INITIAL DEVELOPMENT AND VALIDATION OF THE STUDENT SELF-DETERMINATION OPPORTUNITY SURVEY: TEACHER REPORT

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ABSTRACT

Self–determination instruction is associated with a variety of important outcomes for students with disabilities. A new instrument, the Student Self–Determination Opportunity Survey: Teacher Report version (SSOS–TR), utilizes Causal Agency Theory as a framework to measure teachers' perceptions of the extent to which their instructional practices facilitate this area of skill development. This paper outlines and describes the item development and content validation processes utilized in developing the SSOS–TR. A sample of 151 special education teachers spanning grades K-12 participated in this SSOS-TR instrument pilot. In alignment with the three essential characteristics of self-determined action identified in Causal Agency Theory, the SSOS-TR factor analyses suggested a three-factor extraction. The three resultant subscales produced alpha coefficients ranging from .87-.91, evidencing internal consistency. Implications, limitations, and suggestions for future research are described.

Keywords: self-determination, instrument validation, disability, Causal Agency Theory

My experiences teaching in a variety of educational positions and settings have sharpened my focus on elevating the voices of students with disabilities (SWD). In what I hope will be my research arc as a scholar, I aim to explore the extent to which SWD perceive they are afforded opportunities by their special education teachers to have their student voices heard. Self–determination curricula can provide a means to elevate student voices. Implementing self–determination instruction is associated with a variety of important outcomes for SWD, such as educational goal attainment (Shogren et al., 2012) and positive postsecondary outcomes (e.g., employment, quality of life, integration into community; Nota et al., 2007; Shogren et al., 2012; Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015).

Students need opportunities at school to practice self–determination skills and such opportunities for practice are largely designed, scheduled, and implemented by teachers. While tools exist to capture teacher ratings of a student's present levels of self–determination, missing are tools that focus on teachers' perceptions regarding the extent to which their instructional practices facilitate this skill development. Specifically, with this survey, I hope to measure these opportunities via K–12 special education teacher self–reports as the population of interest. My proposed instrument is named the Student Self–Determination Opportunity Survey: Teacher Report version (SSOS–TR).

This paper outlines and describes the item development and content validation processes that I completed in developing the SSOS–TR. My primary research question is: To what extent do special educators perceive they provide opportunities for SWD to develop self–determination skills? As I continue to explore the perceptions of SWD with regards to their educational experiences and opportunities, the SSOS–TR will serve as an elucidating comparative body of information and potentially expose important gaps in perception between teacher and student populations.

BRIEF REVIEW OF THE LITERATURE

Origins of self–determination trace back to the initial stages of research on personality development in the mid–1900s, particularly by Angyal (1941), who described autonomous–determinism as self–caused action in contrast to actions governed by external laws. Decades later, Wehmeyer (1992) defined and refined (Wehmeyer et al., 1996) self–determination as "acting as the primary causal agent in one's life and making choices and decisions regarding one's quality of life free from undue external influence or interference" (p. 632).

There has been a wide application of this model in special education research across a variety of school types and grade levels. Cobb et al. (2009) summarized the results of self–determination curricula and outcomes for individuals with disabilities in a narrative meta–synthesis. They concluded that (a) multi–element interventions yield more positive outcomes than single–component interventions (e.g., works included in the meta–synthesis by Algozzine et al., 2001; Fowler et al., 2007; Konrad et al., 2007; Wood et al., 2005), (b) self–determination outcomes can be enhanced in targeted interventions for SWD, yet these interventions do not appear to be effective with regards to increasing academic achievement (e.g., works included in the meta–synthesis by Fowler et al., 2007;

Konrad et al., 2007), and (c) there are strong and positive correlations between school self–determination interventions and adult outcomes (e.g., works included in the meta-synthesis by Algozzine et al., 2001; Chambers et al., 2007; Malian & Nevin, 2002). One of the included reviews published by Chambers et al. (2007) is particularly relevant. Among their findings was the fact that teachers' reported ratings on a quantitative scale measuring the importance of self–determination did not necessarily translate to them teaching these skills for various reasons (e.g., lack of teacher preparation and lack of perceived impact on students with more severe disabilities).

CAUSAL AGENCY THEORY

A re–conceptualization of the 1990s definition of self–determination (Wehmeyer et al., 1996) was deemed necessary due to (a) the emerging field of positive psychology and its focus on personal well–being and self–determination as a motivational force (Ryan & Deci, 2000), (b) the changing understanding of disability towards a strengths–based approach (Shogren, 2013), and (c) shifts towards increasingly inclusive models of special education delivery for SWD alongside general education students who would also benefit from self–determination interventions. This new reconceptualization, called Causal Agency Theory, additionally explains how individuals become self–determined (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015). The definition of self–determination as defined within the Causal Agency Theory is as follows:

> … dispositional characteristic manifested as acting as the causal agent in one's life. Self-determined people (i.e., causal agents) act in service to freely chosen goals. Self-determined actions function to enable a person to be the causal agent in his or her life. (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015, p. 258)

Burke et al. (2020) conducted a recent meta–analysis to update the metanalytic literature on self–determination and also to align a synthesis of the self–determination literature with the reconceptualization put forth in the Causal Agency Theory. Burke et al. found 34 articles meeting inclusion criteria, such as implementation of an intervention, participant populations containing (but not limited to) SWD, and outcome variables pertaining to self–determination skill(s). All "suggested positive outcomes of intervention for overall self–determination or one or more skills associated with self-determined action" (p. 183). The number of combined participants in the research studies contained within this meta–analysis was over three times greater than that of the comparable meta–analysis published by Algozzine et al. (2001) almost 20 years prior; thus, the construct of self–determination is one of continued relevance to the field.

According to Causal Agency Theory, there are layers of human agency that span the continuum from meeting basic biological and psychological needs to acting as a fully agentic self. The agentic self is a person who is personally empowered, engaged in goal–directed and self–regulated action, and is continuously self–monitoring in response to environmental changes that can function as either opportunities/supports

or impediments/threats to their goals (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015). According the Causal Agency Theory, people engage in an iterative series of analyses whenever there is a discrepancy between their current status and their goal status. They prioritize actions and evaluate their problem–solving abilities until they find a match between challenge and capacity towards goal–attainment that they can execute by making strategic decisions and choices, or they refine/revise the original goal (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015).

The layers of human agency between the basic and agentic self are the three essential characteristics of self–determined action within the Causal Agency Theory. An individual's motivation to secure basic psychological and biological needs promotes their well–being, which in turn facilitates the optimal condition for developing the essential characteristics of a fully agentic self. I employed these three characteristics as my hypothesized factors for the SSOS–TR: volitional action, agentic action, and action-control beliefs. These hypothesized factors are conceptually defined by Shogren, Wehmeyer, Palmer, Forber-Pratt et al. (2015) as follows:

- Volitional Action: self-initiation based on preferences and conscious choices
- Agentic Action: self-regulated and self-directed towards chosen personal goals
- Action-Control Beliefs: the individual's positive awareness of their sills, knowledge, and capacity towards their goals

These factors also lead to causal agency, which is when "the individual acts with an eye toward causing an effect to accomplish a specific end or to cause or create change" (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015, p. 259). Causal agency is thus both an outcome and an influencer of the fully agentic self, who experiences even higher levels of well–being. I chose Causal Agency Theory as my framework for this survey given its comprehensive utility in both defining what self-determination is and in explaining how to create opportunities for SWD to become agentic selves.

EXISTING INSTRUMENTS

Two predominant tools utilized to measure self–determination were developed in alignment with Wehmeyer's (1992) original theory of self–determination: the American Institutes for Research (AIR) Self–Determination Scale (Wolman et al., 1994) and The Arc's Self–Determination Scale (Wehmeyer & Kelchner, 1995). The Arc's Self–Determination Scale is a student self–report instrument that was designed for use with adolescents labeled with cognitive disabilities to measure their current areas of strengths and limitations as well as the factors promoting or inhibiting their self–determination. The AIR Self–Determination Scale additionally includes the aim of identifying goals that can be adapted for inclusion in a student's Individualized Education Program (IEP; Wolman et al., 1994).

When the functional model of self–determination was re–conceptualized as the Causal Agency Theory (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015), a corresponding instrument was designed in alignment: the Self–Determination Inventory: Student Report version (SDI–SR; Shogren et al., 2017). The SDI–SR is a departure from the scales above in that designed for use by students regardless of disability status (Shogren et al., 2017).

PROBLEM STATEMENT

In reviewing existing instruments, I noted a lack of tools measuring special educators' perceptions of the opportunities they afford to SWD to develop self–determination skills. The closest items I could find in measuring this construct were in the AIR Self–Determination Scale. The teacher version of the AIR Self–Determination Scale has just six items to measure the teachers' perceptions of opportunities that students have to perform self-determined behaviors at school. An example item is: "Student has opportunities at school to explore, express, and feel good about own needs, interests, and abilities" (Wolman et al., 1994). As with this example, the educator form of this scale is exclusively comprised of item stems beginning with "Student."

In contrast, I aim to capture a more direct measure to promote increased accountability for special educators and a tool to prompt meaningful reflection on their individual classroom practices. If the example above was reworded with the special educator as the active agent, it would instead read: "I create opportunities for my students to explore, express, and feel good about their own needs, interests, and abilities." The SSOS–TR will move beyond the measurement of students' skills and towards a measurement of the extent to which teachers themselves are working to create opportunities for SWD to become self–determined.

ITEM DEVELOPMENT PROCESS

I drew influence from the AIR Self–Determination Scale educator form and the Self–Determination Inventory: Student Report version in drafting an initial pool of 37 items. The items were hypothesized to operationally define one of the three essential characteristics of self–determination (i.e., 1=Volitional Action, 2=Agentic Action, 3=Action–Control Beliefs). Prior to the content validation process, I made scale selection considerations. I decided to select a Likert agreement scale with no midpoint to encourage deeper levels of critical thinking and thereby prevent strong satisficing of participants (i.e., selecting a neutral or no–opinion midpoint to minimize the difficulty level of the question on oneself; Krosnick et al., 1996). I selected six response options as opposed to four because of current guidance to include indicators with more than five categories in order for them to be treated as continuous in statistical analyses (McCoach et al., 2013). I created a content validation form to seek feedback regarding my conceptual definitions, capture expert opinions about which survey item belonged within each factor, to what degree they were certain of this judgment, and to what extent they found the item to be relevant to the factors. Last, I created a tab to capture qualitative feedback using open–ended questions probing about topics such as the clarity of survey items, range of content covered, and any additional comments.

CONTENT VALIDITY PROCESSES

EXPERT REVIEW METHODS

I contacted five content specialists in the area of self–determination via email to serve as expert reviewers for content validation. My original email included a line asking experts to suggest additional reviewers. In this way, I was able to generate additional experts for a total of seven experts. The final seven experts included one graduate student and six university professors who all specialize and publish in the area of self–determination. All experts provided their feedback via email using Excel spreadsheets that I created for each individual reviewer.

EXPERT REVIEW RESULTS

I compiled all of the seven experts' content validity forms into one spreadsheet. This sample of experts all indicated that my conceptual definitions were sufficient; no changes to the definitions were recommended. I then calculated the percentage of expert reviewers for each drafted item who were in agreement with its hypothesized factor as well as the percentage of certainty for each reviewer in their factor designation (i.e., Very Uncertain, Moderately Uncertain, Moderately Certain, Very Certain) and the percentage of relevance to constructs that the reviewers attributed to each item (i.e., Totally Irrelevant, Not Very Relevant, Somewhat Relevant, Totally Irrelevant).

The retained items on the revised SSOS-TR were all deemed somewhat relevant or totally relevant. All of the reviewers affirmed that the items seemed to span the range of content for each category as defined. Also, this sample of experts agreed that a 6–point Likert agreement response scale was appropriate. In response to the final qualitative question to reviewers asking for any additional thoughts or comments, one expert shared, "this will be a wonderful tool to add to our knowledge of teachers' current perceptions and practices and then plan for teacher preparation and professional development." This feedback encapsulates my hope for the future utility of the SSOS–TR.

INSTRUMENT ITEM DELETIONS PRIOR TO PILOTING

After analyzing the expert reviewers' content validation forms and qualitative feedback, a total of 17 items were deleted from the initial item pool. Items with fewer than five out of seven experts in agreement with the hypothesized factor were inspected first. Given that these items were so inconsistently classified, there was a possibility that they would load onto more than one factor and would consequently trouble a factor analysis. This criterion resulted in the removal of 13 items.

Two items, "I have my students identify what they can do by themselves," and "I encourage my students to act on their own," not only had low percentages of reviewers in agreement with the hypothesized factors (57% and 29% agreement, respectively), but were also critiqued by expert reviewers as being irrelevant to, and inappropriate for, inclusion within a self–determination instrument. In the qualitative feedback section, one

expert asked, “Why is it necessary for students to identify what they can do by themselves when what is more important is that they know the supports they need to be successful?” Another reviewer similarly commented, “I would make sure there is not a focus on independence. No one is truly independent; we all use supports to engage in our own self-selected goals.” These items went beyond the scope of self–determination and into the realm of independence, which was not the intended construct.

I removed four additional items given qualitative feedback. “I encourage my students to make choices” was consistently identified as redundant with “I provide opportunities for my students to make their own choices.” This redundancy “can cause the association between two variables to be even stronger than can be explained by the underlying factor(s)” (Flora & Flake, 2017, p. 86), which would also be problematic in a factor analysis. Experts who identified these items as redundant unanimously identified the later version as preferable for retention.

Three items that included the concept of confidence were removed: “I know which students are confident in their abilities,” “I know which students are working on their self–confidence,” and “I provide opportunities for confidence–building.” These items had high percentages of overall agreement with hypothesized factors among the experts (71%, 86%, and 86% respectively); however, I decided to remove them after extensive email correspondence with one of my experts. This expert reviewer was critical of the self–determination theoretical framing from within the field. The expert stated that “self–determination is often framed from White, individualistic perspectives” and believed that “questions to teachers should not sound like promoting White, cultural perspectives and practices, especially when it comes to doing things independently and being confident.” The expert also spoke to the reality that “students from culturally and linguistically diverse backgrounds may not present as confident as White students.” This researcher urged me to refrain from including items related to confidence, as it is not the same as self–awareness and self–knowledge, which are represented in the third factor of action–control beliefs. I had already removed the items referring to independence, but this researcher’s feedback was to also remove these three items referring to confidence.

I would like to emphasize the importance of this expert reviewer’s qualitative feedback in supporting me to create a more culturally responsive instrument. As discussed by Sankofa (2021), expert panels do not exhaustively check researcher bias as “experts are plausibly colleagues empowered with similar privileged worldviews and biases as the researcher who developed the scale” (p. 2). My original framing of items was indeed biased towards a cultural perspective uplifting Whiteness due to its value placed on confidence and independence.

INSTRUMENT ITEM REVISIONS

Two items on the SSOS–TR tool were revised for language but not deleted from the item pool. Expert feedback towards the item originally stated as, “I give time for my students to deal with obstacles,” was that “deal with” sounded like the teacher was not supporting students at all. Thus, the item was revised to read, “I give time for my students to confront obstacles.” This rewording still captures the teacher’s self–perception of the opportunities

they afford to students to practice navigating challenges, but exposure to barriers is prioritized over independent resolution of challenges. Another item originally read, "I minimize my influence on students' choices." Experts pointed out that students' choices are largely constrained by external forces beyond the teacher (e.g., curricular, resource, and time constraints) and that it is often necessary for teachers to ensure that authentic choices are available to SWD. The suggested revision was to replace "choices" with the word "decisions" so that the item now reads, "I minimize my influence on students' decisions."

DATA COLLECTION AND METHODS TARGET POPULATION

My revised target population for the SSOS–TR instrument pilot was special education teachers serving students in grades K–12 across a variety of service models most common to special education (e.g., self–contained classrooms for students requiring intensive instruction in all subject areas provided by a special educator within a separate setting or inclusive classrooms co–taught with a general education teacher where students with and without disability labels learn alongside each other). My original target population was secondary (i.e., high school) special education teachers; however, with expert feedback, I was pushed to open the target population to include all special education teachers serving students across grades K-12. Expert rationale for this broadening was to inquire about grades within the demographic section, as differences might emerge between grade bands that could inform my decisions with this tool moving forward. This suggestion to make a single instrument for special educators across all grade bands would help to align the SSOS–TR with the AIR Self–Determination Scale from which it drew much influence, as this tool also spans K-12 in its assessment of self–determination skills.

Some experts questioned my target population restricted to special educators. When Causal Agency Theory (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015) replaced the functional model of self–determination, it did so in part to reflect shifts towards inclusive models of special education for SWD alongside general education students, who would also benefit from self–determination interventions. The corresponding measure updated to align with Causal Agency Theory, the SDI–SR, was designed for use with all students regardless of disability labels, as its creators cited evidence that supports the importance of enhanced self–determination for all students.

Despite these suggestions, I decided to keep the target population restricted to special education teachers. Opening up the target population would generate information on general education teachers' self–perceptions, of which I am not interested at present. Also, as I ultimately aim to research the perceptions of students labeled with disabilities with regards to the opportunities, they perceive they are afforded, I do not wish to capture information on students without disability labels at this time. I do not negate the utility of my SSOS–TR tool for use with all teachers reporting on all students. However, for the specific purposes of my research, I am keeping my target population limited to special educators at this time. The expert suggestion to include all teachers does introduce a new line of inquiry to compare the self–perceptions of special and general educator teachers, which could be investigated in the future.

PILOT SAMPLING METHOD

For the purposes of this study, I used non–probability convenience sampling. I gathered a sample from social media (i.e., Facebook, Twitter) by linking to my survey and tagging relevant special education professional networks. I also generated a generic tweet and Facebook post containing the most widely used special education hashtags. I shared my survey link with graduate student colleagues who are former special education teachers using a snowball sampling outreach strategy in which these colleagues were the "seed" individuals with desired networks. The mechanism behind this strategy is therefore "semi–self–directed, chain–referral," (Sadler et al., 2010) as I asked colleagues to share the recruitment messages to reach the approximate sample size of 200. This goal sample size of 200 satisfied the best practices suggested by Boateng et al. (2018) given that there are 19 items on the revised scale (i.e., a 10:1 ratio of respondents to items) and it also meets the 200–300 sample size range described by the authors as appropriate for running a factor analysis.

INSTRUMENT PILOT TIMELINE

I sent my recruitment messages out to my graduate colleagues and posted the messages to social media platforms of Twitter and Facebook on March 15, 2022. I proceeded with recruitment utilizing the snowball sampling outreach strategy described above. The survey was distributed via a link to Qualtrics, a platform for designing and sharing web–based surveys, and remained active until April 19, 2022, at which point I had received 212 responses (i.e., within the required 200-300 range).

DESCRIPTION OF PILOT SAMPLE PARTICIPANTS

Differing numbers of respondents answered the demographic questions at the end of the SSOS–TR in that some answered all questions, while others answered some or none of them. The mean respondent age for those who provided their age was 42 years old with a range of 22 to 65. With regards to years teaching (including the 2021–2022 year), the mean was 13 years (range: 1–40). This sample reasonably approximates the expected characteristics for special education teachers provided by the U.S. Department of Education. With regards to race, the sample was slightly higher at 91% than the expected 83% for percentage of White–identifying teachers and was higher at 90% than the expected 75% for female–identifying teachers (U.S. Department of Education, 2020).

ANALYTICAL METHODS

I used an exploratory factor analysis (EFA) to analyze my data. An EFA was appropriate to understand the dimensionality of the SSOS-TR given that I was in the initial stages of instrument design. While I hypothesized that the SSOS–TR had three factors, I did not impose this structure a priori. Rather, I wanted to analyze if three was the "smallest number of interpretable factors needed to explain the correlations among a set of items" (McCoach et al., 2013, p. 111) and running an EFA would allow me to explore this hypothesis.

I also elected to run a reliability analysis on my data. I defined reliability in keeping with DeVellis' (2003) definition of scale reliability as "the proportion of variance" that is "attributable to the true score of the latent variable" (p. 27). I focused on internal consistency reliability to analyze the SSOS-TR scores using Cronbach's alpha (Cronbach, 1951), which is a measure of inter-item consistency (Clifton, 2019). Cronbach's alpha assumes that defined subscales are unidimensional and composed of items that are linearly related to an individual's total score. Cronbach's alpha additionally assumes that item errors do not covary, subscale items are normally distributed, and each unidimensional factor's items have equal factor loadings (Cronbach, 1951). I interpreted the overall SSOS–TR's Cronbach alpha as well as the alpha estimates of explored subscales according to DeVellis' standards of acceptability (2003), which outline that which is "unacceptable (<.60), undesirable (.60< < .65), minimally acceptable (.65< < .70), respectable (.70< < .80), very good (.80< < .90), and unnecessarily high such that one should consider shortening one's scale (.90<)" (Clifton, 2019, p. 2).

DATA ANALYSIS AND RESULTS

Two hundred twelve surveys were exported from Qualtrics. To begin, I screened and cleaned my raw data for potential missing items. Although my survey received 212 responses, I encountered a large number of empty entries. In the downloaded spreadsheet of raw data, 61 responses for the SSOS–TR items were blank. The remaining 151 responses were complete, excluding demographic questions. Of note, this was no longer in adherence to the general guidelines for sample size adequacy and will be discussed as an important limitation in the conclusion of this report. The data set of 151 complete cases was then imported for analysis into RStudio, a web–based program for statistical computation and graphics. The data that support the findings of this study are available from the author upon reasonable request.

EXPLORATORY FACTOR ANALYSIS CRITERIA

I looked first to the Kaiser–Mayer–Olkin (KMO) test as computed from the raw correlation matrix, which ranges from 0 to 1. The KMO is an index for analyzing the sum of the partial correlations relative to the sum of the correlations (McCoach et al., 2013). The KMO for my data was 0.91, which is above the .90 cut off for what would be considered a "marvelous" KMO in deciding whether an EFA is appropriate (i.e., the factor analysis will produce factors that are reliable and distinct; Kaiser & Rice, 1974). Similarly, the Bartlett Test of Sphericity endorsed the use of an EFA. Bartlett's Test proposes a null hypothesis that the correlation matrix computed from raw data would be equivalent to an identity matrix with ones on the diagonals and zeros on the off–diagonals. Rejecting this null hypothesis would mean that the data's correlation matrix is statistically significantly different from an identity matrix, which was the case with my data. The 2 value was high at 2038.21 with 171 df and a p–value <.001, indicating that an EFA would be appropriate.

In contrast were the results of the Measure of Sampling Adequacy (MSA), which is an indicator of the strength of an item's correlation with other items in the correlation matrix

(McCoach et al., 2013). The MSA did not fully endorse the appropriateness for an EFA. Although items all had MSAs above .70 and off–diagonals on the anti–image matrix were small, the diagonals on the anti–image matrix were all below .50, ranging from .23 to .43.

Bolstered by the support of the KMO and the Bartlett's Test, I did ultimately decide to proceed despite this concerning MSA and an inadequate sample size. Collecting more responses prior to completing my analyses would have been preferrable; however, I conducted this research as coursework within a doctoral program of study during the spring semester of 2022 and, thus, was under strict time constraints. For these reasons, I proceeded with caution when interpreting results.

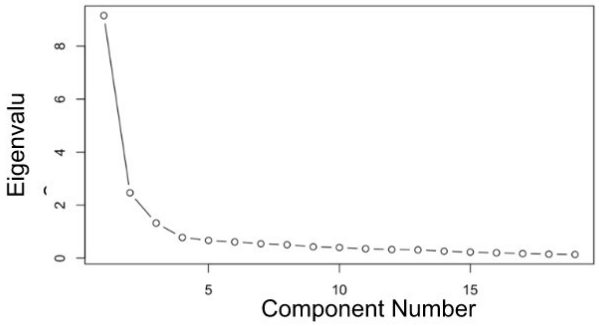
FACTOR EXTRACTION PROCESS

Next, I ensured that the means of the responses for each item fell within the scale options (i.e., 1–6), that the standard deviations demonstrated adequate variability (i.e., were not equal to 0), and that each item's histogram was mostly normally distributed. All of these criteria were met. Although there was indication of skewness on some of the item histograms, none were flagged as bimodal. Nothing stood out as an outlier in the data summaries and no coding errors were identified when examining item ranges. Upon examining inter-item correlations, I did not find any issues regarding low item correlations nearing zero or above 0.90. All the item correlations were positive, confirming that reverse coding would not be necessary moving forward in the EFA.

The first criterion I used to extract factors was Kaiser's criterion (Kaiser, 1958), which explores eigenvalues (i.e., the roots in a correlation matrix) by running a principal components analysis. Kaiser's criterion suggests that all factors with eigenvalues greater than or equal to 1.0 be retained, as these factors are reasoned to account for more variance than a single item (McCoach et al., 2013). The output for my data produced three factors with eigenvalues greater than 1.0. The screen test is a visual form of analysis where eigenvalues on the y–axis are plotted against factor numbers on the x–axis. The plot is then analyzed by looking at the point at which the curve straightens out, colloquially referred to as the "elbow," and using the x–axis label just prior to the elbow as the number of factors to extract (McCoach et al., 2013). My judgment was that the recommended extraction from the scree plot (see Figure 1) was three factors.

Figure 1

Scree Plot from the EFA indicating Three Factors for the SSOS-TR



Another approach is to look to the proportion of variance explained by each factor in a preliminary principal components analysis. The biggest drop in explained variance was between one (48% of the variance) and two (13% of the variance), suggesting a one factor extraction.

As a departure from the non–statistical methods above, parallel analysis is a statistical method of factor extraction. Average eigenvalues are calculated from random data (i.e., a no-factor dataset) and compared to the eigenvalues in the actual dataset. When sample eigenvalues are greater than the random data average eigenvalues, the conclusion is that there exists a 'true' factor (Fabrigar & Wegener, 2012). With my dataset, the parallel analysis suggested the extraction of three factors. Another statistical approach to factor extraction is the Very Simple Structure (VSS) analysis, which provides the optimal number of factors to extract in correspondence with differing levels of complexity. The VSS complexity was highest (i.e., .95) with two factors.

The last statistical approach I explored was Velicer's minimum average partial (MAP) procedure. Velicer's MAP partials out common variance by extracting one component at a time, calculating the average squared partial correlations, creating a new residual matrix, and repeating the process until the smallest squared partial correlation is calculated and only unique variance remains (Velicer, 1976). I utilized Velicer's MAP procedure in accordance with the revision made by Velicer et al. (2000) to use average partial correlations raised to the fourth power instead of squared. With my data, the Velicer MAP achieved a minimum with three factors.

FACTOR EXTRACTION PROCESSES

In summary, the above recommendations for number of extracted factors were one factor (endorsed by the preliminary principal components analysis), two factors (endorsed by the VSS procedure), and three factors (endorsed by Kaiser's criterion, the scree plot elbow method, the parallel analysis procedure, and the Velicer MAP procedure). While the overwhelming endorsement was for three factors, I decided to be thorough by running separate EFAs using one–factor, two–factor, and three–factor models in order to ultimately

decide. For my models, I used an oblimin oblique rotation, as the factors would be correlated given that constructs composing self–determination are related to one another (McCoach et al., 2013).

ONE–FACTOR EXTRACTION MODEL

The one–factor EFA produced five communalities (h2) below .40; given that communalities are interpreted as the amount of variance in each item that is explained by the factor, having few items with low communalities indicates that the majority of the variance in the items is explained by this one factor. Items with low communalities were Items 1, 3, 6, 11, and 13. I flagged these items to attend to when investigating pattern coefficients to see whether they also ended up with low loadings. The output's "fit based upon off diagonal" of .93 was below the .95 cutoff, indicating that the one–factor model is statistically speaking not a good–fitting model.

The one-factor EFA model's sum of squares (SS) loading was 8.63, although a factor eigenvalue above one is to be expected in a one–factor model. At the item level, all items had factor loadings above .40, which is "the most popular cutoff for 'good' factor loadings onto a primary factor" and "it is recommended that satisfactory variables load onto their primary factor above 0.40" (Howard, 2016; p. 55). The factor loadings ranged from .513 to .778; thus, no items in the one–factor model were candidates for deletion based on this criterion. Next, I examined the residuals in the one–factor EFA model. One hundred eleven residuals were greater than the .05 cutoff, which indicated that 65% of items had large residuals. This proportion is above the 50% cutoff for concern. The mean residual was .12, which is above the .08-.10 cutoff for concern. By contrast, the histogram of residuals appeared approximately normally distributed with no outliers. Overall, a one–factor model was not a statistically good fitting model, nor is it conceptually meaningful considering that Causal Agency Theory defines three essential characteristics of self–determined individuals.

TWO–FACTOR EXTRACTION MODEL

The two–factor EFA produced no communalities below .40; all the variance in the items was explained by these two factors and thus, they are satisfactory indicators. The fit based upon off diagonal of .98 was above the .95 cutoff, indicating that the two–factor model is a statistically good–fitting model and a better fitting model than the one–factor model. Also, both of the two-factor EFA model's SS loadings were above one (6.44, 4.35).

All primary factor loadings for the two–factor EFA were above .40, ranging from .42 to .86. However, two of the items had loadings above 0.30 on more than one factor. McCoach et al. (2013) "recommend eliminating any item that has a loading of 0.30 or higher on more than one factor" (p. 143); therefore, in a two–factor EFA, items 16 and 17 would be potential candidates for elimination. Next, I examined the residuals. There were more large residuals in this two–factor model than in the one–factor model, as 141 residuals were greater than the .05 cutoff. Eighty-two percent of the residuals in the two-factor model were large, which is a proportion notably above the 50% cutoff for concern. The

mean residual of .19 was above the .08-.10 cutoff, meaning that a model with more factors might be preferred. Although the histogram of residuals appeared approximately normally distributed, there was some indication of multiple peaks. Therefore, the overall residual output in the two–factor model was of concern.

THREE–FACTOR EXTRACTION MODEL

The three–factor EFA produced no communalities below .40. Also, all of the three–factor EFA model's SS loadings were above one (4.33, 4.16, and 3.39, respectively). Its fit based upon off diagonal of .99 was above the .95 cutoff, indicating that the three–factor model was a statistically good–fitting model and also a better fitting model than the one– and two–factor models on this index. The three–factor model was what I hypothesized during my scale construction and content validation phases, so its primacy as the best fitting model was exciting.

The three–factor EFA had one item with a primary factor loading below than 0.40. This was item 15 (i.e., "I have my students identify the supports they need") and its primary factor loading was .371. Eight of the items had loadings above 0.30 on more than one factor. Next, I examined the residuals in the three–factor EFA model. There were 165 large residuals. Ninety-six percent of the residuals in the three–factor model were large, which is a proportion well above the 50% cutoff. Additionally, the mean residual was .22, which exceeded the .08-.10 cutoff. However, the histogram of residuals did appear approximately normally distributed.

FACTOR EXTRACTION DECISION

I made the decision to select the three–factor model for extraction based on statistical evidence and theory. The main evidence for this decision was that the majority of methods suggested a three–factor extraction. Four out of the six methods I employed (i.e., Kaiser's criterion, scree plot elbow method, parallel analysis, and MAP analysis) all suggested three factors. MAP analysis is largely considered the best method with the next best method being parallel analysis, as both of these are statistical in nature and therefore less subjective. That being the case, having both of the best statistical methods for extraction suggest three factors, in addition to having two other methods also in agreement, makes a strong case for my decision. Also, the three–factor had the best 'fit based upon off–diagonal' of all the three models at .99.

Aside from statistical evidence, the three–factor model conceptually makes the most sense. A three–factor model is in alignment with the Causal Agency Theory, which identifies three essential characteristics of self–determined action. When I compared the item clusters of the two–factor model to the item clusters of the three–factor model, the three–factor model clusters made more conceptual sense in their groupings. Interestingly, both the two– and three–factor models had the exact same items grouped in Factor 2: item 1 ("I ask my students what classroom activities they like"), item 2 ("I provide time for students to think about their goals"), item 3 ("I create opportunities for students to explore their interests"), item 11 ("I teach students to make choices they feel good about"),

item 12 ("I assist my students to align their goals with their interests"), and item 19 ("I provide opportunities for my students to make their own choices"). With that factor's items grouped equivalently across the two– and three–factor models, the other factor containing all remaining items in the two–factor model did not make conceptual sense. However, in the three–factor model, the remaining items were clustered in a way that made conceptual sense when analyzing the individual items.

The units of factor loadings in an EFA represent each item's association with the factor(s). While some items were only associated with a single factor, other items were associated with more than one factor (i.e., double or triple loadings). Given that constructs composing self–determination are related to one another, the factors in this EFA would be correlated. Therefore, an oblique oblimin rotation was the most appropriate rotation technique in this case, as it allows for intercorrelations among the factors (Fabrigar & Wegener, 2012). The factor pattern matrix from the selected three–factor EFA is below in Table 1 with conceptual labels of the subscales.

Table 1

Factor Pattern Matrix from for a Three-Factor Extraction of the SSOS-TR

Note. N=151. The exploratory factor analysis extraction method was principal axis factoring with an oblimin oblique rotation. Factor loadings above .40 are in bold. Factor pattern matrix sorted by size using the fa.sort() and fa.organize() functions in RStudio for ease of comprehension.

	SSOS-TR item	Factor loading		
		1	2	3
Factor 1: Acting on Goals				
Q10	I have my students identify paths to their goals.	**0.892**		
Q04	I teach my students how to monitor progress towards their chosen goal.	**0.714**	0.156	
Q08	I provide opportunities for my students to make their own plans.	**0.668**		0.122
Q13	I give time for my students to reflect on their skills.	**0.628**	-0.130	0.260
Q14	I encourage my students to find their own ways to meet goals.	**0.552**		0.384
Q09	I schedule time for my students to work on their goals.	**0.411**	0.264	0.272
Q05	I provide opportunities for my students to take action.	**0.409**	0.229	0.306
Q15	I have my students identify the supports they need.	0.371	0.189	0.342
Factor 2: Deciding on Actions				

	SSOS-TR item	Factor loading		
		1	2	3
Q19	I provide opportunities for my students to make their own choices.		**0.826**	0.161
Q01	I ask my students what classroom activities they like.		**0.789**	
Q03	I create opportunities for students to explore their interests.		**0.766**	
Q11	I teach students to make choices they feel good about.		**0.721**	0.236
Q12	I assist my students to align their goals with their interests.	0.320	**0.632**	
Q02	I provide time for students to think about their goals.	**0.460**	**0.587**	-0.208
Factor 3: Believing in Self				
Q18	I teach my students that meeting a goal requires effort.	0.168		**0.796**
Q17	I provide opportunities for students to practice self-regulation.	-0.122	0.387	**0.678**
Q07	I give time for my students to confront obstacles.		0.253	**0.642**
Q06	I teach my students that there is more than one path towards a goal.	**0.414**	-0.191	**0.553**
Q16	I provide opportunities for my students to work towards goals.	0.261	0.300	**0.447**

ITEM RETENTION DESCRIPTION

Item 15 had a primary factor loading of .371 and was flagged as a potential candidate for deletion given that this value was below the .40 cutoff. However, .371 is not very far off from .40 and, using another set of heuristics, it would not necessarily be flagged for deletion. Eight of the items in my selected three–factor model had loadings above 0.30 on more than one factor, as seen in the factor pattern matrix in Table 1. While these double and triple loadings were not ideal, I did not recommend any of these items for deletion. Seven of these eight items had primary factor loadings above .40, which serve as protective factors against item deletion. More importantly, I did not delete these items given my inadequate sample size and the caution with which I interpreted results from the EFA. As previously mentioned, the Measure of Sampling Adequacy (MSA) analysis indicated that an EFA was not fully appropriate. Therefore, it would not be wise to delete items from a piloted instrument with factors extracted from a potentially inappropriate exploratory factor analysis. All original 19 items on the SSOS-TR were retained. See Appendix for the final clean copy of the SSOS-TR information sheet and instrument.

SUBSCALES

SUBSCALE DESCRIPTIONS AND INTERPRETATIONS

Subscale 1, "Acting on Goals," contains items relating to how special educators perceive they provide opportunities for their students labeled with disabilities to be agents in their own lives. The items speak to how teachers perceive they facilitate students' abilities to pursue their goals through individual actions, including identifying how to achieve the goal, how to plan for achieving the goal, how to secure supports towards goal attainment, and how to measure goal progress. A high score on the Acting on Goals subscale means that the special educator perceives that they provide frequent, meaningful, and intentional opportunities for their students to be the agentic selves in their lives. High scorers perceive that they schedule time for students to plan, carry out, and monitor their actions towards their individual goals and that they provide students with the encouragement, instruction, and supports to do so. High scorers on the scale tend to strongly agree with items. A low score on the Acting on Goals subscale means that the special educator provides limited opportunities for their students to act as agentic selves in their own lives, likely planning pathways towards goal achievement for the students, offering teacher–identified and selected supports, and monitoring the students' progress for them. Low scorers on the scale tend to strongly disagree with items.

Factor 2, "Deciding on Actions," contains items that relate to how special educators perceive they provide opportunities for SWD to be the center of decision–making processes for their individualized actions based on their own interests. The items capture educator self–perceptions on the degree to which students' preferences drive decisions necessary to achieve goals, the degree to which decisions are the students' own, and the degree to which these decisions are ones that students feel good about making. A high score on the Deciding on Actions subscale indicates that the special educator has a minimized role on students' choices and that decisions are led by students as guided by the students' own interests. High scorers on the scale tend to strongly agree with items. A low score on the Deciding on Actions subscale indicates that the special educator makes decisions for students based on what they think the students would prefer and that the educator chooses goals they believe to be in the students' best interest. Low scorers on the scale tend to strongly disagree with items.

Factor 3, "Believing in Self," contains items that relate to how special educators perceive they provide opportunities for SWD to recognize that they have the capacity to develop skills and knowledge that will facilitate their goal attainment. The items capture how the educators foster the students' awareness that effort, obstacles, and forking paths are normal parts of the journey towards reaching goals and that they can overcome barriers and/or identify alternative routes through commitment, effort, and persistence. A high score on the Believing in Self subscale indicates that the special educator works to develop students' mindsets on how to persevere when faced with challenges. High scorers on the scale tend to strongly agree with items. A low score on the Believing in Self subscale indicates that the special educator devotes little time and attention towards fostering students' awareness of their own skills and have a more rigid, pass/fail approach to goal work. Low scorers might also be educators who set goals for students below their zone of proximal development (i.e., goals in areas where the student is already functioning independently) and generally tend to disagree with items.

These three names and verbal descriptions of subscales align well with the three essential characteristics of Causal Agency Theory. This finding affirms that my item generation and content validation processes prior to piloting the instrument were adequate. Recent communication with one of my expert reviewers alerted me to the fact that the three characteristics have been assigned more practitioner-friendly labels of Decide (formally Volitional Action), Act (formally Agentic Action), and Believe (formally Action–Control Beliefs; Bojanek et al., 2021). I drew from this knowledge when considering the clusters in my EFA but felt it useful to slightly expand upon the names in the case of the SSOS–TR instrument.

SUBSCALE INTERNAL CONSISTENCY RELIABILITIES

With the three–factor decision made, I ran the reliability analysis. The overall mean for the whole SSOS–TR instrument was 4.67 with a standard deviation of .76. I then ran the codes in order to obtain each subscale's Cronbach's alpha values, average inter–item correlations (IIC), and the standard deviations of these IICs for the subscales in Table 2.

Table 2

Reliability Analyses for Subscales 1-3 on SSOS-TR Instrument

	Subscale Name	# Items	Items	Subscale Alpha	Mean of IIC	SD of IIC
1	Acting on Goals	8	4, 5, 8-10, 13-15	.91 (.88, .93)	.60	.16
2	Deciding on Actions	6	1-3, 11, 12, 19	.90 (.87, .92)	.66	.16
3	Believing in Self	5	6, 7, 16-18	.87 (.83, .90)	.66	.19

Note. N=151. "SD" = Standard deviation. "Mean of IIC" = mean of the inter–item correlations for each scale. "SD of IIC" = standard deviation of the inter–item correlations for each scale.

The first subscale for Acting on Goals yielded a high alpha of 0.91 and a narrow 95% confidence interval of (0.88, 0.93). Although an alpha of .91 is above the .90 cutoff that indicates a subscale could potentially be shortened, I did not make any recommendations for deletions for the aforementioned reasons of inadequate sample size and failure to meet all criteria for determining that an EFA was appropriate. The second subscale for Deciding on Actions yielded an alpha of 0.90 with a narrow 95% confidence interval of

(0.87, 0.92); this alpha at 0.90 would be considered right on the line between very good and unnecessarily high in terms of inter–item consistency. The third subscale for Believing in Self yielded a very good alpha of 0.87 and a narrow 95% confidence interval of (0.83, 0.90).

The mean of the inter–item correlations for all subscales were all non–zero and below .90, which is a positive finding signifying that no single item's deletion would have significantly improved its subscale's alpha. Of note, a higher alpha would not be desired for Acting on Goals and Deciding on Actions given their already high to unnecessarily high Cronbach's alpha values. All corrected item–total correlations for items on each of the three subscales were similar to each other as desired and well above the .30 cutoff of concern.

Overall, the three subscale alpha coefficients were very good to high (.91, .90, and .87, respectively). Therefore, there is evidence that subscales on the SSOS–TR are internally consistent. The three subscales comprising the SSOS-TR had positive correlations that were moderate in strength, ranging from r=.32 to r=.49 (i.e., non-zero and below .90). These are good findings, as high correlations between factors (i.e., near or above .80) can signal issues with discriminant validity (Brown, 2015).

SUBSCALE DESCRIPTIVE STATISTICS

The subscale means and standard deviations are summarized in Table 3 below. All subscale ranges were as expected (i.e., from 1-6). While Factor 1 Acting on Goals and Factor 3 Believing in Self had approximately normally distributed histograms, the histogram for Factor 2 Deciding on Actions had some evidence of negative skewness.

Table 3
Scale Means and Standard Deviations for Each of the Subscales on SSOS–TR Instrument

	Subscale Name	Subscale Mean	Subscale SD
1	Acting on Goals	4.38	1.14
2	Deciding on Actions	4.81	1.07
3	Believing in Self	4.97	1.13

Note. N=151. SD= standard deviation.

CONCLUSIONS & IMPLICATIONS

Overall, the three–factor model that was endorsed by the majority of EFA extraction criteria was aligned with my hypothesized model, which was informed by the literature on Causal Agency Theory. This is a promising finding and provides some evidence for construct validity of the SSOS–TR. Although five of my written items did not end up clustering exactly as they were intended in the creation stage, fourteen of the items (i.e., 74%) did cluster together as hypothesized, which is promising. This high confirmation of cluster hypotheses is in large part due to the influence of reviewers. Recruiting and gathering feedback from content experts is not a step in the design process for which there are many clear and structured guidelines. In my experience, it was helpful to first send individual emails asking if the expert would be available to provide feedback and including a brief description of my personal research interests. I then provided individualized content validation forms to willing experts only after they agreed to volunteer their time. Another suggestion is to provide content experts with a specific date by which to return their feedback. More broadly, I recommend adopting the mindset that this expert feedback will lead to a better product, however different from one's original line of thinking. In my case, vulnerability to share drafted work and willingness to acknowledge errors to remediate potential harms to vulnerable, culturally diverse, and/or marginalized populations made for a tool in which I was more confident would benefit all students.

Another implication from my results can be found in the subscale means. My three subscales (i.e., Acting on Goals, Deciding on Actions, and Believing in Self) had item means of 4.38, 4.81, and 4.97. Given that the scale range was from one to six with no neutral middle option, these are all high means. New data would be needed to draw conclusions from subscale means of SSOS–TR scores, as these pilot data were collected during an instrument development process and are limited in their interpretation to factor and reliability analyses. With new data, implications could be made regarding the extent to which special educators perceive they are affording opportunities for SWD to become self–determined and, thus, act as causal agents in their own lives. High scores on items would imply that educators perceive they foster students' abilities to (1) decide on actions, (2) act on goals, and (3) believe in their abilities as causal agents in their own lives.

LIMITATIONS

There were several limitations that should be considered when evaluating the findings from this SSOS–TR instrument pilot. Most notably, the sample size was not adequate and fell below the recommendation for a 10:1 ratio of respondents to items (Boateng et al., 2018). With this logic, for a 19–item survey, the minimum acceptable number of respondents would have been 190; however, I only obtained a sample of 151 complete cases after the initial 212 respondent entries had been screened and cleaned for missingness. The sample size also falls below the general suggestion of securing an appropriate sample size in the 200-300 range in order to run an EFA (Boateng et al., 2018). The impact of this small sample size was that an EFA was not deemed fully appropriate by all of the criteria. For instance, the Measure of Sampling Adequacy (MSA) indicated that an EFA was not appropriate. As indicated previously, additional response

collection did not occur because this research was conducted as part of a doctoral course that was limited to one semester. I proceeded with the EFA because the sample size was sufficient for the software to produce output and because the Kaiser–Mayer–Olkin (KMO) test and the Bartlett Test of Sphericity both endorsed the use of an EFA with my data.

The 151 complete responses did not come from a random sample but rather came from non–probability, convenience sample using a snowball sampling outreach strategy and was thus not a representative sample of special educators. My colleagues who assisted in the snowball sampling were similar to me in terms of years of experience, meaning that the sample likely overrepresented the attitudes of more veteran teachers.

Prior to running the pilot, I only amassed the opinions of seven experts. Perhaps the SSOS–TR would have been composed of different or differently–worded items had there been more collective input from a larger sample of experts in the field. Also, I alone generated the SSOS–TR items on the initial tool sent out to experts for review without seeking input from special educators in focus groups or through cognitive interviews. Cognitive interviewing procedures would "add important qualitative information to ensure that each item on the survey is working as it should" (Ouimet et al., 2004; p. 234) and would enhance the content validity argument for the SSOS–TR.

Another limitation is with regards to the assumption that subscale items had a normal distribution. When screening my data, I found some indication of negative skewness in a few of the item histograms and, thus, a violation of the assumption underlying the use of Cronbach's alpha. Cronbach's alpha also assumes that items for each factor have equal factor loadings, which was not the case on the SSOS–TR. To test whether or not loadings could be constrained as equal at the subscale level would require a Confirmatory Factor Analysis. Therefore, interpreting subscale–level Cronbach's alpha values for the SSOS–TR should be done with caution.

SUGGESTIONS FOR FUTURE RESEARCH

If the SSOS–TR were rerun with an adequate sample size of at least 190 to achieve the minimum 10:1 ratio of respondents to items (Boateng et al., 2018), an EFA would be considered appropriate. The Measure of Sampling Adequacy (MSA) criterion with a sample of this size would also likely endorse the appropriateness of an EFA. Additionally, if reviewed by more experts, the SSOS–TR could make important contributions to the field of self–determination research specifically and to the field of special education more generally. An interesting question would be to compare these findings from the SSOS–TR to ratings of teacher behaviors measured through direct observation. Are educators accurate reporters of their own teaching behaviors?

I originally set out to design this instrument for students labeled with disabilities to measure their perceptions of the degree to which they are afforded opportunities by their teachers to become self–determined; unfortunately, given the IRB constraints under which the SSOS–TR was piloted, this was not possible. Moving forward, the SSOS–TR can serve as an important complement to a parallel student report version. Students labeled with disabilities are the experts on their own lives, so comparing the results of

the teacher and student versions would potentially lead to interesting findings on items that are discrepant. For instance, if teachers perceive that they are providing students with opportunities to make their own choices (i.e., item 19), but the students themselves perceive that they are not afforded the opportunity to make their own choices, what does this discrepancy in perceptions mean? How can exposing such discrepancies improve teacher pre– and in–service training and professional development?

Another area for future research would be to analyze findings of the SSOS–TR and, ideally, the parallel student version disaggregated by disability category to investigate whether opportunities to become self–determined are proportionally provided across disability categories. If not, why? Disaggregating by age of students would also be interesting. Are high school students labeled with disabilities afforded more self–determination opportunities than are elementary students? If so, why? Is having a family member labeled with a disability associated with higher teacher perceptions of the opportunities they afford to their own students labeled with disabilities? Answers to all of these questions would lead to important findings that could, ultimately, serve to inform pre-service teacher preparation programs and ongoing professional development programs. If differences emerge, for example, between disability categories and/or between age groups of students, these could be redressed through targeted interventions and supports for educators so that opportunities to become self–determined are afforded equitably to all students with disability labels.

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