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Exploring Shared Measurement Properties and Score Comparability Between Two Versions of the *Supports Intensity Scale*

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Abstract

This study examined similarities and differences in measurement properties and score comparability of the *Supports Intensity Scale–Adult Version* (16–64 years) and the *Supports Intensity Scale–Children's Version* (5–16 years). Data were collected from 142 adolescents with intellectual disability with both versions of the *Supports Intensity Scale*. Data analyses indicated clear alignment of the specific set of items across parallel activity domains, as well as support for score comparability across two assessments. This suggests the two versions of *Supports Intensity Scale* can be used with confidence with transition-aged students to assess their support needs and inform supports planning, depending on the purpose of assessment. Implications and future directions for research and practice are discussed.

Keywords

Supports Intensity Scale, intellectual disability, support needs, support planning, transition assessment

The Division on Career Development and Transition (DCDT) recently published a position paper that defined age-appropriate transition assessment as "an ongoing process of collecting information on the youth's needs, strengths, preferences, and interests as they relate to measureable postsecondary goals and the annual goals that will help facilitate attainment of postsecondary goals" (Neubert & Leconte, 2013, p. 74). Transition assessment must assist in devising appropriate transition services, which should be included in Individualized Education Plans (IEPs) when students turn 16 years old. The identification of the supports youth need to match their personal competencies with the demands of secondary or postsecondary environments is therefore critical to age-appropriate transition assessment. Focusing on personal competencies and the supports needed to participate in age-appropriate environments shifts the focus to identifying the supports needed within environments to facilitate the success of adolescents with disabilities (Neubert & Leconte, 2013).

In recent years, assessments of support needs, defined as the "pattern and intensity of supports necessary for a person to participate in activities linked with normative human functioning" (Thompson et al., 2009, p. 135), have been developed that have applicability to age-appropriate transition assessment. For example, the *Supports Intensity Scale–Adult Version* (SIS-A; Thompson et al., 2004; Thompson et al., in press-a) was developed by a task force established by the American Association on Intellectual and Developmental Disabilities (AAIDD) to provide a standardized measure of support needs for adults (aged 16–64) with intellectual and developmental disabilities. The SIS-A norming sample (n = 1,306) suggested strong psychometric characteristics, including strong reliability and validity. The SIS-A has been widely adopted in the adult developmental disability service system in the United States and internationally to align resources and funding allocations, enable effective supports planning, and structure and evaluate supports provision. For youth with disabilities aged 16 and above, the SIS-A can be part of age-appropriate transition assessment to identify needs related to the demands of postsecondary environments, facilitating the development of annual goals related to transition.

Given the growing recognition of the importance of assessing support needs across the life span, a second initiative was undertaken to develop a version of the scale

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appropriate for children and youth that could be used for support needs assessment and planning in an educational context, called the *Supports Intensity Scale–Children's Version* (SIS-C; Thompson, Wehmeyer, Hughes, Shogren, Little, et al., in press). The purpose of the SIS-C was to address the lack of standardized and validated measures of support needs for children and youth, providing for the extension of effective support needs assessment and planning, while considering the unique environment demands of childhood that include the demands of learning and participating in educational environments (Thompson et al., 2014). Thus, the SIS-C would be useful for transition assessment and supports planning in younger children.

The SIS-C was developed using the same measurement framework as the SIS-A, with modifications to address the unique environmental demands of childhood. The SIS-A (described further in the "Method" section) uses a standardized interview protocol with respondents who know the target individual with an intellectual disability to generate scores on 57 items linked to seven life-activity domains (Home Living, Community Living, Lifelong Learning, Employment, Health and Safety, Social, and Protection and Advocacy). To develop items for the SIS-C, the task force started with each item on the SIS-A and examined it for content validity for children and youth (see Thompson, Wehmeyer, Hughes, Shogren, Seo, et al., in press). Items that had relevance were retained; those that did not were eliminated. Next, to identify additional support needs relevant for children and youth, a review of the literature was conducted and a candidate pool of items generated. This set of items was then rated for relevance by 51 experts in education and transition for children and youth with intellectual disability. The final 61 items were then grouped into specific life-activity areas: Home Life, Community and Neighborhood Living, School Participation, School Learning, Health and Safety, Social, and Advocacy. Many SIS-A and SIS-C items are exactly the same; however, there are differences, in activity domains and items, to accurately reflect differences in the environmental demands associated with the two age groups (i.e., childhood/adolescence vs. adulthood). Specifically, there are five activity domains that are hypothesized to be parallel constructs across the SIS-A (Home Living, Community Living, Health and Safety, Social, and Protection and Advocacy) and the SIS-C (Home Life, Community and Neighborhood, Health and Safety, Social, and Advocacy). Two additional domains on each scale (SIS-C: School Participation and School Learning; SIS-A: Lifelong Learning and Employment) are assumed to be distinct. At the item level, however, even within the parallel constructs, some modifications were made on the SIS-C items to better reflect the environmental demands of children and youth within those activity domains (e.g., In the Home Living domain, "Housekeeping and cleaning" on the SIS-A was changed to "Completing household chores" on the SIS-C).

To validate and develop norms for the SIS-C, a sample of 4,015 children and youth with intellectual disability from across the United States was identified. Initial analysis of the SIS-C standardization sample suggests it is a valid and reliable tool for measuring support needs in children (Thompson et al., 2014) and norming tables will be published in 2015 (Thompson, Wehmeyer, Hughes, Shogren, Seo, et al., in press). However, work is needed to explore the relation between the SIS-A and the SIS-C, particularly in youth and young adults who are in the age ranges where they will transition from assessment with the SIS-C to the SIS-A as they are engaging in transition planning for adulthood. Specifically a first step is to explore the extent to which "parallel" constructs show comparability in their measurement properties to establish the degree to which scores from the two assessments can be used longitudinally, which allows for youth to seamlessly move between assessments to continuously inform support planning. Establishing construct comparability (i.e., measurement invariance) is a critical step to confirm that the same sets of indicators that represent respective constructs do not differ in subgroups of the population (Brown, 2015).

The purpose of this article, which is part of a series of studies examining the comparability of the SIS-C and SIS-A, was to examine "parallel" constructs on the SIS-C and SIS-A to provide information on the degree to which the SIS-C and SIS-A assessments are measuring the same constructs and to inform how scores from either assessment can be as part of age-appropriate transition assessment and supports planning for transition-aged youth, particularly those aged 15 to 21. Specifically, this article addressed three research questions:

Research Question 1: To what degree do items align in parallel activity domains across the SIS-A and SIS-C, and can a common measurement structure be established?

Research Question 2: Can partial measurement invariance be established across parallel activity domains on the SIS-A and SIS-C?

Research Question 3: Are there latent mean-level differences across parallel activity domains on the SIS-A and SIS-C, after controlling for personal capacity (defined by intellectual functioning and adaptive behavior levels)?

Method

Participants

This study had three categories of participants: student participants, interviewers, and respondents. The SIS-C is completed by a qualified *interviewer* with at least two *respondents* who know the targeted *student participant*. Interviewers need to have completed at least a bachelor-level degree in a field

such as education, social work, or psychology, and need to have been trained in the administration of the scale. A total of 25 interviewers participated in collecting information from respondents for the 142 student participants (subsequently described); the majority of interviewers were females (n = 20, 80%) and most held master's degrees (n = 20, 80%). In addition, in total, 284 respondents participated in the interviews. The majority of respondents were teachers (n = 230, 81%) or paraprofessionals (n = 34, 12%). The average length of time the respondents had known the participants was 2.89 years (SD = 1.79 years).

The student participants for this study were 142 adolescents with intellectual disability or related developmental disabilities. These students were part of the SIS-C normative sample (see Thompson et al., 2014), and the mean age of students at the time of interview was 18 years (range = 15–21 years, SD = 1.5 years). Because the SIS-A is normed from ages 16 to 64 and the SIS-C is normed from ages 5 to 16, 16-year-olds can be assessed using both versions of the SIS: the SIS-C to determine support needs at the time of assessment (e.g., pertaining to the domains within the SIS-C such as school participation and learning) and the SIS-A for use in planning for support needs into young adulthood in transition-related areas such as Employment and Community Living. Furthermore, school age populations (e.g., 16- to 18-year-olds) may be more likely to continue to benefit from information (even if normative scores are not available) on domains related to school participation and learning that are only assessed on the SIS-C. To examine the shared measurement properties and score comparability across two versions of the SIS in this population (i.e., students who are still receiving school-based services and who will transition from the SIS-C to the SIS-A), we targeted students aged 15 to 21 who were still receiving school-based services and whose respondents were willing to be interviewed for both versions of the SIS. These students were recruited from rural, urban, and suburban school districts across three states (Illinois, New York, and Tennessee). Table 1 provides more demographic information.

Table 1. Demographic Characteristics of Study Participants Being Rated.

Variable	n	%
Gender		
Female	62	43.7
Male	79	55.6
Missing	1	0.7
Age		
15 to 16	34	23.9
17 to 18	72	50.7
19 to 20	27	19.0
21	8	5.6
Missing	1	0.7
Ethnicity		
Black	65	45.8
White	55	38.7
Hispanic	13	9.2
Other (Asian/Pacific Islander, multiple ethnic backgrounds)	8	5.6
Missing	1	0.7
Additional diagnoses/classifications[a]		
Autism spectrum disorder	23	16.2
Speech disorder	14	9.9
Physical disability (mobility limitations)	8	5.6
Language disorder	7	4.9
Attention deficit hyperactivity disorder	5	3.5
Physical disability (arm & hand limitations)	5	3.5
Chronic health condition	4	2.8
Developmental delay	4	2.8
Brain/neurological damage	3	2.1
Learning disability	3	2.1
Low vision/blindness	3	2.1
Deafness/hearing impairment	2	1.4
Psychiatric disability	1	0.7
Other	8	5.6

[a]The percentages of additional diagnoses/classifications do not add up to 100% because percentages are calculated within each disability category. For example, about 16% of the total sample have an additional autism spectrum disorder, whereas the rest of 84% do not have an additional autism spectrum disorder.

Measures

The SIS-A. The SIS-A measures the pattern and intensity of supports needed by people with intellectual disability, aged 16 to 64 years. The SIS-A consists of three sections: Exceptional Medical and Behavioral Support Needs, Support Needs Index Scale, and Supplemental Protection and Advocacy Scale. The first section, Exceptional Medical and Behavioral Support Needs, includes common medical conditions and problem behaviors that are essential when considering individuals' comprehensive support needs, but are not included in calculating standardized scores. The second section, Support Needs Index Scale, evaluates support needs across six life activities: Home Living, Community Living, Lifelong Learning, Employment, Health and Safety, and Social. Scores from these six domains are used to calculate a SIS Support Needs Index, the composite standard score, to present an overall standardized index of the intensity of support needs. The third section, Supplemental Protection and Advocacy Scale, is not included in the SIS Support Needs Index, although it was originally intended to be included and is structured in the same way as the six activity domains in Section 2 (Thompson et al., in press-b). In the initial standardization sample (Clay-Adkins, 2004), there were concerns with the reliability of the Protection and Advocacy Scale, which lead to its removal from the standardized portion of the scale. A recent study, however,

provided data suggesting these concerns were a function of the sample, and a lack of trained interviewers in the standardization sample, not psychometric issues (Shogren et al., 2014). Items included in the Support Needs Index Scale and Supplemental Protection and Advocacy Scale are rated on three dimensions: frequency, daily support time, and type of support.

The SIS-C. The SIS-C is designed to measure the intensity of support needs for children with intellectual disability, aged 5 to 16 years. The SIS-C has many aspects in common with the SIS-A, including the administration procedure, rating system, and five activity domains. Adjustments were completed to make the instrument items more appropriate for children and youth. First, even in parallel domains, modifications were made to the wording of items to ensure the applicability to the environmental demands of childhood and adolescence (e.g., in the Community Living domain, "Shopping and purchasing goods and services" on the SIS-A was modified to "Shopping" on the SIS-C). Second, two activity domains (Lifelong Learning and Employment) were replaced with related, but more age-appropriate distinct activity domains (School Participation and School Learning). Third, the Advocacy domain was included in the standardized portion of the SIS-C. And, fourth, modifications were made to the rating scale for frequency on the SIS-C. This dimension of support need is rated on the SIS-C on a 0 to 4 scale, with the following anchors: 0 = *negligible*, 1 = *infrequently*, 2 = *frequently*, 3 = *very frequently*, 4 = *always*. On the SIS-A a 5-point scale is also used, but the anchors differ (0 = *none or less than monthly*; 1 = *at least once a month, but not once a week*; 2 = *at least once a week, but not once a day*; 3 = *at least once a day, but not once an hour*; 4 = *hourly or more frequently*) leading to a subset of items on the SIS-A only having a 3- or 4-point rating scale, as daily or hourly or more support on some items (e.g., participating in recreation/leisure activities with others) is nonsensical. This issue was removed with the adapted rating scale on the SIS-C; however, this change leads to differences in the range of possible scores across items within the SIS-A, and across the SIS-A and SIS-C.

Procedures

The data were collected as part of a larger project that developed the norms and examined the reliability and validity of the SIS-C scores with 4,015 children aged 5 to 16 years (Thompsonet al., 2014). Specifically, participants in the present study were asked to complete both SIS-A and SIS-C to allow calibrating the scales in the 15- to 21-year-old range. We chose this age range for two reasons: First, the target youth were still in school suggesting the potential continued relevance of the SIS-C, and second, youth in this age range would transition from using the SIS-C to the SIS-A, particularly as they exited school and when/if standard scores were needed. Because we were targeting youth still in school, we worked with school districts to identify interviewers to be trained in administration and scoring of both versions of the SIS. The face-to-face teacher training occurred in school districts in close proximity to research team sites. The content of training was based on best practices described in the SIS-A and SIS-C users' manuals (Thompson et al., in press-b; Thompson, Wehmeyer, Hughes, Shogren, Seo, et al., in press) and at the AAIDD website (http://aaidd.org/sis/training#.VLkoAP50ypo). Specifically, in Illinois, teachers were separately trained on the SIS-A and SIS-C (one at a time) and conducted interviews for each scale within a 2-month period; the SIS-C was initially completed and SIS-A was followed. In New York and Tennessee, however, teachers were trained to use both versions of the SIS at the same time. Teachers conducted interviews for each scale at the same time or separate times within no more than a 2-month span as in Illinois. For the standardization of both tools, data were collected on interinterviewer reliability, and as described in both the SIS-A and SIS-C users' manuals (Thompson et al., in press-b; Thompson, Wehmeyer, Hughes, Shogren, Seo, et al., in press) after training was provided, interviewers demonstrated high reliability in their administration and scoring of the tool. For the standardization sample for the SIS-C (from which data from the present analyses were used), reliability coefficients ranged from 0.84 to 1.05, demonstrating good interinterviewer reliability scores.

Analytic Procedures

Pre-analysis steps. We rescaled each rating made on the SIS-A and the SIS-C using proportion of maximum scoring (POMS) because of the aforementioned differences in the rating scales (Little, 2013). Rescaled variables, then, were averaged across three dimensions (i.e., frequency, daily support time, and type of support) of each item to maintain the same scales of metrics for each item and domain measured. The differences in scoring keys of frequency between SIS-A and SIS-C, as previously described, lead to different metrics when summed scores of three domains of each item were included in the structural equation modeling (SEM) models. Thus, we used averaged scores, instead of summed scores, to accurately describe mean-level metric of POMS scoring. Mplus (Muthén & Muthén, 2012), using maximum-likelihood estimation, was used for analyses.

Research Question 1: Examining item alignment and measurement structure. The first step in analyzing the comparability of parallel constructs across the SIS-A and the SIS-C (i.e., Home Living, Community, Social, Health and Safety, and Advocacy) was to conduct item-by-item comparisons to identify similarities and differences across the two versions.

We examined each item to determine which items are parallel or distinct to specify the measurement models for the five parallel activity domains (see Table 2). The lead author and a doctoral student with expertise in support needs assessment independently reviewed each item on the SIS-A and SIS-C and identified items that are potentially aligned. After arranging counterpart items separately, the lead author and doctoral student compared their findings. Then they developed an initial framework that included several alternative sets of item grouping that could be tested empirically to determine the best measurement framework because some items were not clearly aligned.

To empirically determine the best alignment of items across the SIS-A and SIS-C, measurement invariance testing procedures (Little, 2013) were applied to each potential grouping of items to determine which conceptual grouping had the strongest measurement properties. First, models were tested to determine if strong invariance can be established; strong invariance indicates that the items assumed to be parallel on the SIS-A and SIS-C are, in fact, factorially invariant. Measurement invariance testing includes three sequential tests: configural invariance, weak invariance, and strong invariance (Little, 2013). Configural invariance was examined by specifying the same pattern of fixed and freed parameters for each construct. Multiple goodness-of-fit statistics were used to evaluate the configural model fit, including an absolute fit index of root mean square error of approximation (RMSEA) less than .08 and comparative fit index (CFI) and Tucker–Lewis index (TLI) of .90 or greater for acceptable fit (Little, 2013).

Weak invariance testing was performed by constraining corresponding factor loadings for each construct equal across each SIS; strong invariance was tested by equating the corresponding intercepts across the two versions of the SIS. If the change in CFI is less than or equal to .01 between two nested models, the invariance is considered as tenable (Cheung & Rensvold, 2002). Models of aligned items that met strong measurement invariance were then examined to determine which had the best model fit. The best fitting model with the strongest conceptual alignment was then chosen for further analysis. This model is presented in Table 2.

Once the best set of counterpart items were identified based on conceptual and empirical comparisons, parcels were created for those items using the item-to-construct balancing technique. The advantages of parceling include improved psychometric characteristics, model estimation, and fit characteristics (Little, Rhemtulla, Gibson, & Schoemann, 2013). Parcels were created only for items that were parallel across the SIS-A and SIS-C. Items that did not have a counterpart (see Table 2) were allowed to freely load (e.g., were not further tested for measurement invariance across the SIS-A and SIS-C). Because the number of items in parallel constructs was not always the same across the SIS-A and SIS-C, residual-centered phantom indicators were created to match the number of indicators so that the partial factorial invariance models can be tested. When testing models with phantom indicators, factors' factor loadings and intercepts of residual-centered phantom indicators are fixed at zero and not equated. In addition, modeling residual-centered phantom indicators requires corrections to the null and target models' degrees of freedom (*df*) and fit indices. The procedures recommended by Geldhof, Pornprasertmanit, Schoemann, and Little (2013) were followed.

Research Question 2: Testing partial measurement invariance across parallel activity domains. After determining the parceling scheme and specifying phantom indicators to account for the diverse number of items within parallel activity domains, a new measurement model was specified to describe the relation between the manifest variables and the parallel latent activity domain constructs. Measurement invariance (configural, weak, and strong) was again tested, this time to determine if partial measurement invariance could be established across parallel activity domains on the SIS-A and SIS-C. Partial factorial invariance models were run because the target models included the distinct indicators that could not be aligned (and necessary phantom indicators) across the two versions of the SIS, which cannot be constrained to be equal. The steps to determine the partial measurement invariance were the same procedures of measurement invariance (i.e., configural, weak, strong invariance).

Research Question 3:Testing latent parameters. After the partial measurement invariance was established, the equality of factor variances/covariances and the equality of latent means were tested using nested chi-square tests to examine similarities and differences in the latent variances/covariances and means of the SIS-A and SIS-C activity domains. Given other research that has suggested the impact of intellectual functioning and adaptive behavior on support needs as measured by the SIS-A and SIS-C (Seo et al., 2015), we created a latent personal-capacity construct defined by intellectual functioning and adaptive behavior levels and included it as a covariate in the models to control for its effects when testing mean-level differences.

Results

Research Question 1: Item Alignment and Measurement Structure

Table 2 provides a descriptive overview of the final alignment of items across the SIS-A and SIS-C across parallel activity domains. Highlighted items were identified as aligned conceptually and empirically, and items that are not highlighted were freed across the SIS-A and SIS-C constructs, as they did

Table 2. Item-Level Comparisons Between the SIS-A and the SIS-C.

	SIS-A	SIS-C
Parcels	Indicators	Indicators
	Part A: Home Living activities	Part A: Home Life activities
AP1	4. Dressing	4. Dressing
	1. Operating home appliances/electronics	9. Operating electronic devices
AP2	2. Bathing and taking care of personal hygiene and grooming needs	3. Washing and keeping self-clean
	8. Housekeeping and cleaning	1. Completing household chores
AP3	3. Using the toilet	5. Using the toilet
	6. Eating food	2. Eating
	7. Taking care of clothes	6. Sleeping and/or napping
	5. Preparing food	7. Keeping track of personal belongs at home
	Phantom indicator	8. Keeping self-occupied during unstructured time at home
	Part B: Community Living activities	Part B: Community and Neighborhood activities
BP1	3. Participating in preferred community activities	5. Participating in community service and religious activities
BP2	5. Using public services in the community	4. Using public services in one's community or neighborhood
	1. Getting from place to place throughout the community	1. Moving around the neighborhood and community
BP3	2. Participating in recreation/leisure activities in the community	2. Participating in leisure activities (physical)
	6. Shopping and purchasing goods and services	3. Participating in leisure activities (non-physical)
		6. Shopping
	4. Accessing public buildings and settings	8. Attending special events in the community or neighborhood
	8. Going to visit friends and family	7. Complying with basic community standards, rules, and/or laws
	7. Interacting with community members	Phantom indicator
	Part E: Health and Safety activities	Part E: Health and Safety activities
EP1	3. Avoiding health and safety hazards	8. Avoiding health and safety hazards
	7. Maintaining physical health and fitness	2. Maintaining physical fitness
EP2	8. Maintaining emotional well-being	3. Maintaining emotional well-being
	6. Maintaining a nutritious diet	4. Maintaining health and wellness
	5. Learning how to access emergency services	5. Implementing routine first aid when experiencing minor injuries
	1. Taking medications	7. Protecting self from physical, verbal, and/or sexual abuse
	4. Obtaining healthcare services	6. Responding in emergency situations
	2. Ambulating and moving about	1. Communicating health-related issues and medical problems
	Part F: Social activities	Part F: Social activities
FP1	4. Making and keeping friends	6. Making and keeping friends
	5. Engaging in loving and intimate relationships	1. Maintaining positive relationships with others
FP2	7. Communicating with others about personal needs	7. Communicating with others in social situations
	1. Using appropriate social skills	8. Respecting others personal space/property
	6. Socializing within the household	2. Respecting the rights of others
	3. Socializing outside the household	
	2. Participating in recreation/leisure activities with others	3. Maintaining conversation
	8. Engaging in volunteer work	5. Coping with changes in routines and transitions
	Phantom indicator	4. Responding to and providing constructive criticism
		9. Protecting self from exploitation and bullying
	Part G: Protection and Advocacy activities	PART G: Advocacy activities
GP1	2. Making choices and decisions	4. Making choices and decisions
GP2	8. Advocating for others	5. Advocating for and assisting others
	1. Advocating for self	6. Learning and using self-advocacy skills
	5. Belonging to and participating in self-advocacy/support organizations	8. Participating in educational decision making

(continued)

Table 2. (continued)

Parcels	SIS-A Indicators	SIS-C Indicators
	7. Managing money and personal finances	1. Expressing preferences 7. Communicating personal wants and needs
	3. Protecting self from exploitation	2. Setting personal goals 3. Taking action and attaining goals
	4. Exercising legal/civic responsibilities 6. Obtaining legal services	9. Learning and using problem solving and self-regulation strategies in the home and community

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Note. Highlighted indicators are the same between two versions of the SIS. The names of created parcels using highlighted indicators (e.g., AP1) are presented in the first column. SIS = *Supports Intensity Scale*.

not have counterpart items. When there were differing numbers of items in an activity domain, phantom indicators were used. Table 3 (highlighted results) provides the outcomes of measurement invariance testing for the measurement model described in Table 2. Both weak and strong invariance (i.e., ΔCFI $\leq$.01; Cheung & Rensvold, 2002) were supported, indicating that the common counterpart items' factor loadings and intercepts for each construct could be equated across two versions of SIS. As previously mentioned, after identifying the best item-level alignment, parcels were created using the item-to-construct balancing approach. Table 2 identifies the items that were combined to create parcels (column 1).

Research Question 2: Partial Measurement Invariance Across Parallel Activity Domains

After establishing the best structure for the measurement model, the structure was tested for partial factorial invariance. As shown in Table 3 (results without highlights), strong invariance was established after allowing for a correlation between two unique indicators of the Protection and Advocacy Activities on the SIS-A (i.e., Belonging to and participating in self-advocacy/support organizations with Exercising legal/civic responsibilities). Modeling residual-centered phantom indicators, as previously explained, necessitates corrections to the null and target models' fit indices (right-side columns in Table 3). The partial configural model was acceptable based on the following fit indices: $\chi^2(1{,}017) = 2{,}538.823$, *df*-corrected RMSEA = .104, *df*-corrected CFI = .905, and *df*-corrected TLI = .895. These model fit values are at the border of acceptable model fit (Little, 2013), but close inspection of the potential model modifications did not reveal any additional parameters that were substantively meaningful or would appreciably change model fit. Therefore, we used this model as our baseline for comparison. Based on Cheung and Rensvold (2002)'s criterion to determine the tenability of invariance, both weak (Δdf-corrected CFI = .001) and strong (Δdf-corrected CFI = .003) invariances were established.

Furthermore, adding in a covariate (i.e., personal-capacity construct defined by intellectual functioning and adaptive levels) had no impact on model fit. Two distinct SEM models were tested when examining the impact of the personal-capacity construct on support needs, because homogeneity of variances/covariances was not established (see Table 3) across the two versions of the SIS. The lack of homogeneity indicates that the parallel constructs have different variances as well as different patterns of interrelationships across activity domains.

Research Question 3: Latent Parameters

The final step was to compare the latent means of parallel domains across the SIS-A and SIS-C. We found significant overall differences in the latent means, $\Delta\chi^2(5) = 51.389$, $p <$ .001, across activity domains on the SIS-A and SIS-C. Follow-up testing (see Table 4) suggested that the differences were concentrated in the Community Living, Health and Safety, and Social activity domains. As seen in Table 4 (far-right columns), the data indicated that the sample of youth aged 15 to 21 years reported lower support needs in domains of Community Living and Social Activities on the SIS-C versus the SIS-A, but the opposite pattern was revealed in the Health and Safety domain. Based on Cohen's (1988) criteria to determine degrees of effect sizes (i.e., .20 as small, .50 as medium, .80 as large), Community Living and Social Activities had very small effect sizes (d = .03 and d = .13, respectively). The effect size for Health and Safety Activities was .3 indicating a moderate difference between the SIS-A and SIS-C.

Discussion

The purpose of this study was to systematically compare both versions of the SIS at both item and construct level to

Table 3. Fit Indices for the Nested Sequence for Two Different Sets of Measurement Invariance Tests.

		Uncorrected					Corrected							
Model	Chi-square	*df*	*p*	RMSEA	CFI	TLI	$\Delta\chi^2$	*df*	Δdf	*p*	RMSEA	CFI	TLI	Constraint tenable
Null model	9,385.747	462	.00	—	—	—	—	—	—	—	—	—	—	—
Configural invariance	1,241.719	398	.00	.122	.905	.890	—	—	—	—	—	—	—	—
Weak invariance	1,260.046	415	.00	.120	.905	.895	—	—	—	—	—	—	—	Yes
Strong invariance	1,370.799	432	.00	.124	.895	.887	—	—	—	—	—	—	—	Yes
Null model	17,262.574	1,122	.00	—	—	—	—	1,107	—	—	—	—	—	—
Configural	2,696.124	1,018	.00	.108	.896	.885	—	1,003	—	—	.109	.895	.884	—
Partial configural	2,538.823	1,017	.00	.103	.906	.896	—	1,002	—	—	.104	.905	.895	Yes
Weak	2,557.922	1,024	.00	.103	.905	.896	—	1,009	—	—	.104	.904	.895	Yes
Strong	2,622.480	1,031	.00	.104	.901	.893	—	1,016	—	—	.106	.901	.892	Yes
Strong with covariate	2,862.481	1,155	.00	.102	.897	.887	—	1,140	—	—	.104	.893	.896	Yes
Homogeneity of Var/Cov	2,667.262	1,046	.00	—	—	—	44.782	1,031	15	<.001	—	—	—	No
Latent mean	2,674.517	1,036	.00	—	—	—	52.037	1,021	5	<.001	—	—	—	No
Latent mean with covariate	2,913.870	1,160	.00	—	—	—	51.389	1,145	5	<.001	—	—	—	No

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Note. Highlighted models indicate fit indices for the nested sequence of initial measurement invariance tests. The remaining models are fit indices for the nested sequence of partial measurement invariance tests. The combined scores of IQ and adaptive behavior served as a covariate. RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index.

identify similarities and differences in students aged 15 to 21 years, as this is the age range when students are likely to transition from assessment with the SIS-C to the SIS-A. The results of this study provide important, though certainly preliminary, information on (a) how results from either assessment can be used to as part of age-appropriate transition assessment to inform supports planning on parallel constructs and (b) how transitioning from assessment with the SIS-C to the SIS-A for youth above age 16 can provide meaningful information-related support needs in postschool domains.

Study Limitations and Implications for Future Research

This study has several limitations that must be considered in interpreting the findings. First, although the sample comprised of participants with intellectual disability, approximately half of the sample had an additional disability label. Furthermore, the reporting of these categories was based on teacher report from the student's educational record, not independent assessment information. Future research is needed that examines homogeneous participants with intellectual disability to compare the underlying relations between the two versions of the SIS, as well as to explore potential differences in such relations between heterogeneous and homogeneous groups.

It is also worthwhile to note that the sample was highly diverse, with approximately 46% of the sample identifying as African American. Multiple sources suggest that diverse students, particularly African Americans may be overrepresented in the intellectual disability category (U.S. Department of Education & U.S. Office of Special Education and Rehabilitation Services, 2011) and our sample may be representative of this fact. Future research is needed to examine the use of both versions of the SIS across diverse racial/ethnic groups specifically examining construct comparability and differential item functioning. Furthermore, strategies to conduct SIS interviews and engage in supports planning that is culturally responsive must be developed and evaluated.

Summary of the Findings

The findings of this study suggest meaningful patterns of similarities and differences at the item and construct level on the SIS-A and SIS-C. Those items that did align showed strong measurement invariance, suggesting that the same set of items can be used to measure support needs in these activity domains across the SIS-A and SIS-C in youth of this age range. Furthermore, although some of these highlighted items in Table 2 have exactly the same activity statements (e.g., "Using the toilet" in Home Living activities for both versions), some have slight differences to reflect a person's chronological age and changed contextual demands but appear to carry the identical underlying information (e.g., "Advocating for self" on the SIS-A and "Learning and using self-advocacy skills" on the SIS-C). Even with these

Table 4. Tests of the Latent Means and Estimated Latent Means.

Model	χ^2	Corr. *df*	*p*	$\Delta\chi^2$	Corr. Δ *df*	*p*	Constraint tenable	SIS-A *M*[a] (*SE*)	SIS-C *M*[a] (*SE*)	Effect size[b]
Strong invariance with covariate	2,862.481	1,140	.00	—	—	—	—	—	—	—
Mean invariance with covariate	2,913.870	1,145	.00	51.389	5	<.001	No	—	—	—
Home Living-related activities	2,911.892	1,144	.00	1.978	1	.106	Yes	—	—	—
Community Living-related activities	2,905.484	1,144	.00	8.386	1	.002	No	2.40 (.16)	2.23 (.15)	.03
Health and Safety activities	2,877.648	1,144	.00	36.222	1	<.001	No	1.83 (.13)	2.12 (.15)	.30
Social activities	2,894.414	1,144	.00	19.456	1	<.001	No	2.07 (.15)	1.76 (.14)	.13
Advocacy-related activities	2,912.990	1,144	.00	.880	1	.274	Yes	—	—	—

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Note. Corr. *df* = Corrected *df*. The combined scores of IQ and adaptive behavior served as a covariate. SIS = *Supports Intensity Scale*.

[a]Unstandardized values are presented. [b]Effect size is latent *d*, where $d = (\alpha_2 - \alpha_1) / \sqrt{\frac{(n_1 \times \psi_1 + n_2 \times \psi_2)}{n_1 + n_2}}$; α_2 and α_1 are the estimated means in latent variable metric; n_2 and n_1 are the sample size for each group; ψ_2 and ψ_1 are the estimated latent variances of the distributions around the latent means of α_2 and α_1, respectively.

differences, however, the aligned items show measurement invariance. The identified common counterpart items and parallel constructs provide the mechanism to conduct longitudinal studies or compare support needs in different age groups.

There were differences in the number of aligned items within parallel activity domains. The Home Living (six items) and Community Living (five items) have the most items in common, suggesting more similarities in the key indicators of support needs in these activity domains in children and adults. Advocacy activities had the fewest number of overlapping items (three) across versions, suggesting this domain has more developmental differences. The SIS-C, for example, primarily focused on items related to supporting children to express their own preferences and engage in goal-governed actions and self-regulated strategies, whereas the SIS-A represented more advanced advocacy activities, such as exercising legal/civic responsibilities. These differences suggest the importance of transitioning from the SIS-C to the SIS-A with students in this age range to begin to assess the support needs that youth may have as they transition to the environmental demands of adulthood from childhood.

At the latent level, when examining the latent means of parallel constructs, only the subset of aligned items was included in the analyses as these are the items that were determined to be comparable across versions of the SIS. Three of the five latent activity domains demonstrated differences across versions of the SIS: Community Living, Health and Safety, and Social. These differences remained present even after accounting for a personal-capacity covariate defined by intelligence and adaptive behavior scores. Interestingly, youth aged 15 to 21 years tended to score higher in support needs in the Community Living and Social domains on the SIS-A, but lower in the Health and Safety domain. These findings may reflect the different environments experienced by youth and youth adults. For example, for youth still in school settings, there may be less need for support in social activities as there are natural opportunities for social activities at school versus fewer natural social opportunities in adulthood. However, more investigation is needed to explore these findings, particularly for Health and Safety, given research suggesting the barriers to health in adulthood for adults with disabilities. Further research is also needed to examine the relation between total scores across the two versions of the SIS that include parallel constructs, distinct constructs, and their respective indicators.

Implications for Practice

The purpose of implementing the SIS is to understand the supports needed by people with intellectual disability to fully participate in the same activities that their peers without disabilities access and value. Information on support needs can be used to inform planning teams, including educational planning teams, to build systems of supports and then monitor and evaluate the effectiveness of the supports provided. Schalock and Verdugo (2012) provided more information on how the SIS-A can be used in support provision, and Walker, DeSpain, Thompson, and Hughes (2014) provided information on the application of the SIS-C in school settings. Findings of this study, in particular, can assist practitioners in conducting age-appropriate transition assessment and developing, implementing, and evaluating transition plans for adolescents with disabilities. The Individuals With Disabilities Education Improvement Act of 2004 requires any student with disability who is leaving

the school system to receive a summary of his or her academic achievement and functional performance, which includes recommendations to support the student to achieve desired postsecondary goals. Dukes and Shaw (2007) noted that the summary of performance (SOP) should report both formal and informal data to assist students' successful transition, emphasizing practitioners' discretion in making recommendations. In this light, both SIS-A and SIS-C are logical and beneficial assessments to use for students' SOPs because school professionals involved in transition services can provide data-based recommendations on the supports that will be needed in postsecondary environments. For both transition planning and SOPs, practitioners can use the profile of support needs that each SIS generates (a visual plot that provides a graph or pattern of a person's support needs) to understand each student's relative strengths and needs. While in school, a SIS-C plot may be most useful; for the SOP, a SIS-A plot may be most useful. Teachers can, therefore, promote seamless support planning by focusing on support-need activities that are common in SIS-C and SIS-A (highlighted items in Table 2) and paying extra attention to transition-related activities that are distinct in SIS-A. Finally, as an extension of SOPs, service providers in a range of postsecondary settings can also determine practical supports that a person needs to fully participate in major life activities. The shared understanding of assessment information between education and community agencies (or postsecondary education) is critical to improve transition and career development for students with disabilities (Neubert & Leconte, 2013), and the SIS is a desirable tool to facilitate the transition practices.

It is also worthwhile to note that SIS-A information has been used extensively in developing individualized support plans (ISPs) after the evaluation of support needs to generate and/or coordinate individualized support processes (Buntinx & Schalock, 2010; Thompson et al., 2009). Such strategies in the adult service system could be generalized to the identification of support plans in the school context during transition planning as support plans are designed to determine and use resources and strategies to improve human performance, whereas achievement plans such as IEPs or individualized rehabilitation plans target on accomplishing measurable education goals (Schalock & Verdugo, 2012). Considering these two distinct purposes of plans, it is necessary to incorporate the component of ISP into IEPs (or individualized written rehabilitation plans for older populations) so that stakeholders can evaluate a person's skill mastery and support strategies at the same time to improve transition-related outcomes (Schalock et al., 2010). To make this happen, however, future studies need to examine how the stakeholders (e.g., teachers, administrators, parents, policymakers) understand the support planning process or use the individual support strategies aligned with a student's identified support needs. In addition, roles and responsibilities of education professionals should be clearly addressed to plan, deliver, and evaluate support strategies.

Conclusion

Assessing younger students' support needs using the SIS-C and then substituting assessment using the SIS-A during students' transition period is critical in designing, implementing, and evaluating educational and support plans as students face changing environments and challenges. The data in this study suggest comparability in the parallel constructs across the SIS-C and SIS-A, indicating that this information can be considered longitudinally, but that the addition of the domains of Lifelong Learning and Employment on the SIS-A can provide meaningful information during the transition period. In the same vein, this study supports the use of both versions of the SIS to integrate support needs in transition assessment and support planning across an individual's life span, and suggests that transition-aged youth can seamlessly move between assessments to continuously inform supports planning. Future study is needed to promote stakeholders' understandings on support needs assessments and support planning to facilitate smooth transitions of youth and young adults with intellectual and developmental disabilities, including ways such as the SOP to effectively communicate and translate this information between school-based and postsecondary supports and services.

Declaration of Conflicting Interests

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