscale scores on loss of satisfaction from teaching and frustration working with parents were nonsignificant, they were in the predicted direction. Also as expected, ASSET and ASSET-6pt scores showed the weakest and near zero linear relationships with the three MBI subscale scores. Correlations of ASSET scores with the MBI and ITS subscales were very similar to the correlations calculated with the ASSET-6pt scores.

Correlations between scores on the ITS subscales with MBI subscales ranged from |.27| to |.49|, indicating that burnout and stress have small to moderate correlations in this sample. The strongest absolute correlation among the ITS and MBI subscale scores was between ITS self-doubt/need support and MBI emotional exhaustion, whereas the smallest absolute correlation among these measures was between ITS disruption of teaching with MBI personal accomplishments and ITS frustration with parents and MBI depersonalization. All subscale scores of the ITS correlated with all subscale scores of the MBI in expected directions. Teachers who reported higher stress also reported higher burnout. Finally, as expected, all subscales of the ITS correlated moderately to strongly with one another given their strong similarity.

3. Discussion

The Autism Self-Efficacy Scale for Teachers (ASSET) was developed to help understand the self-efficacy of teachers responsible for the educational programs of students with autism and how self-efficacy might influence student outcomes. The current results provide preliminary support for the reliability and unidimensionality of scores generated by the ASSET. Analysis of the psychometric properties of dimensionality and internal consistency of the 30-item ASSET indicated that all items reflected one dominant factor and 28 of 30 items had pattern loadings considered substantial (pattern loading > .5). Although the sample size was small, the factor analysis results are encouraging based on the size of the pattern loadings.

Evidence for the validity of ASSET scores also was encouraging. We predicted that scores on ASSET would be negatively related with scores on each ITS subscale (self-doubt/need for support, loss of satisfaction from teaching, disruption of the teaching process, frustration working with parents) and only weakly or not associated with each of the MBI subscales (emotional exhaustion, depersonalization, personal accomplishment). Although all correlations were in the expected direction, ASSET scores were significantly negatively correlated with scores on only two of the four ITS subscales. One explanation for the nonsignificant findings is that the small sample size may have limited our ability to reliably detect small correlations. A second explanation may be that not all areas of stress represented by the ITS are influenced in similar ways by self-efficacy. We found the strongest correlation between ASSET scores and the ITS subscale self-doubt/need for support. An explanation for this finding is that the correspondence was high between items represented in the ASSET and those in the self-doubt/need for support ITS subscale. This may be due in part to construct/content overlap. That is, ASSET items assess confidence in doing tasks, while the ITS subscale examines stress related to self-doubt, which is a closely related concept.

We also hypothesized a low correlation between scores on the ASSET and MBI subscale scores (emotional exhaustion, depersonalization, and personal accomplishments). Consistent with our expectations, ASSET scores were not statistically significantly related to scores on any of the MBI subscale scores. Although this finding is inconsistent with results from prior research that showed a negative relationship between teacher self-efficacy and teacher burnout (i.e., Ruble et al., 2011), the difference may be due to the more generalized nature of the self-efficacy measure used in previous research. In the current study, we sought to establish a more context-sensitive measure of self-efficacy for teachers of students with ASD. A measure of general burnout such as the MBI may not correspond well with task-specific judgments such as those in the ASSET. The more sensitive a self-efficacy measure is to a particular domain (and, in our case, to teaching a particular student), the less likely it is to be related to more generalized measures or to other domains (Klassen et al., 2011). The ASSET is intended to be sensitive to the experience of instructing a specific student population and thus may miss aspects of burnout not unique to teaching these students. The MBI reflects general burnout/exhaustion with respect to teaching or administration or co-workers and is therefore less reflective of specific instances of teaching children with ASD.

One potential important use of the ASSET or similar measures of teacher self-efficacy for students with autism is to identify aspects of teacher confidence most closely aligned with the actual educational experience provided to students with autism. For example, self-efficacy was most strongly negatively correlated with stress associated with loss of satisfaction/need for support. This finding suggests that if teachers can be screened early for critical indicators of stress, then interventions designed to decrease stress and increase self-efficacy can be implemented with the hope that they may decrease long-term stress, burnout, and attrition.

Results from the item-level analyses of the ASSET suggested that teachers did not use most response categories across the assumed continuum of the 0–100 confidence scale. In fact, they responded in gaps or jumps of 5 or 10, which has been noted by De Vellis (2012) as being problematic with 0–100 scales. Moreover, the results using the 100-point and 6-point scales were virtually identical. These results are consistent with findings from Smith et al. (2003) and Toland and Usher (2011) who have reported that fewer response categories can be used when measuring self-efficacy. However, authors have suggested that as few as four response categories are needed, not six as we observed. One difference is that we used classical test theory and factor analytic methods rather than Rasch scaling techniques as used by other researchers to identify the number of response categories. Based on the current results, a 6-point response scale was deemed adequate.

3.1. Limitations and future research

One limitation of the current study is the small sample size of only 44 participants. The study also was vulnerable to specification error. That is, we did not have access to other concurrent measures that could be useful in validating self-efficacy scores derived from the ASSET, such as, observer reports of ability or other measures of teacher self-efficacy.

Future research should consider using item response theory (IRT) or Rasch methods to examine more closely how items on the ASSET are performing and whether the entire continuum of self-efficacy for teaching children with autism is being measured with the ASSET. Also, future research could use IRT to see if a shorter version of the ASSET (i.e., fewer items) could be used to provide comparable information for the entire latent continuum of self-efficacy of teaching children with autism and validity evidence. IRT analyses could not be conducted in the current study because the results would have been unstable given the small sample size and large number of response categories, but initial analyses are promising and test the initial assumptions about dimensionality needed for unidimensional IRT models.

Also, it would be important for future studies to use IRT methods to examine whether six response categories are necessary or optimal when measuring the beliefs teachers have about their ability to carry out their professional tasks associated with teaching children with autism. As noted above, research by Smith et al. (2003) and Toland and Usher (2011) suggest we might only need four when measuring self-efficacy. Specifically, Smith et al. found that for elementary-age children responding to items on self-efficacy, the scale was optimized with four response categories (*not sure*, *maybe*, *pretty sure*, and *really sure*). However, it may be that for adult teachers we need six labeled response categories. Regardless it would be important for future research to determine what the labels for each response category should be to reduce uncertainty in responses that can occur when not all categories are labeled (De Vellis, 2012; Smith et al., 2003) as was done with the ASSET, which only labeled the anchors and the middle category of 50.

Bandura (1995) suggested that self-efficacy is related to a variety of other factors that were not assessed in this study, such as teaching effort, perseverance in the face of obstacles and failure experiences, decreased teacher anxiety and depression, and increased teaching accomplishments. Research is needed to assess the association between ASSET scores and these important indicators of self-efficacy with emphasis placed on specific instances of teaching children with ASD.

3.2. Conclusions

This study adds to the limited literature on teacher self-efficacy as it pertains specifically to educating children with autism. Moreover, we developed a self-efficacy scale targeted to teaching children with autism and found preliminary evidence for reliability and validity of scores from the ASSET. Additionally, this study discusses the ways in which self-efficacy for teaching students with autism may relate to different areas of teacher stress and burnout. Future research should expand upon this study by further examining the qualities of the newly developed ASSET and exploring ways in which this new measure relates to teaching students with ASD. Researchers should continue to examine the relationship among self-efficacy, teacher stress, and burnout (Klassen et al., 2011).

Appendix A. Autism Self-Efficacy Scale for Teachers

ASSET

Name:____ Date:_______________

This questionnaire is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers of students with autism. Please rate how certain you are that you can do the things discussed with regard to **the student with autism.** Write the appropriate number in the space provided.

Rate your degree of confidence by recording a number from *0* to *100* using the scale given below:

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately can do					Highly certain can do

Remember to respond with your student in mind.

	Confidence (0–100)
1. Conduct an assessment of this student's developmental skills/learning skills	
2. Describe this student's characteristics that relate to autism	
3. Describe the implications for intervention based on this student's characteristics of autism	
4. Translate assessment information into teaching goals and objectives for this student	
5. Write a measurable objective for this student	
6. Write a teaching plan for this student based on goals and objectives	
7. Generate teaching activities for this student	
8. Organize the classroom to increase opportunities for learning for this student	
9. Use visual structure to increase this student's independence	
10. Help this student understand others	
11. Help this student be understood by others	
12. Provide opportunities for communication in the classroom throughout the day for this student	
13. Assess the causes of problematic behaviors of this student	
14. Design positive behavioral supports for this student	
15. Implement positive behavioral supports for this student	
16. Collect data to monitor this student's progress toward objectives	
17. Make use of data to re-evaluate this student's goals or objectives	
18. Assess this student's social interaction skills	
19. Assess this student's play skills	
20. Teach this student social interaction	
21. Teach this student play skills	
22. Train peer models to improve the social skills of this student	
23. Describe parental concerns regarding this student	
24. Communicate and work effectively with this student's parent(s) or caregiver	
25. Describe parental priorities for learning with regard to this student	
26. Help this student remain engaged	
27. Sustain this student's attention	
28. Motivate this student	
29. Help this student feel successful	
30. Teach this student academic skills	

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