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Examining Underlying Relationships Between the Supports Intensity Scale–Adult Version and the Supports Intensity Scale–Children's Version

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Abstract

Given the growing importance of support needs assessment in the field of intellectual disability, it is imperative to develop assessments of support needs whose scores and inferences demonstrate reliability and validity. The purpose of this study was to examine the criterion validity of scores on the *Supports Intensity Scale–Children's Version* (SIS-C) by identifying the relation of SIS-C scores to those on the *Supports Intensity Scale–Adult Version* (SIS-A) for youth on the boundary of appropriateness of the two assessments (ages 16–21). Using data from 142 youth who both completed the SIS-A and SIS-C, we found that parallel support need constructs on the two versions of the SIS have strong associations. In addition, there were similar relations between personal competency (i.e., intelligence and adaptive behavior) and support needs measured by the SIS-A and SIS-C. Implications for future research and practice are discussed.

Keywords

intellectual disability, transition

The *Supports Intensity Scale* (SIS; Thompson et al., 2004) and its refreshed version (*Supports Intensity Scale–Adult Version* [SIS-A]; Thompson et al., 2015a) were the first standardized measure of support needs, a psychological construct 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). The need for measures, such as the SIS-A, emerged from social-ecological models of disability that define disability as a discrepancy between personal competency and environmental demands (Schalock et al., 2010). As such, disability is a state of functioning that can be improved by the application of appropriate personalized supports (Thompson et al., 2009). To identify and develop appropriate personalized supports to assist people with intellectual disability (ID), reliably assessing support needs is a necessary first step.

Support needs assessment activities should begin as early as possible and endure throughout the person's life as a way of ensuring meaningful systems of supports that promote full participation in culturally valued settings (Schalock et al., 2010). For those reasons, the *Supports Intensity Scale–Children's Version* (SIS-C; Thompson et al., 2016a) was developed to compliment the SIS-A (Thompson et al., 2015a) and to assess the relative intensity of support needed by children ages 5 to 16. As shown in Figure 1, the SIS-C author team conceptualized parallel constructs on the SIS-A and SIS-C that had relevance across the life span (home living, community living, health and safety, social, and advocacy domains), while recognizing at the measurement level the items may differ slightly. In addition, two distinct constructs were specified on the measures, representing different demands of child and adult environments (SIS-C: school participation and learning; SIS-A: lifelong learning and employment). For example, items on the SIS-C School Participation subscale include "moving around within the school and transitioning between activities" whereas items on the SIS-A

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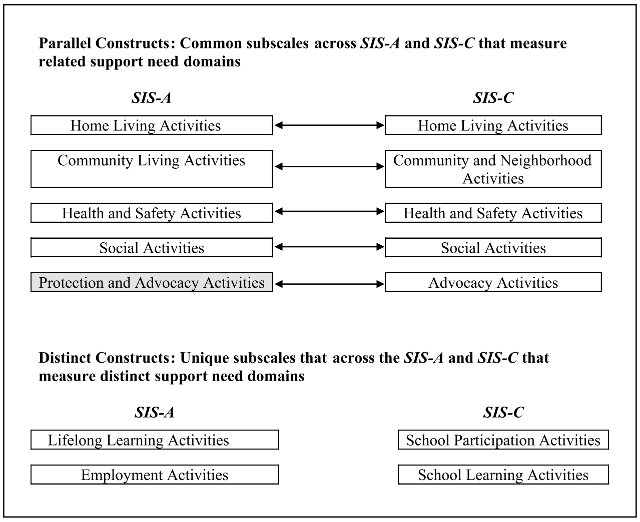

Figure 1. The alignment of parallel and distinct constructs between SIS-A and SIS-C.
Note. The highlighted construct is the not currently included in the *Supports Needs Index* on the SIS-A. SIS-A = *Supports Intensity Scale–Adult Version*; SIS-C = *Supports Intensity Scale–Children's Version*.

Lifelong Learning subscale included "participating in training/educational decisions." Seo, Shogren, Wehmeyer, et al. (2016) provided an overview of the relationship between items across the two scales.

Researchers have examined the construct validity of the SIS-C. The correlation coefficients between SIS-C constructs were strong, ranging from .65 to .89 in the total sample (Thompson et al., 2016b). The factorial validity of the SIS-C was also established, confirming measurement invariance across age groups (Shogren, Seo, Wehmeyer, Thompson, et al., 2015). Attempts to examine criterion validity of the SIS-C have also been made. Due to a lack of standardized assessments that measure support needs of children with ID, Thompson et al. (2016b) examined correlations between SIS-C scores and SIS-C respondents' estimated ratings of support needs on a 5-point scale (1 = *low support needs* to 5 = *high support needs*) for each SIS-C domain and found strong coefficients ranging from .62 to .79 in the total sample. Criterion validity of SIS-C scores was also established when Shogren et al. (2016) divided the SIS-C norming data into two groups (children with diagnoses of autism and ID vs. children with diagnoses of ID alone), and examined intercorrelations between SIS-C scores and respondents' estimated ratings of support needs. The correlation coefficients were all strong and significant at $p < .01$ at both groups, ranging from .55 to .71 in ID only group and .67 to .85 in autism and ID group.

The aforementioned studies are regarded as initial efforts to establish the validity of the SIS-C using the standardization data collected from children or adolescents with ID aged 5 to 16 years. Given that one of the primary strengths of the SIS-C is its potential use as a transition assessment for youth with ID (Seo, Shogren, Wehmeyer, et al., 2016), we further tested the criterion validity of the SIS-C for youth with ID using the SIS-A as a criterion measure for the SIS-C. Such work is needed to guide transition planning, particularly for youth who start to face adult-related environmental demands as they plan for transitioning from school to adulthood, because transition-aged students who receive school-based services could be assessed using either the SIS-A and/or the SIS-C depending on their age and the purpose of the assessment. Determining the relationship between the two measures in transition-age youth can be useful when applying a support planning process (Thompson et al., 2009; Walker, DeSpain, Thompson, & Hughes, 2014), informing steps to undertake to determine which tool can be most useful given the focus on the student's educational and transition programming.

To provide further information on the validity of the SIS-C and its relation with the SIS-A, this article examined (a) latent correlations between SIS-A and SIS-C domains with a particular emphasis on parallel constructs and (b) the associations between a personal-competency construct (i.e., defined by intelligence and adaptive behavior levels from educational records) and support needs measured by SIS-A and SIS-C for youth with ID. The first examination provides key information to guide transition planning teams in selecting the most appropriate tool based on the goals of youth to design seamless supports. For example, further evidence establishing criterion validity between SIS-C and the SIS-A scores will provide justification for teachers using either the SIS-A or SIS-C in planning for supports, by determining if the primary focus is on planning for supports in school-based transitional contexts (e.g., learning and using metacognitive strategies as assessed in the school learning activities domain of the SIS-C) or employment-based transition environments (e.g., seeking information and assistance from an employer as assessed on the employment activities domain of the SIS-A), respectively. The second research question will provide information documenting the validity of the tool for use by teachers with students with varying levels of intellectual impairments and deficits in adaptive behavior, given previous research suggesting the impact of these factors. We hypothesize that if the same underlying correlations across domains and associations between personal competency and support needs constructs are found on the SIS-C and the SIS-A, this provides practical information establishing that the use of the two scales is valid for students with varying levels of intellectual functioning and adaptive behavior impairments, depending on the focus of supports planning (i.e., school participation and learning for the SIS-C vs. lifelong learning and employment for the SIS-A). Specifically, the analyses in this study address two questions:

Research Question 1: Do SIS-A and the SIS-C have strong relations between the parallel and distinct constructs?

Research Question 2: Does a personal-competency construct defined by intelligence and adaptive behavior levels equivalently predict the five parallel domains on the SIS-A and the SIS-C?

Method

Participants: Students, Interviewers, and Respondents

The administration of the SIS-C involves three types of participants: students, interviewers, and respondents. For this study, the SIS-A and SIS-C were completed for 142 student participants with ID. The average age of participants was 18 years (*SD* = 1.5). Students' level of impairment in intellectual functioning and adaptive behavior which were used to define the personal-competency construct used in Research Question 2 were obtained from educational records obtained from teachers. Specifically, standardized scores on assessments of intellectual functioning or adaptive behavior that were used to indicate student's level of impairment in educational records were employed to classify students into one of our groups (i.e., IQ or AB score, <25 or profound; IQ or AB score, 25–39 or severe; IQ or AB score, 40–55 or moderate; IQ or AB score, 55–70 or mild). Table 1 provides further information on demographic characteristics of students. Although the SIS-C is validated for youths through age 16, we recruited 15- to 21-year-olds who are moving from assessment with the SIS-C to the SIS-A and still receiving school-based education services given the use of the SIS-C in school-based services. Second, 25 interviewers (i.e., teachers trained in SIS-C administration) collected data from respondents on the 142 students. Interviewers were trained using standard procedures developed by American Association on Intellectual and Developmental Disabilities (Thompson et al., 2015b, 2016b; see https://aaidd.org/sis for more information). A total of 284 respondents were interviewed because SIS administration required at least two respondents per student to gather divergent perspectives on support needs which are integrated by the trained interviewer. In our study, because all students were still receiving school-based services, teachers were frequent respondents (81%; although it is important to note that a teacher could not serve as an interviewer and respondent for the same student), followed by paraprofessionals (12%), parents (1%), and students themselves (1%). Given the interviewers' key responsibilities to make a final rating based on their clinical judgment and information collected from multiple respondents, we believe that the large input from teachers would not necessarily bias ratings of support needs.

Table 1. Demographic Characteristics of Study Participants Being Rated.

Variable	*n*	%
Gender		
Female	62	43.7
Male	79	55.6
Missing	1	0.7
Student's intelligence level		
<25 or profound	10	7.0
25–39 or severe	11	7.7
40–55 or moderate	51	35.9
55–70 or mild	69	48.6
Missing	1	0.7
Student's adaptive behavior level		
Profound	9	6.3
Severe	13	9.2
Moderate	58	40.8
Mild	61	43.0
Missing	1	0.7
Age		
15–16	34	23.9
17–18	72	50.7
19–21	35	24.6
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 and 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]Percentages of additional diagnoses/classifications are computed based on each disability category.

Measures

The SIS-A. The SIS-A measures the support needs of people with ID aged 16 to 64 years. As shown in Figure 1, the standardized portion of the instrument is comprised of 49 items grouped into six life activities: home living, community living, lifelong learning, employment, health and safety, and social activities (see Thompson et al., 2015b, to find the scale development process). Standard scores for these six domains can be calculated, as can an index overall intensity of support needs (Support Needs Index [SNI] Score). The SIS-A also includes eight items on a Protection and Advocacy subscale, which was originally part of the SIS-A SNI, scored the same way as the six domains. Although these items were subsequently removed because of concerns with its psychometric properties, these concerns have since been discounted (Shogren et al., 2014). Items on the SIS-A have been found to have high internal consistency, with Cronbach's alphas greater than .9 (Thompson et al., 2015b). The factor structure of the SIS-A with the six domains demonstrated good model fit, and the involvement of the Protection and Advocacy domain did not worsen the model fit and provided unique information (Shogren, Seo, Wehmeyer, Thompson, & Little, 2015). Items on the SIS-A are rated across the three dimensions on a 0 to 4 Likert-type scale to measure current status of support needs: frequency (i.e., how often support is needed), daily support time (i.e., how much time is needed to support), and type of support (i.e., nature of support needed). Two additional sections are included on the SIS-A, exceptional medical and behavioral support needs, recognizing that these conditions may impact overall support needs. The intensity of support needed to manage 31 exceptional medical conditions and behavioral challenges are rated on a 0 to 2 scale (Thompson et al., 2015b), and these items are used to inform support planning but do not inform standard scores.

The SIS-C. The SIS-C assesses support needs for children with ID aged 5 to 16 years. The SIS-C has a total of 61 items (see Figure 1) categorized into seven domains for which subscale domain standard scores can be calculated and are used to determine an overall SIS-C SNI. Research on the SIS-C has demonstrated good reliability (Cronbach's $\alpha > .9$, Omega coefficient > .9; Thompson et al., 2016b). Shogren, Seo, Wehmeyer, Thompson, et al. (2015) tested the factor structure of the SIS-C and suggested that the measurement structure can be replicated across different age bands represented in the norming sample. Items on the SIS-C are also rated on the three dimensions used for the SIS-A: type, frequency, and amount of time of support. Three dimensions were determined by the theoretical framework of the support needs measurement (Thompson et al., 2015b, 2016b), and an empirical study that examined the impact of type, frequency, and daily support time in defining the support needs confirmed this theoretical measurement model of support needs (Seo, Shogren, Little, Thompson, & Wehmeyer, 2016). In addition, there are 17 medical and 14 behavioral items that are measured on the same 0 to 2 scale. Thompson et al. (2016b) fully describes the SIS-C development process.

Procedures

The data analyzed for this project were a subset of the data from the standardization sample for the SIS-C (n = 4,015). Specifically, for a subset of students included in the standardization sample, data were collected from the SIS-C and the SIS-A to inform knowledge of the relations across the two versions of the SIS. To generate the standardization sample, school districts in Illinois, New York, and Tennessee (one school district per state) were contacted. A convenience sampling method was used; however, teachers from a range of schools and classes within the school districts were recruited to minimize sample bias. Individualized Education Program (IEP) case managers were recruited, and it was their choice in terms of how many students they wanted to assess under circumstances allowed. Teachers, who served as interviewers in the present study, were trained on the administration and scoring of the SIS-A and SIS-C using standard training procedures (Thompson et al., 2015b, 2016b). Teachers administered the SIS-A and SIS-C either at the same time or within a 2-month span. The diversity in time of administration related to scheduling factors. Because support need is a relatively stable construct, it was not assumed that students' support needs had changed during the time that lapsed between the two interviews.

Data Analysis

Prior to analysis, proportion of maximum scoring (POMS) was used to keep the metrics of measured variables across the SIS-A and SIS-C the same (Little, 2013). This scoring method was necessary because, even though items on both the SIS-A and SIS-C are rated on the same three dimensions (i.e., frequency, daily support time, type of support), the rating anchors for frequency slightly differ, which led to differences in the range of possible scores across items within the SIS-A and across the SIS-A and SIS-C. After POMS, the rescaled variables were averaged across three dimensions of the SIS-A and SIS-C, respectively, which were included in structural equation modeling models for analyses. All analyses were conducted in Mplus 6.2 (Muthén & Muthén, 1998–2012) using maximum likelihood estimation. Figure 2 presents the hypothesized measurement model for the SIS-A and SIS-C; this model was specified based on the findings from Seo, Shogren, Wehmeyer, et al. (2016) that examined construct comparability between the SIS-A and SIS-C. Parcels were created using the item-to-item construct balancing approach (Little, 2013) that pairs the item with the highest item-scale correlation with the item with the lowest item-scale correlation. There were no missing data after creating parcels. Model fit was considered as acceptable when root mean square error of approximation (RMSEAs) were less than .08; comparative fit index (CFIs) and Tucker–Lewis index (TLIs) were greater than .90; and standardized root mean square residual (SRMRs) were less than .08 (Brown, 2015; Little, 2013). It is important to note that models should be evaluated using multiple fit indices with a consideration of the particular aspects of the analytic situation. Visit https://beach.drupal.ku.edu/node/75 to find information on the skewness and kurtosis of indicators used for the hypothesized measurement model.

To examine the first research question related to patterns of correlations between constructs on the SIS-A and SIS-C,

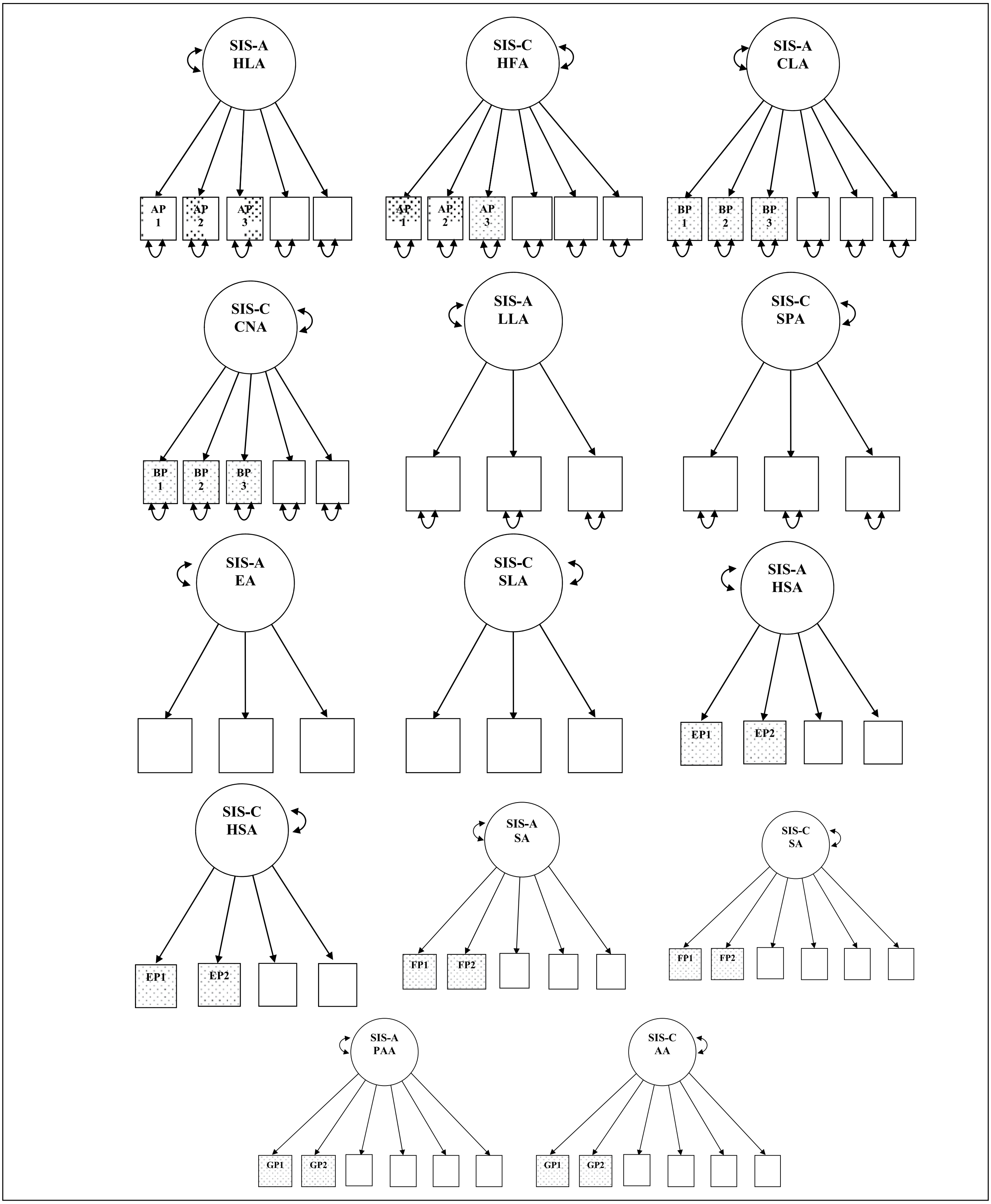

Figure 2. The measurement models of the SIS-A and the SIS-C.

Note. Equivalent manifest variables across the two versions of the SIS are indicated by dots. SIS-A = *Supports Intensity Scale–Adult Version*; SIS-C = *Supports Intensity Scale–Children's Version*; HLA = home living activities; HFA = home life activities; CLA = community living activities; CNA = community and neighborhood activities; LLA = lifelong learning activities; SPA = school participation activities; EA = employment activities; SLA = school learning activities; HSA = health and safety activities; SA = social activities; PAA = protection and advocacy activities; AA = advocacy activities.

Table 2. Correlation Coefficients Among Constructs of the SIS-A and SIS-C.

Construct	HFA (C)	CNA (C)	SPA (C)	SLA (C)	HSA (C)	SA (C)	AA (C)
HLA (A)	**.84**	.73	.71	.55	.70	.67	.67
CLA (A)	.73	**.82**	.77	.69	.79	.70	.75
LLA (A)	.77	.82	.80	.76	.82	.75	.79
EA (A)	.77	.74	.75	.70	.75	.72	.76
HSA (A)	.85	.83	.83	.69	**.85**	.79	.82
SA (A)	.81	.79	.82	.68	.80	**.81**	.78
PAA (A)	.66	.72	.74	.67	.76	.72	**.76**

Source. Adapted with permission from Thompson et al. (2016b).
Note. Correlation coefficients presented in this table are parameter estimates from separate analyses. Bolded estimates indicate coefficients between parallel constructs. Every coefficient is significant at $p < .001$. (A) and (C) indicate adults' and children's versions, respectively. SIS-A = *Supports Intensity Scale–Adult Version*; SIS-C = *Supports Intensity Scale–Children's Version*; HFA = home life activities; CNA = community and neighborhood activities; SPA = school participation activities; SLA = school learning activities; HSA = health and safety activities; SA = social activities; AA = advocacy activities; HLA = home living activities; CLA = community living activities; LLA = lifelong learning activities; EA = employment activities; PAA = protection and advocacy activities.

we ran separate analyses to test each support need domain correlation because of the relatively small sample size and the complexity of the model (e.g., home living on SIS-A vs. home life on SIS-C). The magnitude of the correlation coefficients was regarded as high (.80 or above), moderate (.40 to .60), and low (.30 or less; Shavelson, 1996).

To address the second research question on the degree to which the impact of the personal-competency construct was equivalent on the five parallel domains on the SIS-A and the SIS-C, two sequential analyses were performed. First, we conducted separate analyses to examine the predictive impact of the personal competency on each support needs domain. The personal-competency construct was specified by equating factor loadings of the intellectual functioning and adaptive behavior classification derived from educational records (coded as 1 = mild, 2 = moderate, and 3 = severe/profound). This step was taken to obtain more accurate parameter estimates by (a) supporting the local identification of the model and (b) dealing with multicollinearity resulting from the high correlation between two classifications (r = .86). We then conducted likelihood ratio (LR) tests to examine if the personal-competency construct equivalently predicted support needs on the SIS-A and SIS-C. Specifically, LR tests were conducted by comparing the model fit when the regression path was freely estimated with when the regression path was constrained to be equal between the SIS-A and SIS-C (see Brown, 2015, for more information). The strong invariance model from Seo, Shogren, Wehmeyer, et al. (2016) served as the baseline model for chi-square comparisons.

Results

For the first research question, the bolded correlation coefficients in Table 2 indicate strong relationships between parallel activity constructs across both versions of the SIS. The strongest coefficient was found in Health and Safety domain across the two scales (r = .85), whereas the lowest coefficient was found in Advocacy domains across scales (r = .76). We also found high and moderate correlation coefficients between two pairs of distinct constructs: Lifelong Learning and School Participation (r = .80) and Employment and School Learning (r = .70). As shown in Table 3, model fits were acceptable with RMSEAs ranging from .069 to .212, CFIs from .88 to 1.00, TLIs from .85 to 1.01, and SRMRs from .00 to .06. RMSEAs tend to have artificially poor fit and possibly mislead the results when models have small degrees of freedom especially with small sample sizes, which is the case in the present analyses (Kenny, Kaniskan, & McCoach, 2015). When only looking at CFIs and TLIs, less desirable model fit was found in two models with both CFI and TLI being less than .90 (a coefficient between home life activities on SIS-C and home living activities on SIS-A and a coefficient between home life activities on SIS-C and protection and advocacy activities on SIS-A).

In addressing our second research question, Table 4 provides the model fit for each of the models specified to test the predictive path between the personal-competency construct and each support needs domain. Again, we followed Kenny et al.'s (2015) suggestion when evaluating RMSEAs. The majority of models demonstrated acceptable model fit, except for one case in the Protection and Advocacy on SIS-A (see Table 4). This model showed less desirable model fit statistics, indicating the regression parameter estimate should be interpreted with caution and examined in future research. The beta weights suggest that participants with higher levels of personal competency tended to have lower support needs. Next, LR tests were conducted to identify if the degrees to which predictive relations between personal competency and support needs were the same across the two scales for each domain (i.e., to examine the equivalent impact of the personal-competency construct on support needs measured by the SIS-A and SIS-C).

Table 3. Model Fits to Examine Correlation Coefficients Between Constructs of the SIS-C and SIS-A.

Correlation	Chi-square	*p*	RMSEA (90% CI)	CFI	TLI	SRMR
HFA (C) with HLA (A)	$\chi^2(43) = 274.44$	.00	.20 [.17, .22]	0.88	0.85	.06
HFA (C) with CLA (A)	$\chi^2(53) = 201.95$	.00	.14 [.12, .16]	0.93	0.92	.05
HFA (C) with LLA (A)	$\chi^2(26) = 122.08$	.00	.16 [.13, .19]	0.94	0.92	.04
HFA (C) with EA (A)	$\chi^2(26) = 119.01$	.00	.16 [.13, .19]	0.94	0.92	.03
HFA (C) with HSA (A)	$\chi^2(34) = 168.00$	.00	.17 [.14, .19]	0.92	0.90	.05
HFA (C) with SA (A)	$\chi^2(43) = 191.48$	.00	.16 [.13, .18]	0.92	0.90	.04
HFA (C) with PAA (A)	$\chi^2(53) = 301.49$	.00	.18 [.16, .20]	0.89	0.87	.05
CNA (C) with HLA (A)	$\chi^2(34) = 101.44$	.00	.12 [.09, .15]	0.97	0.95	.03
CNA (C) with CLA (A)	$\chi^2(43) = 134.42$	.00	.12 [.10, .15]	0.96	0.95	.03
CNA (C) with LLA (A)	$\chi^2(19) = 35.63$	.01	.08 [.04, .12]	0.99	0.99	.02
CNA (C) with EA (A)	$\chi^2(19) = 65.22$	.00	.13 [.10, .17]	0.97	0.96	.02
CNA (C) with HSA (A)	$\chi^2(26) = 83.73$	.00	.13 [.10, .16]	0.97	0.96	.03
CNA (C) with SA (A)	$\chi^2(34) = 94.09$	.00	.11 [.09, .14]	0.97	0.96	.04
CNA (C) with PAA (A)	$\chi^2(43) = 226.30$	.00	.17 [.15, .20]	0.93	0.90	.04
SPA (C) with HLA (A)	$\chi^2(19) = 53.04$	.00	.11 [.08, .15]	0.98	0.96	.03
SPA (C) with CLA (A)	$\chi^2(26) = 76.12$	.00	.12 [.09, .15]	0.97	0.96	.02
SPA (C) with LLA (A)	$\chi^2(8) = 13.41$	.10	.07 [.00, .13]	1.00	0.99	.02
SPA (C) with EA (A)	$\chi^2(8) = 16.46$	.04	.09 [.02, .15]	0.99	0.99	.02
SPA (C) with HSA (A)	$\chi^2(13) = 36.83$	.00	.11 [.07, .16]	0.98	0.97	.03
SPA (C) with SA (A)	$\chi^2(19) = 48.28$	.00	.10 [.07, .14]	0.98	0.97	.03
SPA (C) with PAA (A)	$\chi^2(26) = 189.26$	.00	.21 [.18, .24]	0.91	0.88	.04
SLA (C) with HLA (A)	$\chi^2(19) = 61.81$	.00	.13 [.09, .16]	0.97	0.96	.04
SLA (C) with CLA (A)	$\chi^2(26) = 69.03$	.00	.11 [.08, .14]	0.98	0.97	.02
SLA (C) with LLA (A)	$\chi^2(8) = 2.66$	.95	.00 [.00, .00]	1.00	1.01	.00
SLA (C) with EA (A)	$\chi^2(8) = 4.38$	.82	.00 [.00, .06]	1.00	1.01	.01
SLA (C) with HSA (A)	$\chi^2(13) = 42.00$	.00	.13 [.08, .17]	0.98	0.96	.03
SLA (C) with SA (A)	$\chi^2(19) = 43.19$	.00	.10 [.06, .13]	0.98	0.98	.02
SLA (C) with PAA (A)	$\chi^2(26) = 192.50$	.00	.21 [.19, .24]	0.92	0.89	.04
HSA (C) with HLA (A)	$\chi^2(26) = 77.25$	.00	.12 [.09, .15]	0.97	0.96	.03
HSA (C) with CLA (A)	$\chi^2(34) = 73.82$	.00	.09 [.06, .12]	0.98	0.98	.02
HSA (C) with LLA (A)	$\chi^2(13) = 30.08$	.00	.10 [.05, .14]	0.99	0.98	.02
HSA (C) with EA (A)	$\chi^2(13) = 42.04$	.00	.13 [.08, .17]	0.98	0.97	.02
HSA (C) with HSA (A)	$\chi^2(19) = 55.32$	.00	.12 [.08, .15]	0.98	0.97	.03
HSA (C) with SA (A)	$\chi^2(26) = 61.20$	.00	.10 [.07, .13]	0.98	0.97	.03
HSA (C) with PAA (A)	$\chi^2(34) = 212.59$	.00	.19 [.17, .22]	0.92	0.90	.03
SA (C) with HLA (A)	$\chi^2(43) = 144.96$	.00	.13 [.11, .15]	0.95	0.94	.03
SA (C) with CLA (A)	$\chi^2(53) = 181.09$	.00	.13 [.11, .15]	0.95	0.94	.04
SA (C) with LLA (A)	$\chi^2(26) = 101.87$	.00	.14 [.12, .17]	0.96	0.95	.03
SA (C) with EA (A)	$\chi^2(26) = 108.93$	.00	.15 [.12, .18]	0.96	0.94	.03
SA (C) with HSA (A)	$\chi^2(34) = 117.39$	.00	.13 [.11, .16]	0.96	0.94	.03
SA (C) with SA (A)	$\chi^2(43) = 124.89$	.00	.12 [.09, .14]	0.96	0.95	.03
SA (C) with PAA (A)	$\chi^2(53) = 271.06$	.00	.17 [.15, .19]	0.92	0.90	.04
AA (C) with HLA (A)	$\chi^2(43) = 122.79$	.00	.11 [.09, .14]	0.96	0.95	.03
AA (C) with CLA (A)	$\chi^2(53) = 133.99$	.00	.10 [.08, .13]	0.97	0.96	.02
AA (C) with LLA (A)	$\chi^2(26) = 70.92$	.00	.11 [.08, .14]	0.98	0.97	.02
AA (C) with EA (A)	$\chi^2(26) = 72.07$	.00	.11 [.08, .14]	0.98	0.97	.02
AA (C) with HSA (A)	$\chi^2(34) = 88.87$	.00	.11 [.08, .13]	0.97	0.97	.02
AA (C) with SA (A)	$\chi^2(43) = 123.71$	.00	.12 [.09, .14]	0.96	0.95	.03
AA (C) with PAA (A)	$\chi^2(53) = 277.13$	.00	.17 [.15,.19]	0.92	0.90	.04

Note. (A) and (C) indicate adults' and children's versions, respectively. SIS-A = *Supports Intensity Scale–Adult Version*; SIS-C = *Supports Intensity Scale–Children's Version*; RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index; TLI = Tucker–Lewis index; SRMR = standardized root mean square residual; HFA = home life activities; HLA = home living activities; CLA = community living activities; LLA = lifelong learning activities; EA = employment activities; HSA = health and safety activities; SA = social activities; PAA = protection and advocacy activities; CNA = community and neighborhood activities; SPA = school participation activities; SLA = school learning activities; AA = advocacy activities.

Table 4. Beta Weights Indicating the Impact of Intelligence and Adaptive Behavior on the Latent Constructs in the Structural Models.

Latent construct	Beta (*SE*)	*z* score	*p*	Standardized beta	Chi-square	*p*	RMSEA (90% CI)	CFI	TLI	SRMR
SIS-A										
Home living	.44 (.10)	4.22	.00	.40	$\chi^2(14) = 54.43$	.00	.14 [.10, .18]	0.95	0.93	.050
Community living	.33 (.10)	3.36	.00	.32	$\chi^2(20) = 73.58$	.00	.14 [.11, .17]	0.96	0.94	.041
Lifelong learning	.36 (.10)	3.55	.00	.34	$\chi^2(5) = 7.13$	.21	.06 [.00, .14]	1.00	0.99	.029
Employment	.46 (.11)	4.33	.00	.42	$\chi^2(5) = 7.58$	.18	.06 [.00, .14]	1.00	0.99	.023
Health and safety	.32 (.10)	3.21	.00	.31	$\chi^2(9) = 50.80$	.00	.18 [.13, .23]	0.93	0.89	.074
Social	.43 (.10)	4.08	.00	.39	$\chi^2(14) = 54.18$	.00	.14 [.10, .18]	0.95	0.92	.044
Protection and advocacy	.26 (.10)	2.69	.01	.25	$\chi^2(20) = 170.02$	.00	.23 [.20, .26]	0.83	0.84	.048
SIS-C										
Home life	.57 (.11)	5.13	.00	.49	$\chi^2(20) = 100.73$	.00	.17 [.14, .20]	0.93	0.90	.036
Community and neighborhood	.54 (.11)	4.98	.00	.47	$\chi^2(14) = 43.78$	.00	.12 [.08, .16]	0.98	0.97	.026
School participation	.49 (.11)	4.66	.00	.44	$\chi^2(5) = 0.48$	.99	.00 [.00, .00]	1.00	1.01	.004
School learning	.34 (.10)	3.47	.00	.32	$\chi^2(5) = 6.92$	.23	.05 [.00, .14]	1.00	1.00	.016
Health and safety	.49 (.11)	4.66	.00	.44	$\chi^2(9) = 13.28$	.15	.06 [.00, .12]	1.00	0.99	.011
Social	.38 (.10)	3.80	.00	.35	$\chi^2(20) = 78.25$	.00	.14 [.11, .18]	0.96	0.94	.026
Advocacy	.39 (.10)	3.88	.00	.36	$\chi^2(20) = 58.09$	.00	.12 [.08, .15]	0.98	0.97	.018

Source. Adapted with permission from Thompson et al. (2016b).
Note. Intelligence and adaptive behavior levels are coded as 1 = mild, 2 = moderate, and 3 = profound and severe. RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index; TLI = Tucker–Lewis index; SRMR = standardized root mean square residual; SIS-A = *Supports Intensity Scale–Adult Version*; SIS-C = *Supports Intensity Scale–Children's Version*.

Table 5. Tests of Beta Weights Indicating the Impact of Intelligence and Adaptive Behavior on Support Needs Across Two Measurements.

Model	χ^2	*df*	*p*	$\Delta\chi^2$	Δdf	*p*	Constraint tenable
Baseline model[a]	2,882.949	1,159	0.00	—	—	—	—
Home living activities	2,883.856	1160	0.00	0.907	1	>.05	Yes
Community-related activities	2,886.135	1,160	0.00	3.186	1	>.05	Yes
Health and safety activities	2,885.077	1,160	0.00	2.128	1	>.05	Yes
Social activities	2,883.133	1,160	0.00	0.184	1	>.05	Yes
Advocacy-related activities	2,883.685	1,160	0.00	0.736	1	>.05	Yes

Source. Reprinted with permission from Thompson et al. (2016b).
Note. SIS-C = *Supports Intensity Scale–Children's Version*; SIS-A = *Supports Intensity Scale–Adult Version*.
[a]Strong invariance model established in Seo, Shogren, Wehmeyer, et al. (2016). This model also includes the distinct SIS-C (School Participation and School Learning) and SIS-A constructs (Lifelong Learning and Employment) and an IQ and adaptive behavior construct.

The impact of personal competency on the five parallel activity domains was equivalent across the SIS-A and SIS-C (see Table 5).

Discussion

The SIS-A has played an important role in integrating support needs assessment into resource allocation and support planning for adults with ID (Thompson et al., 2009). The SIS-C has the potential to play the same role for children and youth with ID. The present study, using data from adolescents and young adults with ID who were still receiving school-based services and completed both versions of SIS, examined the criterion validity of the SIS-C scores by exploring the relation between activity domains across the SIS-A and the SIS-C.

In terms of parallel constructs' relationships, the data suggest strong correlation coefficients between parallel activity domains. Support needs in advocacy-related activities showed the lowest coefficient (r = .76). The lowest coefficient, though still strong, is likely due to the variation shown at the item level. Seo, Shogren, Wehmeyer, et al. (2016) found that the support needs in the area of advocacy-related activities has the least number of shared items (n = 3) among five pairs of parallel constructs across two versions of the *SIS*, and concluded that the advocacy-related activities reflect developmental changes from school to adult life. It should be also noted that some coefficients between nonparallel constructs (e.g., Home Life on the SIS-C and Health and Safety on the SIS-A) were as strong as or slightly larger than the coefficients between parallel constructs. It is uncertain if high coefficients between nonparallel constructs are by-products of multiple tests. Given these findings, future studies should test coefficients among constructs of both scales simultaneously with a large sample size to investigate any further validity-related findings.

As for two pairs of distinct constructs, the correlation coefficient between Lifelong Learning on the SIS-A and School Participation on the SIS-C was strong (r = .80), which was almost the same magnitude of coefficient found for the parallel constructs. Furthermore, the coefficients between even nonlinked constructs (e.g., community and neighborhood activities on the SIS-C and health and safety on the SIS-A) were still strong, ranging from .55 to .85. This suggests that, in the context of school-based assessment, similar findings will be obtained across the SIS-C and SIS-A and that IEP teams can use the assessment most relevant for specific planning being undertaken (i.e., school-based supports for participation and learning or postschool supports related to employment and lifelong learning). This provides critical information for transition planning teams and necessitates identification of the life domains that are being targeted in transition planning for each student as they move through their secondary school experiences.

Further evidence for the criterion validity of the SIS-C scores was found when examining the relation between supports needs and a personal-competency construct. Personal competency predicted each domain on the SIS-A and SIS-C, and these predictive patterns were equivalent on parallel domains across the SIS-A and SIS-C. We were particularly interested in relations between the personal-competency construct and support needs because (a) both Intelligence and Adaptive Behavior scales have remained key diagnostic tools to identify a person's ID over the last 50 years and (b) concepts of support needs and personal competency (especially adaptive behavior on "typical" performance in daily activities) can be often confused, with people assuming that support needs is an inverse notion of personal competence or vice versa while these are two related but not inverse constructs (Schalock et al., 2010). As further described in "Limitations of the Study" section, however, predictive relations found in this study should be further tested in future research using verified IQ and adaptive behavior scores, as the scores used in this study were derived from educational records. Overall, these findings suggest that while personal competence is predictive of support needs and should be considered in supports planning for youth ages 16 to 21, there is a distinction between the constructs of support needs and personal competence, and that support needs must be considered in the context of planning for transition supports for youth and young adults with ID.

Limitations of the Study

In interpreting the findings of this study, there are several limitations that must be considered. First, as there was a relatively small sample size compared with the model complexity, we could not include all constructs in one model simultaneously. Study findings should be understood with cautions because multiple testing increases the probability of Type I errors (i.e., false positive results) while reducing the probability of Type II error (i.e., false negative results; Little, 2013). Second, to analyze the predictive relations, students with severe and profound ID were combined into a single category. Further research is needed with large enough samples to explore unique impacts of level of intellectual functioning and adaptive behavior. Third, we did not independently conduct assessment of intellectual functioning and adaptive behavior impairments and instead relied on information from educational records provided by teachers on classifications of intellectual functioning and adaptive behavior impairments. While it was assumed that educational records provide a reasonable indication of disability classification, independent assessment should be used in future research to provide more specific information on the criterion-related validity between support needs and intellectual functioning and adaptive behavior. Overall, however, the results of this study provide important information to guide supports planning teams to prepare youth and their systems of supports for the transition from school-based supports to postschool supports and environments.

Implications for Practice

A person's pattern and intensity of support needs reflect an "enduring characteristics of the person rather than simply a point-in-time description of the need for a particular type of support" (Schalock et al., 2010, p. 107). The premise underlying this statement provides an essential implication to professional practices, suggesting that children and young adults with ID have ongoing support needs and that support plans should be revised as children and adults with ID encounter new environments and activities. Planning for the movement to new environments and activities is a central focus for adolescents with ID in secondary schools. The Individuals With Disabilities Education Improvement Act (2004) specifies that transition services should include "instruction, related services, community experiences, the development of employment and other postschool adult living objectives, and when appropriate, acquisition of daily living skills and a functional vocational evaluation" (Sec. 1414(d)(1)(A)(i)(VIII)(bb)). Considering the discouraging National Longitudinal Transitional Study-2 findings (Newman et al., 2011) indicating limited participation of adolescents with ID in multiple life activities, it is critical to promote a seamless transition of supports as students move from secondary school to postschool life to enable the attainment of goals developed through transition planning. Such supports should be based on support needs assessment data aligned with the goals targeted by the student. The results of this study suggest that within transition planning, teachers can use the SIS-C and/or the SIS-A based on school-based or postschool supports. Specifically, based on the transition needs targeted by students with ID (e.g., school-based vs. employment-based support needs), the supports planning team can use either version of the SIS to link identified support needs to evidence-based practices to support youth with ID to meet their desired transition goals. In this regard, the current findings of shared underlying mechanisms between the SIS-C and SIS-A are important to inform future efforts to design, implement, evaluate, and revise high-quality transition services, specifically the assessment utilized in the process of planning for supports in school and post-school, for transition-aged students with ID.

Conclusion

In sum, this study extends the literature by establishing the criterion validity of SIS-C scores, confirming shared mechanisms among parallel constructs on the two versions of the SIS. The study provides information that will be useful for support teams working with students with ID during the transition planning years. It confirms our hypotheses that scores on the SIS-C and SIS-A were highly correlated and similarly predicted by personal competence, suggesting that both assessments can be useful in informing support planning in transition-age youth depending on the goals targeted by the student, with differential information available based on whether the goal of planning is school-based supports or postschool supports for employment and lifelong learning. These findings suggest that a smooth transition in assessment procedures can be undertaken to enable seamless educational and postschool planning by promoting ongoing and systematic supports.

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References

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). New York, NY: Guilford.

Individuals With Disabilities Education Improvement Act of (2004). P.L. 108-446, 20 U.S.C. § 1400 et seq.

Kenny, D. A., Kaniskan, B., & McCoach, D. B. (2015). The performance of RMSEA in models with small degrees of freedom. *Sociological Methods & Research*, *44*, 486–507.

Little, T. D. (2013). *Longitudinal structural equation modeling: Methodology in the social sciences*. New York, NY: Guilford press.

Muthén, L. K., & Muthén, B. O. (1998–2012). *Mplus user's guide* (7th ed.). Los Angeles, CA: Author.

Newman, L., Wagner, M., Knokey, M., Mard, C., Nagle, K., Shaver, D., . . . Schwarting, M. (2011). *The post-high school outcomes of young adults with disabilities up to 8 years after high school. A report from the National Longitudinal Transition Study-2(NLTS2)* (NCSER 2011-3005). Menlo Park, CA: SRI International.

Schalock, R. L., Borthwick-Duffy, S., Bradley, V., Buntinx, W. H. E., Coulter, D. L., Craig, E. M., . . .Yeager, M. H. (2010). *Intellectual disability: Definition, classification, and systems of supports* (11th ed.). Washington, DC: American Association on Intellectual and Developmental Disabilities.

Seo, H., Shogren, K. A., Little, T. D., Thompson, J. R., & Wehmeyer, L. M. (2016). Construct Validation of the Supports Intensity Scale–Children and adult versions: An application of a pseudo multitrait-multimethod approach. *American Journal on Intellectual and Developmental Disabilities*, *121*, 550–563.

Seo, H., Shogren, K., Wehmeyer, M. L., Hughes, C., Thompson, J., Little, T., & Palmer, S. (2016). Examining shared measurement properties and the score comparability between two versions of the Supports Intensity Scale. *Career Development and Transition for Exceptional Individuals*, *39*, 216–226.

Shavelson, R. J. (1996). *Statistical reasoning for the behavioral sciences* (3rd ed.). Needham, MA: Allyn & Bacon.

Shogren, K. A., Seo, H., Wehmeyer, M. L., Thompson, J. R., Hughes, C., Little, T. D., & Palmer, S. B. (2015). Support needs of children with intellectual and developmental disabilities: Age-related implications for assessment. *Psychology in the Schools*, *52*, 874–891.

Shogren, K. A., Seo, H., Wehmeyer, M. L., Thompson, J. R., & Little, T. D. (2015). Impact of protection and advocacy subscale on the factorial validity of the Supports Intensity Scale–Adult version. *American Journal on Intellectual and Developmental Disabilities*, *121*, 48–64.

Shogren, K. A., Thompson, J., Wehmeyer, M., Chapman, T., Tassé, M., & McLaughlin, C. (2014). Reliability and validity of the supplemental protection and advocacy scale of the supports intensity scale. *Inclusion*, *2*, 100–109.

Shogren, K. A., Wehmeyer, M. L., Seo, H., Thompson, J. R., Schalock, R. L., Hughes, C., & Palmer, S. B. (2016). Examining the reliability and validity of Supports Intensity Scale—Children's Version in children and youth with autism and intellectual disability. *Focus on Autism and Other Developmental Disabilities*. Advance online publication. doi:10.1177/1088357615625060

Thompson, J. R., Bradley, V. J., Buntinx, W. H. E., Schalock, R. L., Shogren, K. A., Snell, M. E., . . .Wehmeyer, M. L. (2009). Conceptualizing supports and the support needs of people with intellectual disability. *Intellectual and Developmental Disabilities*, *47*, 135–146.

Thompson, J. R., Bryant, B. R., Campbell, E. M., Craig, E. M., Hughes, C. M., Rotholz, D. A., . . . Wehmeyer, M. (2004). *Supports Intensity Scale (SIS)*. Washington, DC: American Association on Mental Retardation.

Thompson, J. R., Bryant, B. R., Schalock, R. L., Shogren, K. A., Tassé, M. J., Wehmeyer, M. L., . . . Rotholz, D. A. (2015a). *Supports Intensity Scale–Adult version*. Washington, DC:

American Association on Intellectual and Developmental Disabilities.

Thompson, J. R., Bryant, B. R., Schalock, R. L., Shogren, K. A., Tassé, M. J., Wehmeyer, M. L., . . . Rotholz, D. A. (2015b). *Supports Intensity Scale–Adult version user's manual*. Washington, DC: American Association on Intellectual and Developmental Disabilities.

Thompson, J. R., Wehmeyer, M. L., Hughes, C., Shogren, K. A., Seo, H., Little, T. D., & Schalock, R. L. (2016a). *Supports Intensity Scale–Children's version*. Washington, DC: American Association on Intellectual and Developmental Disabilities.

Thompson, J. R., Wehmeyer, M. L., Hughes, C., Shogren, K. A., Seo, H., Little, T. D., & Schalock, R. L. (2016b). *Supports Intensity Scale–Children's version user's manual*. Washington, DC: American Association on Intellectual and Developmental Disabilities.

Walker, V. L., DeSpain, S. N., Thompson, J. R., & Hughes, C. (2014). Assessment and planning in K-12 schools: A social-ecological approach. *Inclusion*, *2*, 125–139.