Inclusion

Structural Validity Evidence for the TAGG-Alternate Professional Version for Individuals with Extensive Support Needs in Employment
--Manuscript Draft--

Structural Validity Evidence for the *TAGG-Alternate Professional Version* to Support

Individuals with Significant Needs in Employment

Abstract

Employment outcomes have long been emphasized as a primary transition outcome for individuals with extensive support needs. To develop appropriate annual IEP goals for transition, appropriate transition assessments must be administered to guide the process (Prince et al., 2014). As such, transition assessment is a required component of the Individual Education Program according to IDEA legislation. Unfortunately, very few appropriate formal transition assessments, including validity and reliability evidence, currently exist for individuals with extensive support needs (Deardorff et al., 2020). To fill this need, the *Transition Assessment and Goal Generator – Alternate* (*TAGG-A*) was created. The purpose of this manuscript is to report on validity evidence related to the structure of the professional version of the assessment, the *TAGG-A-P*, as a necessary part of the larger project. The alignment of the resulting constructs with employment outcomes is discussed.

Structural Validity Evidence for the *TAGG-Alternate Professional Version* for Individuals

with Extensive Support Needs in Employment

The year 2021 marked 45 years since the passage of PL-94-142, the initial special education federal law guaranteeing the right to a free and public education to all students with disabilities. Arguably, many advances within the field of special education have occurred since its passage; however, more must be done to support students with disabilities in their successful transition to postsecondary life, particularly for those with extensive support needs. Despite achieving lower postsecondary outcomes than peers with disabilities (Maulik et al., 2011), data show youth with extensive support needs are the least engaged in postsecondary transition areas of education or employment after high school compared to their peers (Lipscomb et al., 2017).

Access to employment and the financial freedom associated with full-time employment remains a significant barrier for individuals with extensive support needs who wish to live independently. When examining postsecondary employment, 2020 data reflect higher rates of unemployment for individuals with a disability (12.6%) compared to those without a disability (7.9%) across all educational attainment groups (i.e., high school diploma, college education, advanced degree), and higher rates of part-time employment (29%) among those with a disability versus individuals without a disability (16%; Bureau of Labor Statistics, 2021). In 2017, a comprehensive survey of over 20,000 adults with an intellectual or developmental disability revealed only 14.8% of respondents held paid employment, and of those paid, only 4.0% were considered to be competitively employed (Hiersteiner et al., 2017). These outcomes highlight the need to identify barriers to successful postsecondary employment and targeted, research-identified interventions in necessary skills during the crucial transition years in educational settings needed to overcome those barriers.

Role of Formal Transition Assessment to Increase Postschool Outcomes

Achieving the goal of increasing positive postsecondary outcomes for youth with extensive support needs is no small feat. One essential step in this process is the utilization of high-quality, appropriate transition assessments by educational professionals designed for this purpose. The history of transition assessments is rooted in federal mandates surrounding transition planning, dating back to 1990. It was at this time that first mention of a required transition plan was included in federal law (Individuals with Disabilities Education Act [IDEA], 1990). Since then, several amendments to IDEA have occurred (1997; 2004) and currently what is required for transition planning includes:

(a) measurable postsecondary goals based upon age-appropriate transition assessments related to training, education, employment and, where appropriate, independent living skills; (b) transition services, including course of study, needed to assist the child in reaching those goals; and (c) a statement that the child has been informed of the child's rights under Part B, if any, that will transfer to the child on reaching the age of majority beginning no later than one year before the child reaches the age of majority (20 U.S.C. 141 (d)(1)(A)(i)(VIII)).

Transition planning is to begin no later than age 16 (IDEA, 2004); however, the majority of states and U.S. territories choose to begin earlier, with 14 being the most common age (Suk et al., 2020).

Specific to transition assessment, "age-appropriate transition assessments" are not clearly defined in IDEA (2004) beyond their relation to education/training, employment, or independent living skills. Research has advocated for meaningful assessment to drive the transition planning process and resulting services (Neubert & Leconte, 2013), but evidence from teacher reports

(Deardorff et al., 2020) and litigation (Prince et al., 2014) shows implementation of this recommendation remains inconsistent, particularly for students having more extensive support needs. As an example, there has been much ambiguity about what qualifies as an "appropriate" transition assessment. Special educators have been left to determine what this means with little guidance or advice from federal legislation, particularly if their district does not designate approved transition assessments (Carter et al., 2014). The result is that assessments used for transition planning with individuals having extensive support needs are often not designed for transition planning purposes (Deardorff et al., 2020).

Based on continued litigation and court rulings, Prince et al. (2014) outlined four essential recommendations relevant to postsecondary transition assessment and its use in IEP planning. First, Prince et al. (2014) recommended that *multiple* age-appropriate transition assessments should inform postsecondary goals and should not solely depend on informal measures. IDEA legislation clearly indicated transition assessments (plural) be used (20 U.S.C. 141 (d)(1)(A)(i)(VIII)) and thus, no transition plan should be based on any one assessment (Martin et al., 2020). As such, *formal* assessment of transition-based skills should be an essential component of a transition assessment battery. Formal assessments are defined as having ample reliability and validity evidence, ensuring the assessment is psychometrically sound, and providing some assurance the assessment is ethically appropriate for its intended use (McGrath, 2011). These formal assessments can be contrasted with informal transition assessments, often based upon checklists or interviews designed to elicit student interests and strengths, most of which are created by teachers (Thoma et al., 2009). Second, Prince et al. (2014) highlighted the importance of transition plans using practical goals leading to the transition into life after school reflective of a student's skills, interests, and specific needs. Third, student participation should be

maximized—including both attendance and participation in the transition planning process. Lastly, Prince et al. (2014) recommended transition services be detailed in how goals will be achieved, and who will carry out the responsibilities of supporting goal development.

Although these areas of critical importance regarding transition planning are applicable to all youth with disabilities, for students with more extensive support needs it becomes even more relevant. Though recommendations for transition plans, student participation, and details of transition services can be developed for students with extensive support needs, teachers have limited choice in the availability, quality, and accessibility of transition assessments (Martin & McConnell, 2016) designed for this population.

Necessity of a Formal Transition Assessment for Students with Extensive Support Needs

As highlighted above, for students with more extensive support needs, there are few transition assessments of sufficient quality with adequate validity or reliability evidence (Deardorff et al., 2020). Going one step further, there are no current formal transition assessments for this population that directly inform the development of Indicator-13 compliant transition goals. In essence, this translates into saying there are currently no psychometrically sound transition assessments that are specifically written for students with extensive support needs. Without such sound assessments, teachers are not able to fulfill the recommendations by Prince et al. (2014), and ultimately not able to develop and implement appropriate transition planning as outlined by IDEA ((20 U.S.C. 141 (d)(1)(A)(i)(VIII)).

The lack of formal transition assessment options for students with extensive support needs may be due to the difficulties in their design for this population. These challenges can be attributed to many different factors, such as mild communication deficits (Kasari et al., 2013) all the way to behavior and accommodations rendering the assessment invalid (Berry-Kravis et al.,

2006). Other times individuals with extensive support needs have cognitive limitations resulting in difficulty understanding or answering assessment questions correctly (Szarko et al., 2013). Due to such limitations, assessment developers must be knowledgeable of this population to address assessment concerns.

To improve the transition outcomes of this population, our research team engaged in a multi-step project to design and collect validity evidence for a new transition assessment, the *Transition Assessment and Goal Generator-Alternate (TAGG-A)*, for students with extensive support needs taught to alternate academic standards that takes into account some of the difficulties commonly seen in both designing and administering assessments for this population (Hall et al., 2012). As this population has been historically underserved in relation to transition assessment (Martin & McConnell, 2016), careful consideration and attention to detail was of critical concern for the research team.

Although the *TAGG-A* will serve as a robust assessment with three versions (i.e., professional, student, and family) once fully developed, the current context discussed is specific to the Professional version only (*TAGG-A-P*), which is a rating scale completed by the professional without the student needing to be present. For the purpose of this study, the term "professional" refers to a school-based employee who best knows the student with extensive support needs and is capable of accurately answering questions pertaining to the behavior and skills of individual students. The most common professionals to participate included classroom special education teachers and district level transition coordinators. Before describing the purpose of this particular study to gather necessary validity evidence as a portion of the larger project, we will briefly describe the steps previously taken to design and develop the *TAGG-A-P*,

including construct and item development, pilot testing, and initial validation activities in Field Test 1.

Construct and Item Development

Prior to work done in the present study, development of the *TAGG-A-P* underwent several stages, briefly described here. *TAGG-A-P* constructs were identified, organized, and revised over several iterations prior to the present study, including: (1) initial development of proposed constructs and items (see McConnell et al., 2021, for additional details); (2) pilot testing; and (3) Field Test 1 (see Sinclair et al., 2021, for additional details). These iterative development stages represent an evolving early understanding of the potential factors to be measured by the *TAGG-A-P*. It should be noted that during the early stages of the assessment development process, it is not uncommon for factors to be reorganized or renamed as more information is gathered. When this happens, it is important to understand how the factors of an assessment link back to the initial constructs. To provide context for the description of the factor changes resulting from the present analyses and described later in the discussion section, each of these early stages will be briefly summarized in the following section.

Initial Development and Pilot Test

Initial construct development began with an in-depth literature review for the purpose of identifying the Skills, Behaviors, Expectations, and Experiences (SBEEs) associated with positive employment, further education, and independent living outcomes for students with extensive support needs following high school (McConnell et al., 2021). The resulting SBEEs were organized into ten constructs by the researchers and assessment items for each SBEE were drafted. The constructs and assessment items were reviewed by a panel of 10 experts in special education with expertise related to transition skills and services for youth with extensive support

needs. Though revisions were made to specific items based on feedback from the reviewers, no changes to the constructs were deemed necessary by the expert panel. This resulted in 103 items asking about specific student skills and behaviors observed by professionals that are associated with transition outcomes (McConnell et al., 2021). Table 1 provides a listing of the original 10 constructs.

To obtain additional information on the constructs and items, a pilot test was conducted with 68 transition education professionals having classroom experience teaching students with extensive support needs and writing transition plans for individuals in this population. Pilot test participants reviewed the 103 assessment items via a Qualtrics survey and were asked to provide feedback on the appropriateness of the content and wording of each question. Results were used to modify specific assessment items for usability and applicability as seen in a classroom situation.

Field Test 1

After initially defining *TAGG-A-P* constructs through an in-depth literature review combined with expert review and pilot testing, Field Test 1 was conducted. The purpose of Field Test 1 was to gain further insight into how constructs initially developed could be operationalized by the *TAGG-A-P* items. During Field Test 1, professionals answered the 103 assessment items about each participating student with extensive support needs via Qualtrics survey and collected demographic and educational data, resulting in approximately 45 to 60 minutes of professionals' time for each student about which an assessment was completed. Results of initial Field Test 1 analyses are described in detail separately (see Sinclair et al., 2021); however, to provide the appropriate context for the description of the Field Test 2

analyses and results, a summary of the changes to the initially designed *TAGG-A-P* resulting from Field Test 1 is warranted.

The initial analyses of Field Test 1 data collected from professional educators about students enrolled in the study resulted in both a reduction in the number of items and a reorganization of the item groupings, which will be referred to as factors going forward. Despite the reorganization of the items, a general factor indicating an overarching trait representing the SBEEs included in the *TAGG-A-P* was present. The researchers renamed each of the initial constructs to describe the factors more clearly (Sinclair et al., 2021). To verify the reorganized and renamed factors were appropriate, an expert in assessment development and an expert in students with extensive support needs reviewed the factors and associated items. Factor names were presented to two educators of students with extensive support needs to confirm the renamed groupings matched the content of the included items.

Purpose of the Present Study

The purpose of the present study was to further examine the internal structure of the Professional version of the *Transition Assessment and Goal Generator-Alternate* (*TAGG-A-P*) to determine relations among items and constructs, by analyzing data from Field Test 1 together with a new sample of teacher participants (Field Test 2). Validity evidence related to the structure of the *TAGG-A-P* is vital for it to serve as a formal transition assessment as outlined by Prince et al. (2014). Collecting evidence of appropriate assessment structure serves as the basis for identifying the constructs and their specific components that can be used to write transition goals for students with extensive support needs. Results of this study provide further validity evidence related to the structure of the *TAGG-A-P*, and will result in operational definitions of factors for the *TAGG-A-P*.

Method

Across both FT1 and FT2, procedures were relatively similar in participant recruitment and inclusion and exclusion criteria parameters. Divergence between procedures occurred with actual participants in FT1 and FT2 (i.e., each study sample), in the number of items to which professionals responded, and in assessment distribution procedures, as Qualtrics was used in FT1 and the *TAGG* online platform was used in FT2. As Field Test 2 is part of a larger study, only those procedures directly related to the present study will be described here.

Participant Recruitment

For both field tests, recruitment occurred on multiple levels and via multiple outlets. Both recruitment campaigns included emails to national listservs amounting to over 10,000 educator contacts, targeted social media postings within national organizations in the field of transition and disability-specific advocacy groups supporting individuals with an intellectual or developmental disability, and *TAGG-A* research team member presentations at multiple national conferences to provide education on transition assessment and to recruit participants. Across both FT1 and FT2, several hundred educators completed and collected consent and assent documentation for themselves, their student(s), and associated family members. Recruitment occurred across 30 states and included participants from 26 states.

Inclusion and Exclusion Criteria

Participation parameters in *TAGG-A* remained constant across both field tests. Inclusion criteria were based primarily on student demographics. Students must be: (a) enrolled in high school, (b) estimated to be between the ages of 14-26 with a diagnosed disability considered a "severe cognitive disability", (c) currently covered under IDEA with a qualifying IEP, and (d) participate in the state's alternate assessment program. Exclusion criteria were again based upon

student demographic data: (a) had already completed high school, or (b) were attending a postsecondary program for individuals with an intellectual or developmental disability. The only requirement for the educational/transition professional is they must have worked with the student long enough to be adequately prepared to accurately answer assessment items about the student—approximately 6 months or more.

Study Sample

Field Test 1 and 2 sample demographics are detailed in Table 2. Across both field tests 127 professionals completed the *TAGG-A-P* assessment for 494 youth. Though the professional population was predominately female (90.3% FT1; 89.1% FT2) and White (91.7% FT1; 78.2% FT2), there was a slight increase in racial and ethnic diversity in FT2 professionals. Turning attention to student participants, the overall sample for both field tests was primarily male (54.5% FT1; 63.9% FT2). Racial and ethnic make-up of student participants was also mostly White (59.4% FT1; 69.2% FT2) but presented more diversity than the professionals with representation in smaller percentages for Black youth (18.4% FT1; 12.8% FT2) and LatinX youth (17.6% FT1; 10.4% FT2). The age of students fell into the range of 15-18 years most often for both field tests (52.8% FT1; 56.4% FT2). The most represented disability categories across both field tests were intellectual disability (54.9% FT1; 37.6% FT2) and autism (27% FT1; 30.4% FT2). Most students for whom data were reported were instructed in pull-out special education classrooms in the four core subjects of English (n=200, 90.5% FT1; n=215, 100% FT2), mathematics (n=198, 94.4% FT1; n=215, 87.4% FT2), social studies (n=167, 77.8% FT1; n=145, 87.6% FT2), and science (n=170, 82.4% FT1; n=150, 84.7%). The remainder of the students for whom professional educators left these questions blank were enrolled in the 18–21-year-old program.

Assessment and Distribution

Professionals responded to *TAGG-A-P* items by responding about their observations of specific transition skills or behaviors by the student with extensive support needs about which they were responding over the past year relating to the frequency of behaviors observed (e.g., never, always) or the level of support needed to complete the skill (e.g., only with full support, independently). The assessment was accessed through a secure, online environment. Professionals also gave their own demographic information and collected demographic information on the students about whom they were responding from school records (e.g., ethnicity, IQ test scores).

Field Test 1 was distributed via the University-supported Qualtrics survey platform. For a detailed description of FT1 procedures see Sinclair et al. (2021). Data were collected during Field Test 2 on the Amazon-supported *TAGG* web-based platform (found at https://tagg.ou.edu/tagg/) to best prepare for the assessment to be widely disseminated. In this platform, teachers were provided with unique log-in credentials that, once finalized, will provide them with access to all *TAGG* assessment materials, including *TAGG-HS* materials, for transition planning and IEP development purposes.

In both field tests, professional educators received compensation for participation. Professionals received $30.00 for each completed *TAGG-A-P,* performing other tasks related to the present study, and completing small tasks related to the larger project. These tasks included but were not limited to: (a) recruitment of students with the support of family members; (b) distribution, collection, and return of all consent/assent forms; (c) collection of student demographic information from school records, and (d) maintaining communication with the research team.

Data Analysis Procedures

Data for this study were collected across two independent field tests. Due to school-level restrictions with when data needed to be collected around IEP development and COVID-19 timing restrictions, we were unable to finalize a version of the *TAGG-A-P* instrument before collecting a second dataset. This resulted in the second dataset including only a subset of items from the assessment based on preliminary data analyses (see Sinclair et al., 2021). Moreover, because the needs of students with extensive support needs are very diverse, the factor structure of the entire assessment will be determined by analyzing both datasets together. To do this, a preliminary factor structure was established using FT1 data and was subsequently modified based on the characteristics of FT2 data. In other words, some items were eliminated from consideration across both datasets because the distribution of responses was quite different across the two datasets. Specific analyses will be described in the results section.

Though not standard practice, we made the conscious decision not to submit the *TAGG-A-P* datasets to measurement-invariance tests. The reason for this decision was that though the demographic characteristics with respect to students' disability categories and IQ scores (inclusion criteria for this study) were comparable, students with extensive support needs exhibit a wide variety of individual needs. We could not guarantee the support needs of the students across samples were similar, which would lead to different item and factor scores, not to mention factor loadings, intercepts, and residual variances.

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Results

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General Analysis Procedures

We began our study with a reanalysis of data collected from FT1. To develop a model of the initial structure of the *TAGG-A-P* assessment, we commenced data analysis by using three

general steps. Because many items (*n*=103 items) were initially written to determine the best items assessing student skills, we first reduced the number of items in subsequent analyses by investigating item-level descriptive statistics and correlations between the items and the constructs they were originally designed to assess. We then ran a series of exploratory factor analyses to further investigate relations among items and reduce the pool of potential items for the assessment. Confirmatory factor analyses were then conducted in service of this exploratory purpose to ensure an adequate model to test with data collected in FT2.

After assessing adequate model-data fit, minor modifications were made to the item stems (e.g., changing punctuation for ease in understanding) and qualitative item anchors were modified so that all items exhibited a 5-point Likert-type scale to simplify the rating task for participants across the entirety of the assessment. Data were then collected on the reduced item pool at FT2. Comparisons in response patterns for items across the two datasets were completed to identify items not performing similarly across the two datasets and further reduce the item pool. After eliminating items not performing similarly across the two datasets, a final confirmatory model was assessed using FT1 data and the final model was investigated using confirmatory procedures using FT2 data.

Descriptive and Correlational Analyses of FT1 TAGG-A-P Data

We first investigated item-level descriptive statistics to determine the extent to which items were contributing variance to assessment scores. Specifically, item means and standard deviations were calculated as well as values for skewness and kurtosis. Results of this analysis showed all six items initially designed to assess self-care skills (e.g., using the bathroom appropriately, or using utensils and a cup) showed little variance and were eliminated from

further analyses. Moreover, many items asking questions about students' employment status and responsibilities were removed due to low response numbers.

We then moved to an analysis of correlations between items and constructs they were designed to assess. Because factor analytic techniques are designed to assess underlying latent variables that may influence students' responses to assessment items by modeling the covariance structure of the data collected from each item, those items exhibiting low correlations with the intended factor will not load appropriately if included in a factor analysis. With this idea in mind, and because we initially designed the *TAGG-A-P* with a large pool of items, we began our analysis by investigating the extent to which each of the *TAGG-A-P* items correlated with the construct they were designed to assess. Composite scores for each participant on each of the 10 designed constructs were calculated by adding scores for each of the items designed to assess that construct. Correlations between composite scores and items contributing to composite scores were calculated and items correlating lower with the designed construct were eliminated from further consideration. Because the goal of this step was to eliminate potential assessment items not related as strongly with the theoretical constructs, we privileged items assessing primary skills (SBEEs) included in each construct over those skills less strongly associated with construct definitions, which sometimes resulted in instances when items more highly correlated with a construct were eliminated in favor of items with lower correlations. After a thorough look at all item-factor correlations and the specific content of each item, 56 items were eliminated, leaving a total of 47 items for further analyses.

Structural Analysis of the TAGG-A-P

Field Test 1. We submitted the 47 remaining items in the *TAGG-A-P* dataset collected at FT1 to a series of Exploratory Factor Analyses using maximum likelihood (EFA-ML) estimation

and promax rotation using the PROC FACTOR program in SAS®. Specifically, we investigated

factor solutions ranging from four to ten factors and then compared Akaike Information Criterion

(AIC; Akaike, 1974) and Schwarz's Bayesian Information Criterion (BIC; Schwarz, 1978) for

each solution to determine the optional number of factors (Preacher et al., 2013). Results

suggested that the AIC and BIC values stopped changing drastically with a 6-factor solution,

suggesting that six factors were the best fit to the data. A series of EFA-ML analyses were run to

reduce the pool of items and determine the groups of items best assessing underlying factors.

Across these analyses, eight items exhibited either no loading on any factor or uninterpretable

cross-loadings. Four additional items asked professional educators about services the student

received and were not teachable skills, and one item asked professionals to comment on the

frequency of behaviors exhibited by students in a community setting rather than in school.

Finally, one item loaded negatively onto a factor without being a negatively worded item and

was eliminated. In all, fourteen items were eliminated from further consideration.

  After eliminating this group of items, Confirmatory Factor Analysis using maximum

likelihood (CFA-ML) estimation in the SAS® program PROC CALIS was used to assess model-

data fit. Fit of the 6-factor model to the observed data was less than adequate (χ^2 = 1116.904, df

= 480, $p < .0001$, RMSEA = .075, SRMR = .070, CFI = .870, TLI = .857). An investigation of

asymptotically standardized residuals suggested the existence of two doublet pairs (Landis et al.,

2009; Mulaik, 2009), meaning that two items generally loading on the same factor share residual

variance that cannot be accounted for by the factor. In practice, this means that participants

answer the two paired items in a highly correlated manner, ostensibly interpreting the items so

similarly that they are indistinguishable to the respondent. Two solutions are generally proposed

when doublet pairs are found: fitting a model with correlated residuals or eliminating one of the

offending items in the pair. In this case we chose to fit a model with two correlated errors. Though this solution adds complexity to the model, no clear hierarchy in item content was obvious to suggest which item should be eliminated as has been done in research on previously developed transition assessments (see Hennessey et al., 2017). An investigation of other factor loadings across the assessment suggested that, though significant, two items loading onto factor one exhibited qualitatively lower loadings than all other items loading onto that factor (average loadings of .38 compared to .73) and were subsequently eliminated. These modifications exhibited improved model-data fit ($\chi^2 = 853.995$, df = 417, $p < .0001$, RMSEA = .067, SRMR = .066, CFI = .908, TLI = .898).

　　　To better determine the extent to which all items collected from the *TAGG-A-P* assessment would produce adequate results across multiple administrations of the assessment, we then compared item-level descriptive statistics across FT1 and FT2 datasets. The purpose of this step was to determine items that may be candidates for elimination from the final assessment due to their inability to extract comparable data across samples of participants. Upon comparison of item-level descriptive statistics, three items appeared to be answered by professional educators in quite different ways across the two datasets though the items themselves did not change, suggesting the item responses may be significantly influenced by the specific needs of the students under question. These three items constituted the entirety of Factor 6 in the FT1 analysis. After removing these three items and the concomitant factor from the model of FT1 responses, a CFA-ML was rerun. Results again suggested adequate, and slightly improved, model-data fit ($\chi^2 = 715.788$, df = 338, $p < .0001$, RMSEA = .069, SRMR = .066, CFI = .917, TLI = .907).

Field Test 2. The extent to which the model was reproduced with FT2 data was then investigated, with a couple differences. Most importantly, due to the changes in response scales from a slider scale to a 5-point Likert-type scale, data were treated as ordered categorical in FT2 analyses and were analyzed using the lavaan package in R (version 3.6.3). Diagonally-weighted least squares estimation was employed because this method is more appropriate for ordinally-scaled observed variables (Li, 2016). Applying the model developed from FT1 data to FT2 data in this fashion resulted in a non-positive definite covariance matrix. An examination of item correlations revealed that two items were almost perfectly correlated, suggesting multicollinearity in the data resulted in the non-positive definite matrix. Removal of one of the offending items in FT2 data resulted in acceptable model-data fit (χ^2 = 664.611, df = 312, $p <$ .0001, RMSEA = .068, SRMR = .087, CFI = .985, TLI = .983). The model with the removed item was then applied to FT1 data, and model-data fit was again adequate (χ^2 = 663.935, df = 312, $p <$ .0001, RMSEA = .069, SRMR = .066, CFI = .916, TLI = .905). Factor loadings for all items across both FT1 and FT2 for the final group of items can be found in Table 3.

Factor Correlations and Reliability

After establishing the structure of the assessment across two independent samples, we investigated correlations among the factors across both FT1 and FT2 datasets (Table 4). Though most factor correlations were of similar range, the pattern of correlations, particularly for Factor 2, was markedly different across the two datasets. Whereas most factor correlations across the two datasets were in the moderate to high range (FT1: .591-.810; FT2: .724-.907), correlations with Factor 2 showed a different pattern across the two datasets. Correlations with Factor 2 in FT2 remained in the same range as those for other factors across both datasets (.633-.885), but

FT1 correlations for Factor 2 ranged from .169-.271, which is markedly lower than all other observed factor correlations.

Reliability of the overall 27-item *TAGG-A-P* was acceptable across both datasets (FT1: .938; FT2: .960). Across FT1 data, factor reliability estimates ranged from .865 (Factor 2) to .917 (Factor 1). Across FT2 data, factor reliability estimates ranged from .877 (Factor 4) to .919 (Factor 2). Despite the differences in the *TAGG-A-P* assessment across the two datasets and differences in the correlation pattern with respect to Factor 2, these results show factor scores presented here can provide relatively stable estimates of students' skills and behaviors.

Discussion

Before discussing the results of this specific investigation, it is important to note that this study is part of a larger, multi-year project to create the *Transition Assessment and Goal Generator-Alternate* (*TAGG-A*). Investigations throughout this larger project require multiple data analyses over multiple time points with each version of the assessment to ensure appropriate validity and reliability of assessment factors and items, thus ensuring the *TAGG-A* meets the requirements necessary for it to be considered a formal transition assessment for individuals with extensive support needs. In the present study, the internal structure of the Professional version of the *TAGG-A* was investigated because ensuring an appropriate assessment structure serves as the basis for constructs assessed by the instrument and, ultimately, transition goals related to those constructs to prepare students with extensive support needs for postsecondary employment outcomes.

Final *TAGG-A-P* Factors

The purpose of this study was to investigate the structure of the Professional version of the *Transition Assessment and Goal Generator-Alternate*. Results of this study provide evidence

of the internal structure of the *TAGG-A-P* for validity purposes. Specifically, results give evidence that *TAGG-A-P* constructs can be operationalized as five factors formed using items reconfigured from various initial constructs (McConnell et al., 2021) and preliminary analyses of Field Test 1 data (Sinclair et al., 2021) for use in creating transition goals related to skills necessary for employment for students with extensive support needs. All initial constructs and the following final factors are derived directly from literature examining skills, behaviors, and experiences for individuals with extensive support needs both within high school and in a postsecondary setting. This is critical to note, as this population is often overlooked in transition literature when developing formal transition assessments (Deardorff et al., 2020). Table 5 lists the final constructs operationalized as factors across the two combined *TAGG-A-P* field tests along with brief descriptions of item content. The resulting constructs are described below with specific focus on the potential for each to be interpreted by educators for the purpose of improving employment outcomes for individuals with extensive support needs.

Academic Skills for Independent Living

Academic Skills for Independent Living was reconfigured from items in the original constructs of Academics and School Experience. One example question from this factor includes: "The student reads and demonstrates an understanding of basic words found in their environment." Academic success has long been a contributing factor of postschool success around employment (Bouck & Chamberlain, 2017; Krumpelman & Hord, 2021). Previously called functional skills, many of these items relate to the daily skills one needs to "function" within an environment and have long been included in the curriculum of individuals with extensive support needs. Functional skills are directly related to the employability of young adults requiring unique and extensive support needs (Storey & Miner, 2017). Historically,

individuals with more extensive support needs have been excluded from employment settings, particularly those with minimum wage or above (Hiersteiner et al., 2016). Targeting essential academic skills within the context of independent living may help improve the likelihood of gainful employment for this population.

Technology Usage

Technology Usage held closely between the initial construct development (McConnell et al., 2021), preliminary Field Test 1 analyses (Sinclair et al., 2021), and the confirmatory factor analyses of Field Test 1 and Field Test 2 presented in this paper. This construct remains the smallest with only three items. One item example is: "The student uses assistive technology devices, for example, communication boards, computers, phones, or tablets to follow a schedule." These skills have been directly connected to employment outcomes and the development of self-determination (Cihak et al., 2015; Shepley et al., 2017). Specific to this population of individuals with extensive support needs, if assistive technology (AT) is needed for communication, appropriate and independent use of AT devices can open doors previously closed in a variety of ways. Within employment settings, students can attain independence at skills such as customer relations, communicating with coworkers and supervisors, and advocating for personal needs with proper practice and fluency with AT use within the high school or transition setting. Reliance on one's own ability to communicate instead of that of a job coach or personal assistant may lead to more than just independence in the employment setting, including increased senses of self-worth, confidence, and purpose (Rothman et al., 2008) for individuals having more extensive support needs.

Disposition and Social Skills

Items operationalizing *Disposition and Social Skills* focused on the attitudes, behaviors, and social dispositions displayed by individuals with an intellectual or developmental disability. One example question is: "The student displays appropriate social behaviors toward others." Though additional items were added to operationalize this factor following preliminary Field Test 1 analyses, (Sinclair et al., 2021) this construct generally held together well with a clear focus on the social and soft skills needed for employment outcomes. The development of social skills and soft skills are becoming increasingly talked about in the disability community (Al Houli & Al-Khayatt, 2020). Social skills refer to the ability to communicate and interact with others (Sigafoos et al., 2017). Soft skills are defined as the other non-job specific skills that lead to employment and employee behavior (Cimatti, 2016). Both social skills and soft skills training are recommended for individuals with extensive support needs to promote successful vocational participation (Connor et al., 2020). Historically, many employment-focused training programs have targeted "hard skills" such as work productivity (Grossi & Heward, 1998). What has been missing from many transition training programs are the employability skills supervisors and managers look for when hiring and retaining employees (e.g., dispositional attitudes). These nuanced and more subjective behaviors and skills need to be taught earlier in transition programming to students having more extensive support needs to ensure they are present within their repertoire of employability skills for future vocational settings. In fact, employers have indicated soft skills are important and often more important than other desirable characteristics in future employees (Lindsay et al., 2014). Thus, the inclusion of *Disposition and Social Skills* in the *TAGG-A-P* may present teachers with a way to identify the needs their students in this population have in these areas.

Self-Determination Skills

Self-determination is a broad set of skills which allows one to have "goal directed, self-regulated, autonomous behavior" (Field et al., 1998, p. 115). Although the definition of self-determination has shifted over the past 20 years (Shogren et al., 2015), the underlining concepts remain the same. Self-determination is about taking control of one's life, and with over thirty years of research, the importance of self-determination has been established (Agran et al., 2008; Field & Hoffman, 1994; Mazzotti, et al., 2021; Test et al., 2009). In addition, self-determination is directly related to success in employment (Shogren et al., 2017). Comparable with the focus on this skill set in the extant literature, it is not surprising the focus of items operationalizing *Self-Determination Skills* in the *TAGG-A-P* was maintained for students with extensive support needs throughout all stages of assessment development. One example question is: "The student actively participates in his or her educational planning meetings." Enough cannot be said about the importance of focusing on the development of an individual's self-determination skillset. Examining and promoting a student's ability to advocate for themselves, set and achieve goals, manage their own behaviors and emotions, or be aware of themselves and their personal strengths or needs is a powerful teaching tool. For students with extensive support needs this will look different and highly individualized. The inclusion of *Self-Determination Skills* on the *TAGG-A-P* can help teachers identify the ways in which their students having more extensive support needs require additional supports to promote individualized independence to achieve their desired level of employment.

Contributing Factors for Employment and Financial Literacy

The initial "transition" movement was originally focused on employment with the Bridges Model (Will, 1984). Though not contained within only one initial construct (McConnell et al., 2021; Sinclair et al., 2021), the identified factor of *Contributing Factors for Employment*

and Financial Literacy is intimately related to employment, and includes items related to obtaining a job, job skills, and vocational goals. Vocational instruction, work study, high school jobs, paid work, and other skills and experiences have all been established as contributing to postschool employment success (Mazzotti et al., 2021), as have specific instructional strategies such as video modeling (Park et al., 2020), community instruction (Gilson et al., 2017), and employment experiences (Petcu et al., 2015). Previous research has also clearly demonstrated family support and connection to the community is directly related to employment outcomes (Grigal et al., 2012; Timmons et al., 2011). Because specific employment skills are vital to and inherent in all initial constructs, this factor was also formed by items originally designed to assess the initial constructs of Family Home Expectations and Support, Personal Experiences, and Employment Savvy. This final *TAGG-A-P* factor represents many of the supporting and necessary factors that must be in place for individuals in this population to successfully seek, gain, and maintain employment, a set of skills taken for granted by some, and for others representing unique challenges due to their support needs. By targeting and calling attention to these various areas, this construct facilitates goal setting and skill development for students with extensive support needs within transition settings to promote the interagency and essential personnel collaboration needed to best support the individual and their desired employment outcomes. One item from this factor reads: "The student knows how to find a job in the community." Special educators or transition personnel working with agency partners can work in tandem to develop transition programming to support individuals with extensive support needs through scaffolded instruction to build skills leading to job exploration in the local community.

Applying the *TAGG-A-P* in the School Setting

As a result, the *TAGG-A-P*, regardless of individual constructs, directly relates to promoting employment outcomes for students with extensive support needs. The resulting 27 items operate together to measure employment readiness by identifying a student's strengths and areas of further need. The results of this study to identify the structure of the *TAGG-A-P* assessment promote the inclusion of individuals with extensive support needs in inclusive, community-based employment, through previously identified predictors of employment success (Mazzotti et al., 2021).

Example Goal Generation

Due to the possibility of misuse of *TAGG-A-P* items without appropriate scoring algorithms designed to suggest and develop appropriate transition goals, specific wording of the items included on the *TAGG-A-P* is not given here. Though the details of those processes and the underlying algorithms are outside the scope of the present study, results of the *TAGG-A-P* generate potential transition goals and coordinated activities aligned with the identified factors above and each of the individual items within those factors. As an example, one item assessing *Disposition and Social Skills* asks about students' ability to have a good relationship with individuals in the community (see Table 5). Two potential goal items generated by the *TAGG-A-P* associated with this factor (given below) may be used or modified by the transition professional to meet the student's unique needs:

- When in the community [at a bank, etc.], [the student] will [stay on topic; respond to greetings; initiate communication; etc.] during conversation [___% of the time; out of ___ times] [as measured by ___].

- When in the community [at a bank, etc.], [the student] will respond to "small talk" by [smiling, verbal response, waving, etc.] [___% of the time; ___ out of ___ times] [as measured by ___].

An example of coordinated activities for these example goals that would also be generated by the *TAGG-A-P*, include, "Participate and engage in the local community," or "When accessing community resources (bank, grocery store, etc.), advocate for oneself."

What is unique about the *TAGG-A-P* profile is the ability to translate the goals provided and individualize them to each student. Not only are each student's support needs unique, each school and local community is unique. Goals should reflect what would best support the student's areas of need, availability of resources, and opportunities to practice and develop the skills necessary for success.

Limitations and Future Research Opportunities

From the previous text, it can be seen that the content of the items clustered within constructs operationalizing the *TAGG-A-P* reflect the necessary skills needed for individuals with more extensive support needs to be successful in employment settings. However, as with any research investigation, the present study is not without limitations, nor should this study be understood as a comprehensive collection of all relevant validity evidence. We highlight a few of the more pressing limitations and areas for future research below.

First, we made the decision not to submit the *TAGG-A-P* results to measurement invariance testing. As a case in point, factor correlations (see Table 4) exhibit a visually different pattern across the two samples, likely due to diversity across the two samples. Though all student participants in the present study met the inclusion criteria, there was no way for us to guarantee a similar level of educational needs across participants, or even across the two samples. Because

students in this population exhibit large variability in their educational and support needs, we would need much larger samples to ensure the comparability necessary for measurement invariance testing. As such, we were only able to assess the structure of the two datasets independently of each other, but those results did show comparability across the two datasets. Future research on the structure of the *TAGG-A-P* with a larger sample is necessary to test invariance. Nevertheless, we believe this study represents an important first step to ensuring an appropriate factor structure for the Professional version of the assessment.

Next, minor changes in the wording of items and revisions made to the response anchors and scales from FT1 to FT2 may have contributed to some of the differences seen in the results. For example, factor correlations exhibited in the *TAGG-A-P* datasets across the two samples were different, particularly with respect to Factor 2. The extent to which these differences are due to changes made to the assessment or diversity exhibited in the population remains an empirical question that should be investigated in future studies on the assessment.

Finally, this study represents only one in a series of studies necessary to provide validity evidence for the appropriate use of the *TAGG-A-P*. The development of psychometrically sound assessments remains an iterative and ongoing process throughout the life of any assessment (American Educational Research Association et al., 2014); thus, there will always be a need to collect additional validity evidence. Though outside the scope of the present study, future research should include perspectives of students and family members to gain a full understanding of the needs presented by each individual to best prepare them for employment outcomes, as well as how Indicator-13 compliant transition goals should be written based on assessment results. Future studies should also investigate relations between *TAGG-A-P* scores with longitudinal outcomes, such as those across years within the school setting and future employment outcomes.

This last suggestion for future research is important in the collection of evidence showing predictive relations between *TAGG-A-P* factors and outcomes.

Conclusion

Despite these limitations, we believe the results presented in this study met the stated purpose of determining the most appropriate internal structure of the Professional version of the *Transition Assessment and Goal Generator-Alternate,* because it is that internal structure that will drive the development of appropriate transition goals for students with extensive support needs. Specifically, five factors were identified that relate clearly to initial constructs developed from an extensive literature review (McConnell et al., 2021), each of which assesses skills necessary for students having extensive support needs to be successful in employment situations. Because the validation process is necessarily continuous and iterative (AERA et al., 2014), our investigation of the structure of the assessment serves as an important precursor to refining and narrowing down the specific skills and behaviors that potentially predict employment outcomes, and as a mechanism by which teachers can understand the skills and behaviors students need to obtain future employment. Thus, results of this study place the *TAGG-A-P* on the path to gaining the psychometric evidence necessary to be considered a formal transition assessment (Prince et al., 2014). Since the factors identified in this study heavily align with employment outcomes, the *TAGG-A-P* assessment may be used by teachers to determine skills still necessary for the potential employability of each student. Moreover, results of this study, coupled with those of future studies outlined in the section above, will allow educators to feel confident they can use results of this assessment during transition planning for students with extensive support needs to meet the assessment requirements set forth under IDEA (2004).

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Table 1

TAGG-A Initial Constructs Identified from Literature Review

	Construct	Number of SBEEs	Number of Items Written
1	Academics	5	8
2	Agency Assistance	13	15
3	Employment	13	13
4	Family Home Expectations and Support	17	17
5	Personal Experiences	10	10
6	School Experiences	9	9
7	Self-Determination	8	8
8	Self-Care	3	6
9	Social	10	11
10	Technology	6	6
	Totals	94	103

Table 2

Professional and Student Demographics TAGG-A-P for Field Tests 1 and 2

	FT1 (n=72) Professionals		FT2 (n=55) Professionals		FT1 (n=244) Students		FT2 (n=250) Students	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Gender								
Male	7	9.7	6	10.9	133	54.5	159	63.9
Female	65	90.3	49	89.1	105	43.0	89	35.6
Race/Ethnicity								
Hispanic/Latino	0	0	4	7.3	43	17.6	26	10.4
American Indian/Alaska Native	4	5.6	2	3.6	3	1.2	1	0.4
Asian	1	1.4	1	1.8	7	2.9	7	2.8
Black/African American	1	1.4	1	1.8	45	18.4	32	12.8
Native Hawaiian	0	0	0	0	0	0	1	0.4
White	66	91.7	43	78.2	145	59.4	173	69.2
Student Age								
11 – 14					38	15.6	39	15.6
15 – 16					65	26.6	76	30.4
17 – 18					64	26.2	65	26.0
19 – 20					52	21.3	48	19.2
21+					19	7.8	17	6.8
Student Grade Level								
9th Grade					32	13.1	58	23.2
10th Grade					42	17.2	50	20.0
11th Grade					33	13.5	22	8.8
12th Grade					39	16.0	41	16.4
18+ Program					71	29.1	35	14.0
Student Disability Category								
Autism					66	27.0	76	30.4
Deaf-Blind					1	0.4	0	0
Hearing Impairment (inc. Deaf)					1	0.4	1	0.8
Intellectual Disability					134	54.9	94	37.6
Orthopedic Impairment					3	1.2	0	0
Specific Learning Disability					15	6.1	17	6.8
Speech/Language Impairment					1	0.4	0	0
Traumatic Brain Injury					3	1.2	0	0
Multiple Disabilities					3	1.2	21	8.4
Other Health Impairment					9	3.7	19	7.6

Note. All questions were optional, therefore not all totals will be equivalent due to missing data points.

Table 3

Standardized Factor Loadings and R² for TAGG-A-P for FT1 and FT2

Item	Factor1 FT1	Factor1 FT2	Factor2 FT1	Factor2 FT2	Factor3 FT1	Factor3 FT2	Factor4 FT1	Factor4 FT2	Factor5 FT1	Factor5 FT2	R^2 FT1	R^2 FT2
PTAGGA11	.854	.795									.730	.632
PTAGGA12	.879	.859									.773	.738
PTAGGA13	.849	.944									.721	.891
PTAGGA14	.858	.911									.736	.830
PTAGGA20			.723	.907							.523	.823
PTAGGA21			.773	.860							.598	.740
PTAGGA22			.734	.882							.538	.778
PTAGGA1					.730	.444					.533	.197
PTAGGA2					.651	.351					.424	.123
PTAGGA3					.802	.630					.643	.397
PTAGGA4					.711	.481					.505	.231
PTAGGA5					.893	.707					.798	.500
PTAGGA36					.754	.941					.569	.885
PTAGGA37					.675	.919					.456	.845
PTAGGA26							.770	.666			.593	.444
PTAGGA27							.739	.650			.546	.423
PTAGGA28							.671	.654			.450	.428
PTAGGA38							.603	.846			.364	.716
PTAGGA39							.816	.831			.666	.691
PTAGGA40							.802	.823			.643	.677
PTAGGA15									.781	.874	.610	.764
PTAGGA23									.552	.745	.304	.555
PTAGGA24									.720	.738	.518	.545
PTAGGA25									.622	.742	.387	.551
PTAGGA32									.612	.946	.374	.895
PTAGGA33									.838	.830	.702	.689
PTAGGA34									.746	.810	.557	.656
Alpha	.917	.916	.865	.919	.897	.886	.885	.877	.870	.915	.938	.960

Note: Factor 1 = Academic Skills for Independent Living, Factor 2 = Technology Usage, Factor 3= Disposition & Social Skills; Factor 4 = Self-Determination, Factor 5 = Contributing Factors for Employment and Financial Independence. FT1 = Field Test 1. FT2 = Field Test 2. Cronbach's alpha reliability estimates are given. Alphas presented in R^2 column represent reliability for the overall assessment in FT1 and FT2.

Table 4

Correlations Between TAGG-A-P Factors at Both Timepoints

		Factor1	Factor2	Factor3	Factor4
Factor2	FT1	.271	---		
	FT2	.724	---		
Factor3	FT1	.593	.169	---	
	FT2	.861	.707	---	
Factor4	FT1	.783	.254	.743	---
	FT2	.757	.633	.887	---
Factor5	FT1	.810	.190	.591	.808
	FT2	.907	.885	.842	.766

Note: Factor 1 = Academic Skills for Independent Living, Factor 2 = Technology Usage, Factor 3= Disposition & Social Skills; Factor 4 = Self-Determination, Factor 5 = Contributing Factors for Employment and Financial Independence. FT1 = Field Test 1. FT2 = Field Test 2.

Table 5

Description of TAGG-A-P Skills, Behaviors, Expectations, and Experiences (SBEEs) by Final Factors

Academic Skills for Independent Living	Self-Determination
- Demonstrates ability to read - Demonstrates functional academic skills (tells time) - Demonstrates functional academic skills (phone/email skills) - Demonstrates functional academic skills (read common signs)	- Demonstrates empowerment - Demonstrates autonomy - Does not feel afraid of looking for work - Has self-advocacy skills (participation) - Demonstrates ability to work efficiently - Demonstrates ability to show initiative - Has self-advocacy skills (accommodations)
Technology Usage	**Contributing Factors for Employment Success**
- Uses technology (learn new things) - Uses technology (follow a schedule) - Uses assistive technology (communicate)	- Uses cash, credit/debit card, or phone app to pay for purchases - Family expects a paying job after school - Family expects future financial self-support - Knows how to apply for jobs - Knows where to look for jobs - Travels in the community

Disposition and Social Skills
- Gets along well with people in the community   - Has a positive attitude   - Displays appropriate social behavior towards others   - Demonstrates good character   - Has appropriate classroom behavior   - Shows initiative at school, work, or home   - Completes tasks at school or work in a timely manner

Note: Due to the potential misuse of assessment items, this table is not representative of actual item wording.