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Autonomy, Psychological Empowerment, and Self-Realization: Exploring Data on Self-Determination From NLTS2

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ABSTRACT: *The authors used data from the National Longitudinal Transition Study-2 (NLTS2; SRI International, 2000) to examine the aspects of self-determination assessed in NLTS2 and measurement equivalence and latent differences across the 12 disability categories recognized in the Individuals With Disabilities Education Act (IDEA; 2004). NLTS2 included a direct assessment with items representing 3 of the 4 essential characteristics of self-determination—autonomy, self-realization, and psychological empowerment. The authors established measurement equivalence, but significant latent differences occurred across specific disability groups. Students with high-incidence disabilities (learning disabilities, emotional disturbances, speech or language impairments, and other health impairments) showed similar latent means and variances, as did students with sensory disabilities (visual and hearing impairments) and cognitive disabilities (autism, multiple disabilities, and deaf-blindness). Students with intellectual disability, traumatic brain injury, and orthopedic impairments could not be collapsed with any other group. Across the 6 collapsed disability groups, significant differences existed in the latent variances and limited mean level differences.*

Researchers have consistently identified the promotion of student self-determination as a key element of effective secondary transition services (Chadsey-Rusch, Rusch, & O'Reilly, 1991; Hughes et al., 1997; Thoma, Baker, & Saddler, 2002; Wehman, 2006). Reviews of the self-determination literature have found strong support for the efficacy of instructional strategies to teach skills (e.g., making choices, making decisions, setting goals) associated with self-determined

behavior (Algozzine, Browder, Karvonen, Test, & Wood, 2001; Cobb, Lehmann, Newman-Gonchar, & Alwell, 2009; Wood, Fowler, Uphold, & Test, 2005). Researchers have found a link between teaching these skills and greater involvement in transition planning (Arndt, Konrad, & Test, 2006; Martin et al., 2006) and participation and progress in the general education curriculum (Konrad, Fowler, Walker, Test, & Wood, 2007; Palmer, Wehmeyer, Gipson, & Agran, 2004; Shogren, Palmer, Wehmeyer, Williams-Diehm, & Little, 2012). Self-determination may also influence postschool outcomes; researchers have suggested that students with disabilities who leave high school with higher levels of self-determination may be more likely to achieve positive postschool outcomes (Wehmeyer & Palmer, 2003; Wehmeyer & Schwartz, 1997).

Despite the growing body of research suggesting effective instructional strategies and positive impacts of promoting self-determination, significant gaps in the literature remain (Calkins, Wehmeyer, Bacon, Heller, & Walker, 2011; Cobb et al., 2009). One area that has begun to receive attention is the potential impact of individual and environmental factors on self-determination (Walker et al., 2011; Wehmeyer, Abery, et al., 2011). Individual and environmental factors likely play a role in the development of self-determination and may interact with interventions to promote self-determination, suggesting the importance of these factors in designing effective interventions that address the unique support needs of each student.

Research has begun to explore specific individual and environmental factors that affect self-determination (Carter, Trainor, Owens, Sweden, & Sun, 2010; Lee et al., 2012; Nota, Ferrari, Soresi, & Wehmeyer, 2007; Shogren et al., 2007). One student factor that has received attention in the literature is disability category and/or characteristics associated with specific disability categories (e.g., intelligence, adaptive behavior, support need). It is logical to assume that a student's disability or support needs may influence his or her capacity for self-determination (Wehmeyer & Garner, 2003); and researchers have found differences in relative levels of self-determination among students served under different disability categories. For example, students with intellectual disability tend to report lower overall levels of self-determination than students with learning disabilities (Shogren et al., 2007; Wehmeyer & Garner, 2003; Williams-Diehm, Wehmeyer, Palmer, Soukup, & Garner, 2008). Researchers have also found differences between students with emotional and behavioral disorders and those with learning disabilities (Carter et al., 2010). Outside of comparative work, researchers have suggested specific issues that must be considered in understanding self-determination in youth with autism (Wehmeyer & Shogren, 2008; Wehmeyer, Shogren, Zager, Smith, & Simpson, 2010) and visual impairments (Agran, Hong, & Blankenship, 2007). Despite these differences in relative levels of self-determination, researchers assert that all students can develop self-determination with appropriate supports and accommodations (Wehmeyer & Garner, 2003). However, to provide appropriate supports and accommodations, educators must understand the individual factors that affect relative levels of self-determination.

The scope and sample of work to date on understanding individual and environmental factors has been limited. Specific to disability, most studies have only compared students served in certain disability categories (e.g., learning disability vs. intellectual disability, emotional and behavioral disorder vs. learning disability); and samples have not been representative of the population of students. The difficulties inherent in attempting to collect a nationally representative sample of students in diverse disability categories limits the ability of researchers to systematically explore these variables. However, the National Longitudinal Transition Study-2 (NLTS2; SRI International, 2000) furnishes data on a nationally representative sample of students served in each of the 12 disability categories recognized under the Individuals With Disabilities Education Act (IDEA, 2004) at the secondary level.

The U.S. Department of Education funded the original NLTS in the mid-1980s to explore the secondary school and postschool experiences of a nationally representative sample of students from each of the disability categories recognized in IDEA (2004). Previous research (Hasazi, Gordon, & Roe, 1985; Mithaug, Horiuchi, & Fanning, 1985; Sitlington & Frank, 1990), which had been the basis for many conclusions drawn

about the postschool experiences of students with disabilities, had significant limitations related to sample size and generalizability. NLTS2 is a companion study to the original NLTS, and the U.S. Department of Education also funded it. The purpose of NLTS2 was to provide an update on the secondary and postschool experiences of a nationally representative sample of students with disabilities, as well as to allow for an analysis of the impact of transition services on the outcomes of students with disabilities. Data collection for NLTS2 began in 2000 and continued through 2010. Just as NLTS provided information that researchers could generalize to the population of students with disabilities and addressed the lack of nationally representative data on the factors that affected the postschool outcomes of students with disabilities, NLTS2 also gives researchers a mechanism to further explore and understand the factors that affect the postschool outcomes of a contemporary, nationally representative sample of students with disabilities.

NLTS2 included questions from an assessment of student self-determination, *The Arc's Self-Determination Scale* (SDS; Wehmeyer & Kelchner, 1995), which provides an opportunity to explore the relative self-determination of students across the 12 disability categories in IDEA. However, NLTS2 only included a subset of items from the SDS. Therefore, our purpose in this study was twofold: (a) to explore the questions included in NLTS2 from the SDS to determine what aspects of self-determination NLTS2 measured and to develop a framework for use in this research as well as in future research, and (b) to examine measurement equivalence and latent differences in the self-determination constructs in youth across the 12 disability categories represented in NLTS2.

METHODS

Sample

This study involved secondary analyses of NLTS2 data. As previously mentioned, the purpose of NLTS2 was to furnish an update on the secondary and postschool experiences of a nationally representative sample of students with disabilities. SRI International collected data from 2000 to 2010. The design of the NLTS2 sampling plan allowed generalization of the results to the population of students receiving special education services in the United States in each federally recognized disability category (i.e., autism, deaf-blindness, emotional disturbance, hearing impairment, specific learning disability, mental retardation, multiple disabilities, orthopedic impairment, other health impairment, speech or language impairment, traumatic brain injury, and visual impairment). The study used a two-stage sampling process. First, the SRI researchers selected a stratified (geographic region, size, community wealth) random sample of districts serving students between 13 and 16 years old from the universe of districts. Approximately 500 local education agencies (LEAs) ultimately contributed students to NLTS2. In the second stage, the SRI researchers selected students from each LEA. The SRI researchers based calculations for the appropriate number of students to sample from each LEA within each disability category on the size of the district and the number of students with disabilities. The SRI researchers randomly selected students within each LEA until they obtained a sufficient sample (with the exception of the categories of traumatic brain injury and deaf-blindness, in which the SRI researchers sampled all available students in an LEA because of the low incidence of these conditions). Wave 1 sampled approximately 1,250 students per disability category, which the SRI researchers projected would lead to a sufficient sample in Wave 5 of data collection. See SRI International (2000) and Javitz and Wagner (2005) for additional details, including analyses of sample attrition and representativeness. Because the NLTS2 sample was a stratified random sample designed to be generalizable to the national population of students within and across disability categories, researchers conducting secondary data analysis needed to weight the data when analyzing it to ensure that the data adequately represented the target population.

Data Source

Data collection for NLTS2 began during the 2000–2001 school year and occurred in five waves (a wave equals a 2-year period of data collection), ending in 2010. The data used for our

analyses was from the student assessment conducted in Waves 1 or 2 of NLTS2, as well as data that the school furnished on the disability category under which each student received services. Students participated in the student assessment once when they were between 16 and 18 years old. Wave 1 sampled students in the older age cohorts (age 15 and 16 at the start of data collection), and Wave 2 sampled students in the younger age cohorts (age 13 and 14 at the start of data collection; Wagner, Newman, Cameto, & Levine, 2006). SRI International collapsed the data into one student assessment file provided to researchers with a restricted-use data license. The direct student assessment tested the reading, math, social, and life skills of youth using standardized or criterion-referenced assessments. The direct assessment included portions of the SDS (Wehmeyer & Kelchner, 1995). Because of the range of support needs of students included in NLTS2, a small subset of students did not participate in the direct assessment, and teachers instead completed the *Scales of Independent Behavior–Revised* (SIB–R; Bruininks, Woodcock, Weatherman, & Hill, 1996). Students who did not participate in the direct assessment did not complete the assessment of self-determination.

Teachers screened students to determine who would participate in the direct assessment. The emphasis was on having as many students as possible participate with modifications and supports. The criteria for taking the direct assessment were that the student (a) had a consistent response mode, (b) was able to work with a stranger, and (c) was able to complete the first item of the direct assessment battery (Wagner et al., 2006). Javitz and Wagner (2005) reported an overall response rate of 53.6% for Wave 1 and 59.8% for Wave 2 and reported that limited bias existed in the data at that response rate. Table 1 indicates the percentage of students across disability labels who took the direct assessment (versus those whose teachers completed the SIB–R). As shown in Table 1, variability occurred across categories, with students with learning disabilities, emotional disturbance, other health impairments, and speech or language impairments having the highest level of participation and students with autism, multiple disabilities, and deaf-blindness having the lowest participation levels. On the basis of our preliminary analyses, each disability group had sufficient numbers for inclusion in our analyses. However, the included students do not represent the entire population of students with these labels but instead represent the subset that was deemed able to participate in the direct assessment.

TABLE 1

Percentage of Students by Disability Category Who Completed the Direct Assessment

Disability Label	*Percentage of Students*
Autism	58
Deaf-Blindness	66
Emotional Disturbance	96
Hearing Impairment	93
Intellectual Disability	77
Learning Disability	98
Multiple Disabilities	52
Orthopedic Impairments	85
Other Health Impairments	96
Speech or Language Impairment	98
Traumatic Brain Injury	92
Visual Impairment	80

Self-Determination Assessment

The direct assessment included a subset of questions from the SDS (Wehmeyer & Kelchner, 1995). The SDS, which is based on the functional theory of self-determination (Wehmeyer, 2003), is a 72-item self-report measure that provides data on self-determination through measuring the four essential characteristics of self-determined behavior: autonomy, self-regulation, psychological empowerment, and self-realization (Wehmeyer, 1996). Researchers can calculate subscale scores for these four characteristics, as well as a total self-determination score. Wehmeyer (1996) developed and normed the SDS with 500 adolescents with cognitive disabilities. The SDS had adequate reliability and validity in measuring self-determination. It is the most widely used assessment of global self-determination in the disability field and has demonstrated good internal consistency across multiple studies with diverse disability populations, including intellectual disability, learning disabilities, physical disabilities, emotional distur-

bances, speech impairments, other health impairments, and autism (Lee et al., 2011; McDougall, Evans, & Baldwin, 2010; Shogren et al., 2007). Subsequent research (Shogren et al., 2008) has verified the proposed theoretical structure of the SDS (i.e., four related but distinct latent constructs [autonomy, self-regulation, psychological empowerment, and self-realization] that contribute to a higher order self-determination construct). In developing NLTS2, SRI International sampled 26 items from three of the four subscales of the SDS: autonomy (15 of 32 items), psychological empowerment (6 of 16 items), and self-realization (5 of 15 items).

Analytic Procedure

Research Question 1. What aspects of self-determination did NLST2 measure? Because NLST2 measured only three of the four subscales, we conceptualized self-determination at the subscale level, focusing on autonomy, psychological empowerment, and self-realization. To explore the first research question, we first conceptually reviewed the subset of items included from each of the three subscales with the lead author of *The Arc's Self-Determination Scale* (Wehmeyer & Kelchner, 1995) and determined that there was sufficient coverage of the content of the original subscales to proceed. Next, we subjected the three subscales to a confirmatory factor analysis (CFA) on the entire direct assessment sample (disability groups collapsed) to confirm that the overall model fit well and to explore factor and correlation structures to ensure the necessary preconditions for parceling (Cheung & Rensvold, 2002; Little, Cunningham, Shahar, & Widaman, 2002; Little, Rhemtulla, Gibson, & Schoemann, in press). Next, we constructed a parceled model and tested it for use in all subsequent multiple group comparisons.

Parceling is the mean aggregation of two or more indicators for the purpose of creating more parsimonious, just-identified CFA models (Little et al., 2002). After accounting for documented precautions (e.g., unidimensionality and uncorrelated variances), parceling has psychometric benefits, such as improved reliability and relationships between variables, as well as closer approximations to normality (Brown, 2006). Parceling is an appropriate method to use when the focus of a study is on the overall construct differences (e.g., mean level differences in psychological empowerment versus autonomy) and not on the individual item-level differences between groups (e.g., specific items from psychological empowerment subscale; Little et al., 2002, in press). We parceled the items by counterbalancing on the basis of factor loadings in the initial model. For example, we grouped the six items under psychological empowerment into three two-item parcels by matching the highest loading item with the lowest item until we had combined all items, resulting in three parcels per latent variable (Little et al., 2002).

Research Question 2. Can measurement equivalence be established, and are there latent differences in the self-determination constructs across the 12 disability groups included in NLTS2? To answer Research Question 2, we attempted to establish measurement equivalence and explore latent differences in the self-determination constructs in youth across the 12 disability categories represented in NLTS2. We used structural equation modeling (SEM), specifically, multiple-group CFA based on the means and covariance structures (MACS) model (Little, 1997). SEM procedures involve the integration of measurement models, which specify the relationships among latent and observed variables, with structural models, which specify the relationship among latent factors. First, we examined whether measurement equivalence existed across disability groups. Measurement invariance indicates measurement of the same construct in each of the 12 disability groups, such that when researchers compare the relative fit, proportional equality exists across groups for the patterns of fixed and free parameters, the factor loadings, and the factor intercepts (Little, 1997, 2013).

We tested measurement invariance in three steps. First, we tested configural invariance by constraining all groups to have the same pattern of fixed and free parameters. Second, we further constrained the model to test for weak factorial invariance by equating factor loadings across all groups. Third, we tested strong metric invariance by equating indicator means. We evaluated each step of invariance by using relative change in the comparative fit index (CFI). CFI changes of less than .01 between each nested model test support

invariance (Cheung & Rensvold, 2002; Little, 2013).

After establishing strong factorial invariance, we could evaluate structural models to explore similarities and differences in the latent means, variances, and correlations across the disability groups (Little, 1997). For the latent variable tests, we compared absolute fit by using adjusted chi-square difference tests as the measure of invariance. With this sample size, we used a *p*-value of .005 to determine significance. Because of the number of parameters to test, we developed conceptual groupings of disability categories to test for invariance in latent means, variances, and correlations. We developed the conceptual groupings on the basis of a review of descriptive data on the 26 indicators broken down by disability category, literature on the impact of the disability category on self-determination, and literature on disability characteristics. The three groups were as follows: (a) high-incidence disability group (learning disability, other health impairment, emotional disturbance, and speech or language impairment), (b) cognitive disability group (autism, intellectual disability, deaf-blindness, multiple disabilities, and traumatic brain injury), and (c) sensory and physical disabilities group (visual impairment, hearing impairment, and orthopedic impairment). The hypothesized groups served only as a guide, and we systematically tested them to explore the degree to which they matched the data.

RESULTS

Research Question 1

The first research question explored the aspects of self-determination measured by NLTS2 to develop a framework for conceptualizing self-determination. Because the NLTS2 data represented only a subset of items from three of the four subscales of *The Arc's Self-Determination Scale*, we conceptualized and tested a three construct model—autonomy, self-realization, and psychological empowerment. We first examined an unparceled model, then a parceled model. We conducted all analyses in Mplus, Version 6.12 (Muthén & Muthén, 1998–2010), using the "type=complex" option, "wt_na" sampling weight, stratum, and cluster to account for the complex sampling design. The preliminary nonparceled CFA involved categorical items; therefore, we used the means and variances adjusted weighted least squares estimator (WLSMV). For the final models using parceled items, the indicators are continuous variables, and we used robust maximum-likelihood (MLR). The preliminary collapsed nonparceled CFA yielded good fit indexes for the overall model ($\chi^2_{(295,\ n=5140)}$ = 528.719, RMSEA = 0.012 $_{(0.011,\ 0.014)}$, NNFI = 0.923, CFI = 0.931). Recommendations for acceptable model fit are an absolute fit index of root mean square error of approximation (RMSEA) less than .08 (i.e., as close to zero as possible), and relative fit indexes of nonnormed fit index (NNFI) and CFI of .90 or greater for acceptable fit (i.e., as close to 1.00 as possible; Little, 2013).

The parceled model also showed strong fit ($\chi^2_{(17,\ n=5130)}$ = 13.611, RMSEA = 0.000 $_{(0.000,\ 0.010)}$, NNFI = 1.004, CFI = 1.000). With both the unparceled and parceled models showing acceptable fit, we chose to use the parceled model.

Research Question 2

To explore measurement invariance across the 12 groups represented in NLTS2, we followed the procedures described in the Methods section. As shown in the first section of Table 2, the initial freely estimated model fit the data well ($\chi^2_{(204,\ n\ =\ 5130)}$ = 372.631, RMSEA = 0.039$_{(0.032,\ 0.046)}$, NNFI = 0.958, CFI = 0.972). We applied systematic constraints across loadings and intercepts and did not detect significant differences among the 12 disability groups. In the event that the change in CFI equaled .01, we verified that the constructs were indeed invariant by examining whether the nested models fell within the 90% confidence interval (CI) of the previous model using the RMSEA (Little, 2013). As shown in the first section of Table 2, CFI changes were less than 0.01 and/or nested models fell within the 90% CI of the RMSEA for each nested model test, so we assumed invariance. This trivial change in fit suggests that across all 12 disability categories, we were measuring the same constructs—autonomy, psychological empowerment, and self-realization—and that we could examine differences related to latent means, variances, and

TABLE 2

Invariance Testing for Alternative Null Model: Santorro-Bentler Correction for MLR

Invariance/Equality Test	χ^2	*df*	*RMSEA*	*90% CI*	*CFI*	*NNFI*	*S-B* χ^2	*S-B P-Value*
Measurement Invariance								
Configural	372.631	227	0.039	0.032–0.046	0.972	0.958		
Loadings	395.548	260	0.035	0.028–0.042	0.974	0.966		
Intercepts	526.425	315	0.04	0.034–0.045	0.959	0.956		
Tests of Latent Parameters								
Homogeneity of var/cov	631.847	381	0.039	0.034–0.045	0.951	0.957	105.706	0.001
Homogeneity of var/cov by Groups	615.07	375	0.039	0.033–0.044	0.953	0.958	89.258	0.008
Latent Mean Invariance	700.044	348	0.049	0.043–0.054	0.931	0.934	164.952	0.000
Latent Mean Invariance by Groups	552.136	327	0.04	0.034–0.046	0.956	0.955	25.711	0.012

Note. MLR = robust maximum-likelihood; RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index; NNFI = nonnormed fit index; var/cov = variance/covariance.

covariances. Table 3 provides the loadings and intercepts for the strong invariant model.

Next, we tested for homogeneity of latent variances and covariances/correlations and equality of latent means across groups in sequential steps. As shown in the bottom portion of Table 2, initial testing constraining across all groups yielded significant differences in the latent variances and covariances/correlations ($p < .005$). However, when decomposing differences, we found that the differences concentrated in the latent variances and that the latent correlations did not significantly differ from one another ($\chi^2_{(15, n=5130)} = 14.77$, $p = .47$.). The common correlations among the constructs for all disability groups were autonomy and self-realization ($r = .69$), autonomy and psychological empowerment ($r = .48$), and psychological empowerment and self-realization ($r = .66$). When looking at differences in the latent means, we found significant differences ($p < .005$).

To understand the pattern of differences in the latent variances and latent means, we systematically tested the impact of adding or freeing latent constraints across the 12 disability groups by using the hypothesized disability groupings described in the Methods section. We used these sequential steps to establish a structural model representing the latent differences in autonomy, self-realization, and psychological empowerment. As shown in Table 4, the data supported our hypothesized high-incidence disability group (learning disabilities, other health impairments, emotional disturbances, and speech and language impairments). Essentially, no differences existed between these disability categories in the structural models (i.e., latent means and variances did not significantly differ from each other). However, the data only partially supported the hypothesized cognitive disability and sensory and

TABLE 3

Loading and Intercept Values for the Strong Metric Invariance Models

	Twelve Group Model Estimate	
Indicator	*Loading* (SE)	*Intercept* (SE)
Autonomy		
Parcel 1	0.35 (0.02)	2.93 (0.03)
Parcel 2	0.33 (0.02)	3.02 (0.02)
Parcel 3	0.40 (0.02)	2.78 (0.03)
Self-Realization		
Parcel 1	0.42 (0.02)	3.11 (0.03)
Parcel 2	0.42 (0.02)	3.14 (0.03)
Psychological Empowerment		
Parcel 1	0.13 (0.02)	1.83 (0.01)
Parcel 2	0.12 (0.02)	1.91 (0.01)
Parcel 3	0.13 (0.02)	1.92 (0.01)

TABLE 4

Strong Metric Invariance Model Across Six Collapsed Disability Groups Latent Variance and Mean Differences

	Groups	High Incidence	Sensory Disabilities	Intellectual Disability	Orthopedic Impairments	Cognitive Disabilities	Traumatic Brain Injury
AUT	Latent Variance Difference	1.000	1.073*	1.256*	1.078*	1.718*	0.976*
	Mean Difference	0.000	0.137	0.185	–0.154	–0.323	0.028
SREAL	Latent Variance Difference	1.000	0.841*	0.990*	0.857*	1.321*	0.769*
	Mean Difference	0.000	–0.001	–0.064	0.058	–0.288	0.027
PSYE	Latent Variance Difference	1.000	0.880*	1.402*	1.091*	1.587*	0.548
	Mean Difference	0.000	–0.156	–0.630*	–0.202	–0.915*	–0.186

Note. AUT = Autonomy; SREAL = Self-Realization; PSYE = Psychological Empowerment.
*$p < .005$.

physical disabilities groups. In the cognitive disability group, it was possible to collapse students with autism, deaf-blindness, and multiple disabilities into a single group. However, students with traumatic brain injury (means and variance structure, $p < .005$) and intellectual disability (means only, $p < .005$) demonstrated significant differences. We examined whether we could collapse either group with other groups (e.g., high-incidence), and we could not. Similarly, in the sensory and physical disability groups, we found that although we could collapse students with visual and hearing impairments, students with orthopedic impairments did not fit within this group or with any other disability group. Orthopedic impairments, traumatic brain injury, and intellectual disability did not pass equivalence testing in any configuration, and we thus allowed them to vary in the final model.

Table 4 provides the latent means and variances for the six collapsed disability groups. With the exception of the traumatic brain injury group for the psychological empowerment construct, all groups differed significantly from the reference group—high-incidence disabilities—in the latent variances. This finding indicates that the distribution of scores for each of the latent constructs differed across the six groups. For latent means, fewer significant differences existed; the only significant differences were between the reference group and students with intellectual disability and cognitive disabilities (autism, multiple disabilities, deaf-blindness) for the psychological empowerment variable, with these students showing significantly lower levels of psychological empowerment.

DISCUSSION

The present study explored two main research questions: (a) What aspects of self-determination did NLTS2 measure? and (b) Can measurement equivalence be established, and are there latent differences in the self-determination constructs across the 12 disability groups included in NLTS2?

Measurement of Self-Determination in NLTS2

Because NLST2 included only a subset of items from three of the four subscales of *The Arc Self-Determination Scale* (Wehmeyer & Kelchner,

1995), we had to pay careful attention to the use of these items to describe self-determination. A review of the included items indicated that NLTS2 did not capture the overall construct of self-determination, as described and empirically validated in the functional theory (Shogren et al., 2008; Wehmeyer, 2003). In our analyses, we chose to use a three-construct representation of the included items. This limited three-construct representation is conceptually and psychometrically sound, and the results suggest that researchers can justifiably use the constructs of autonomy, psychological empowerment, and self-realization. However, future research should systematically explore the specific aspects of autonomy, psychological empowerment, and self-realization assessed in NLTS2. Although it is not possible with the current data, future research must assess direct comparisons of included versus nonincluded items on the range of scores.

Furthermore, because NLST2 included a subset of items, we recommend that future researchers use caution in interpreting the sum of the responses to individual items as representative of the constructs of autonomy, psychological empowerment, self-realization, or overall self-determination. Instead, when using SEM, our analyses suggest the validity of using parcels of items to represent the latent constructs. Because parceling reduces the random error and specific components of the item's variance, an individual item score is less reliable than aggregate scores (Little et al., 2002; in press). Also, the use of parcels leads to more parsimonious models (fewer estimated parameters), and fewer chances exist for residuals to be correlated or for dual loadings to emerge. Bandalos (2002) argues that the use of parcels results in lower levels of nonnormality, better-fitting solutions, lower Type I error rate, and less biased results in the presence of coarsely categorized items. When using more traditional analytic approaches, researchers must very cautiously interpret summed scores of the items included in NLTS2. Focusing on specific items as outcome variables or on the pattern of relationships among summed scores and other variables, rather than on the summed scores themselves, is necessary.

Measurement Equivalence and Latent Differences

Although the NLTS2 study measured only three of the four essential characteristics of self-determination, the data provide an unprecedented opportunity to understand the autonomy, psychological empowerment, and self-realization of a nationally representative sample of students with disabilities. When we examined the impact of disability on the three-construct representation of self-determination, we established strong metric equivalence across the 12 disability groups. In the sample of students who participated in the direct assessment and were capable of providing meaningful responses to the self-report questions, these results suggest that the same self-determination constructs were being measured and that researchers could use the same items to define the constructs for each disability group.

After establishing that researchers could use the same items to measure the constructs across the 12 groups, we were able to explore latent differences. First, we looked across the 12 disability groups to explore the degree to which we could collapse disability groups in the structural models. The ability to collapse groups indicates that the latent means, variances, and covariances/correlations do not significantly differ from one another. We found that the correlations did not vary across any of the disability groups, indicating the same pattern of relationships among the constructs across disability groups. The correlations among constructs ranged from .48 to .69, indicating moderate to strong relationships. The relationship between autonomy and psychological empowerment was slightly lower than the relationship between autonomy and self-realization and self-realization and psychological empowerment. These correlations are consistent with previous research on *The Arc's Self-Determination Scale* (Wehmeyer & Kelchner, 1995), suggesting moderate to strong correlations (Shogren et al., 2008) but clear differentiation.

However, when exploring differences in each construct individually (i.e., latent variances and means), we did find significant differences across disability groups. When attempting to determine which disability groups showed similar patterns of findings in latent variances and means, a high-

incidence disability group emerged; this group, as previously mentioned, included students with learning disabilities, emotional disturbances, other health impairments, and speech or language impairments. Students with intellectual disability did not fit with this group, nor did they fit with the cognitive disabilities group that emerged (i.e., autism, deaf-blindness, multiple disabilities). These findings are congruent with other research that has suggested greater social and behavioral similarities among students with learning disabilities and emotional and behavioral disorders than with students with mild intellectual disability (Sabornie, Cullinan, Osborne, & Brock, 2005; Sabornie, Evans, & Cullinan, 2006) but differ from research with high school students with learning disabilities and emotional disturbance that has suggested specific behavioral and social skill differences (Lane, Carter, Pierson, & Glaeser, 2006). However, none of these studies have specifically looked at self-determination, nor have they included all disability groups represented in IDEA. Our findings suggest that students with high-incidence disabilities tend to show more similarities than differences. However, students with intellectual disability show significant differences from this group of students, as well as from students with low-incidence disabilities.

Understanding the impact of disability is a first step; but as our findings suggest, researchers need to account for more variability to obtain a full understanding of autonomy, self-realization, and psychological empowerment in students with disabilities.

Less congruence occurred in the means and variances across students with labels that researchers traditionally view as lower incidence. A group of students with autism, deaf-blindness, and multiple disabilities emerged, but students with intellectual disability did not fit in this group. We called this group a cognitive disability group. Since data collection began for NLTS2 in 2000, the population of students who have a label of autism likely has shifted significantly; and the group of students with autism included in NLTS2 may differ significantly from students with this label today. We chose to call this group a cognitive disability group because of work in the late 1990s and early 2000s suggesting the high incidence of intellectual disability in individuals with autism (National Research Council, 2001) and with multiple disabilities and deaf-blindness (Orelove, Sobsey, & Silberman, 2004). Interestingly, students with sensory disabilities—visual and hearing impairments—formed their own group; and we were unable to collapse them with any other group, suggesting specific differences based on the presence or absence of a sensory disability. This finding is congruent with research on other social and behavioral outcomes that suggests that researchers must consider the unique characteristics and experiences of students with sensory disabilities (Algozzine & Ysseldyke, 2006). Like students with intellectual disability, students with orthopedic impairments and traumatic brain injury did not fit with any of the groupings. Future research should attempt to better understand and explore factors that contribute to these differences and unique profiles, particularly given the implications for interventions to promote self-determination. Although educators have developed a number of curricula, rarely have the curricula specifically addressed support needs for students with diverse disabilities. Further research should explore factors that interact with disability and affect support need and self-determination.

When looking at the specific pattern of differences across the combined disability groups, it is important to note that the differences concentrated in the latent variances of the constructs, rather than in the latent means. As shown in Table 4, the only differences in latent means were for the psychological empowerment construct, with students with intellectual disability and cognitive disabilities scoring significantly lower than the reference group of students with high-incidence disabilities. These findings are congruent with previous research suggesting that students with intellectual disability often are less empowered than their peers with other disabilities (Shogren, Bovaird, Palmer, & Wehmeyer, 2010), perhaps because of low expectations and limited ability to

exert control over their environment (Stancliffe, 1997, 2001). However, unlike previous research that has documented mean level differences in overall self-determination across specific disability groups, namely, students with intellectual and learning disabilities (Shogren et al., 2007; Wehmeyer & Garner, 2003; Williams-Diehm et al., 2008), our findings did not suggest mean level differences for the autonomy and self-realization construct. A possible explanation for this finding is the significant differences across all groups and constructs in the latent variances, with the exception of psychological empowerment for students with traumatic brain injury. The latent variance differences indicate that the distribution of scores within the different disability groups varies significantly. Previous findings suggesting mean level differences may have had more homogeneous samples resulting from sampling a restricted number of districts, teachers, and classroom settings. It is also possible that previous work did not capture the full range of variation within disability groups. The differences in the latent variances suggest that disability alone is not able to account for all variability in student autonomy, self-realization, and psychological empowerment scores and that researchers must consider other personal and environmental factors. Further research should explore more complex models of personal (e.g., support need, social skills, supports) and environmental (e.g., opportunities for self-determination, inclusion, access to the general curriculum) factors that interact with disability to influence students' relative levels of self-determination. Understanding the impact of disability is a first step; but as our findings suggest, researchers need to account for more variability to obtain a full understanding of autonomy, self-realization, and psychological empowerment in students with disabilities.

Limitations of the Study

NLTS2 provides useful information on the autonomy, self-realization, and psychological empowerment of students with disabilities across the nation. However, researchers must consider some limitations when interpreting our secondary analyses. First, as previously mentioned, it is problematic that the direct assessment of NLTS2 included only a subset of items from three of the four subscales of *The Arc's Self-Determination Scale* (Wehmeyer & Kelchner, 1995). This limitation creates issues in interpreting the constructs that were measured. However, because of the breadth of data collected for NLTS2, truncating the original measure likely reconciled time and resource constraints. In future research, using a systematic and data-based process for identifying the subset of items most representative of the assessment and included in the direct assessment may be useful. Second, only a subset of the overall NLTS2 sample participated in the direct assessment, and some students participated in an alternative process because they were unable to complete *The Arc's Self-Determination Scale* (Wehmeyer & Kelchner, 1995). As shown in Table 1, for some groups (autism, multiple disabilities), only slightly more than 50% of the sample participated in the direct assessment. Thus, the data are not representative of the entire population of students with disabilities but instead only represent those deemed capable of participating in the direct assessment. This problem is inherent in assessing self-determination, because current measures require that students be able to reliably respond to complex questions.

Data on students' disability categories came from the school districts, and these data were used to group students into disability categories for the present analyses. When doing secondary data analysis, no method exists to account for school, district, and state variations in disability classification; nor is there any way to verify the accuracy of diagnoses. Researchers might raise questions about the specific characteristics of students with, say, multiple disabilities or deaf-blindness who were able to participate in the direct assessment. However, because of the size of the sample and the consideration given to sampling to ensure representativeness, these data clearly have power to guide our understanding of autonomy, self-realization, and psychological empowerment in students with diverse disabilities who are able to participate in direct assessment.

Directions for Future Research and Practice

Although this study provides initial insight into the autonomy, self-realization, and psychological

empowerment of a nationally representative sample of students with disabilities, more work is necessary to understand these complex constructs and their application in practice. Additional research should also concentrate on the assessment of self-determination. Clearly, one finding of this study is that brief measures of self-determination may be useful in both research and practice. Work is necessary to develop these measures in a conceptually and statistically sound manner. The development of such measures can enable teachers to quickly and efficiently assess student self-determination before and after implementing interventions. Existing brief measures of self-determination can serve as a starting point (Wehmeyer, Little, Lopez, & Shogren, 2011). Additional research should also focus on assessing the self-determination of individuals with severe disabilities who are not able to complete self-report measures, as well as on strategies that teachers can use to support students with severe disabilities to develop these skills. Different approaches, such as observational systems, may provide a means to understand self-determination in this population.

In practice, the results suggest the importance of assessing self-determination before implementing interventions to support self-determination.

In practice, the results suggest the importance of assessing self-determination before implementing interventions to support self-determination. Given the variability in self-determination scores across disability groups, assessment data would provide teachers with a mechanism to understand the impact of an intervention and engage in data-based decision making when working with students to support self-determination. Promoting teachers' knowledge and use of self-determination assessments and developing frameworks to link assessment data to instructional practices are also necessary. The results of this study provide a starting point. Students with learning disabilities, emotional and behavioral disorders, speech or language impairments, and other health impairments may have more commonalities in their relative levels of self-determination in high school than students from other disability groups. In practice, teachers can use this information in selecting self-determination interventions on the basis of knowledge of disability characteristics and assessment data. For example, the self-advocacy strategy developed by Van Reusen, Bos, Schumaker and Deshler (1994) has increased participation in individualized education program (IEP) meetings for students with learning disabilities (Van Reusen & Bos, 1994), as well as for students with other high-incidence disabilities (emotional and behavioral disorders; Test & Neale, 2004). It also may have benefits for students in the high-incidence group that emerged in these analyses. When considering interventions with students with intellectual disability or cognitive disabilities, developing and implementing interventions that specifically target psychological empowerment may be important. Curricula that have been developed with the needs of this population in mind and that include activities that focus on building advocacy skills and feelings of empowerment, such as *Whose Future Is It Anyway?* (Wehmeyer et al., 2004), may address these issues. Ultimately, educators should base their selection of self-determination interventions on a number of factors, including student, school, and classroom characteristics and needs. This study suggests that disability is one factor that educators should consider in making these decisions and highlights the importance of assessment and the systematic consideration of personal characteristics by practitioners working to meaningfully assess and promote self-determination for all students.

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