

Multi-informant assessment of transition-related skills and skill importance in adolescents with autism spectrum disorder

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Kara Hume¹, Jessica Dykstra Steinbrenner¹, John Sideris²,
Leann Smith³, Suzanne Kucharczyk⁴ and Kate Szidon³

Abstract

Adolescents with autism spectrum disorder have limited participation in the transition planning process, despite the link between active participation and an improvement in postsecondary education and employment outcomes. The Secondary School Success Checklist was designed to support transition planning for adolescents with autism spectrum disorder by incorporating their own assessments of strengths, skill deficits, and prioritization for instruction along with those of their parents and teachers across multiple skill domains. Findings from more than 500 adolescents with autism spectrum disorder across the United States indicate discrepancies between adolescent, teacher, and parent ratings of skills highlighting the importance of the inclusion of multiple perspectives in transition planning. Although ratings varied, agreement between adolescents with autism spectrum disorder, parents, and teachers across the highest and lowest rated skills suggests the need to broaden the focus on critical transition skills to include problem-solving, planning for life after high school, and self-advocacy.

Keywords

adolescent, autism, Secondary School Success Checklist, skill importance, transition

Individuals with autism spectrum disorder (ASD) often have poor postsecondary outcomes compared to their peers without disabilities, including high rates of unemployment and underemployment, and continued difficulties in adaptive behavior and social relationships (Henninger and Taylor, 2012; Howlin et al., 2004; Roux et al., 2013; Shattuck et al., 2012). National survey data suggest that after high school nearly 80% of young adults with ASD still live at home, half have no employment, and many experience a decrease in insurance coverage and therapy services (Shattuck et al., 2011, 2012; Wagner et al., 2003). Longitudinal studies of individuals with ASD and their families forewarn that the transition out of high school and into the adult world is a time of increased vulnerability for youth and burden for parents (Taylor and Seltzer, 2010, 2011).

One malleable contributor to postsecondary outcomes is the quality of transition plans developed as part of the Individualized Education Plan (IEP; Erickson et al., 2013). The Individuals with Disabilities Education Improvement Act (Individuals with Disabilities Education Act (IDEA), 2004) requires transition planning for all students with

disabilities beginning by age 16 years, although some states mandate an earlier date, with a focus on developing goals around activities such as employment, recreation, postsecondary education, self-determination, and community living and participation after graduation. Research suggests that student involvement in transition planning, including student participation in IEP meetings and training in self-determination and advocacy, is associated with more optimal transition outcomes (Test et al., 2009b); however, students with ASD rarely have a leadership role in the transition planning process (Shogren and Plotner,

¹The University of North Carolina at Chapel Hill, USA

²University of Southern California, USA

³University of Wisconsin–Madison, USA

⁴University of Arkansas, USA

Corresponding author:

Kara Hume, Frank Porter Graham Child Development Institute, The University of North Carolina at Chapel Hill, 517 S. Greensboro Road, Carrboro, NC 27510, USA.

Email: kara.hume@unc.edu

2012). Furthermore, little research has been conducted to understand students' perspectives of their own transition skills, goals, and learning priorities as a guide to their transition planning. This study addressed this gap by examining the transition-related skills and beliefs about the importance of those skills of adolescents with ASD.

In addition to advancing understanding of adolescents' perceptions of their own skills and priorities, this study also examines these priorities in relationship to those of other key stakeholders, namely parents and teachers. Studies of adolescents in the general population have demonstrated low to moderate agreement for adolescents, teachers, and parents, highlighting how different reporters contribute unique information for understanding an adolescent's behavioral functioning. For example, in a large population-based study of the Achenbach measures of behavior problems, Van Der Ende and Verhulst (2005) found that parents reported higher levels of behavior problems than teachers, whereas adolescents reported higher levels of behavior problems than both parents and teachers. These findings suggest that having only a single informant may lead to an incomplete picture of an individual's strengths and needs (Hanssen-Bauer et al., 2010; Salbach-Andrae et al., 2009).

Differences in perceptions across informants have also been observed for youth with ASD (Jepsen et al., 2012; Koning and Magill-Evans, 2001; Vickerstaff et al., 2007). For example, in a study of quality of life, parents reported lower quality of life for their teens than did the teens themselves, although the teens with ASD were determined to be reliable and valid reporters of their quality of life (Shipman et al., 2011). In another study, adolescents reported higher levels of psychiatric symptoms compared to the reports of their parents (Kuusikko et al., 2009). A recent study found discrepancies between parental and self-report of adolescents with ASD using a social skills assessment (McMahon and Solomon, 2015). Adolescents with ASD reported a higher frequency of engaging in social skills and viewed social skills to be less important compared to their parents (McMahon and Solomon, 2015). This lack of alignment across informants in the perception of social skills and potential motivation for learning these skills highlights the critical need to include multiple perspectives when planning interventions for youth with ASD. Notably, the McMahon and Solomon study did not include learning targets other than social skills, leaving questions regarding other key transition areas. Broadly, the voice and views of adolescents with ASD have been absent in the literature and practice. This is despite clear evidence that when stakeholder input, specifically that of the individual with ASD, is gathered and used during transition planning and intervention implementation, there are positive impacts on the likelihood of implementation, social validity of the intervention, and postsecondary outcomes (Bottema-Beutel et al., 2015; Elsabbagh et al., 2014; Test et al., 2009b).

This study aimed to understand the transition-related skills and learning priorities of adolescents with ASD from the perspectives of three key informants: adolescents with ASD, their parents, and teachers. The study assessed the skills and priorities of a large US sample using a new measure, the Secondary School Success Checklist (SSSC). The SSSC was developed to gather information from key stakeholders, including adolescents across the spectrum, on their current skill level in transition-related domains (e.g. independence, self-management, social interaction) as well as rank priorities for goal setting, thus actively contributing to the transition planning process. In addition to the inclusion of the perspectives of adolescents themselves, the SSSC addresses limitations of existing transition assessment tools (e.g. Arc's Self-Determination Scale, Wehmeyer and Kelchner, 1995; Supports Intensity Scale, Thompson et al., 2004; TEACCH Transition Assessment Profile, Mesibov et al., 2007; Transition Planning Inventory, Clark and Patton, 1999), as it is designed specifically to identify skills relevant for adolescents with ASD across multiple domains, includes prioritization of skills, allows for multiple informants, and is easily accessible at no cost.

This study had three specific aims. First, to determine the level of transition-related skills of adolescents with ASD as reported by the adolescents, their parents, and their teachers. Second, to describe the perceived importance of each skill across informant groups. Third, to examine the relationships between the perceptions of skill proficiencies across informant groups. Consistent with past work with adolescent samples showing differences in behavioral measures across informants (e.g. Achenbach et al., 2002; McMahon and Solomon, 2015), we hypothesized that parent and teacher rankings would be more closely aligned than parent and student or teacher and student rankings.

Methods

Participants

Participants in this study were part of a larger ongoing research project examining the efficacy of a comprehensive treatment model for high school students on the autism spectrum (Center on Secondary Education for Students with ASD (CSESA)). Sixty high schools across three states (NC, CA, and WI) were randomly assigned to the intervention (CSESA) or control group. This examination of the SSSC data does not address intervention efficacy and only utilizes data collected prior to the intervention; thus, no further distinction between participant groups is made.

Adolescents and their parents were recruited at each high school site. Consent packets for adolescent and parent participants were sent to eligible adolescents and signed forms were returned to research staff. All adolescents and parents consented to their participation, and the study was conducted in compliance with the University of North

Table 1. Demographic and descriptive information about adolescents.

	n	%
Gender		
Male	464	86
Female	75	14
Race		
American Indian/Alaskan Native	17	3
Asian	25	5
Black/African-American	68	13
White	362	67
Multi-racial	35	6
Other	23	4
Not reported	9	2
Ethnicity		
Hispanic	108	20
Non-Hispanic	428	79
Not reported	3	1
Diploma		
Standard diploma	307	57
Modified diploma	234	43
Not available	1	<1
Autism severity (based on SRS)		
Severe	166	31
Moderate	159	29
Mild	84	16
No ASD	93	17
Not available	37	7
	M (SD)	Range
Age at enrollment (n = 534), years	16.1 (1.4)	13.6–20.9
SRS-2 (n = 502)	70.5 (12.3)	39–110
Vineland Adaptive Behavior Composite Standard Score (n = 454)	75.8 (16.6)	20–131
Leiter Non-Verbal IQ (n = 490)	85.8 (27.2)	30–141

SRS: Social Responsiveness Scale; ASD: autism spectrum disorder; SD: standard deviation.

Carolina's Institutional Review Board (IRB; # 13-3002). A total of 547 adolescents and their parent(s) enrolled in the CSESA study (NC=195, CA=199, and WI=153). Adolescents were enrolled in the study if they met the following inclusion criteria: (a) were between 13 and 22 years old, (b) had an educational classification of autism, (c) planned to remain in high school for 2 years after enrolling in the study, (d) did not have a significant uncorrected vision/hearing impairment, and (e) had a parent who consented to participate and could complete a series of assessments in English or Spanish. For the purposes of this study, there were SSSC data from 539 of the participants. Demographic data on the adolescent and parent sample for this study are shown in Tables 1 and 2, respectively.

Procedures

Trained research staff administered an assessment battery to adolescents in the fall of their school's first year of participation with CSESA. This battery included assessments to

Table 2. Demographic information about families and caregivers.

	n	%
Primary caregiver education		
<High school	20	4
High school	64	12
Associate's degree/some college	126	23
College degree	134	25
Graduate degree	80	14
Not reported	117	22
Family annual income		
<40K	97	18
40–79K	120	22
≥80K	200	37
Not reported	122	23

describe the sample (e.g. Leiter) and to support transition and intervention planning (i.e. SSSC). Parents received the SSSC via mail or through an online survey site in English or Spanish

Table 3. Internal consistency calculated with subset of sample (Cronbach's alpha).

	Adolescent (n = 237)	Parent (n = 181)	Staff (n = 217)
Independent behavior	0.64	0.79	0.85
Transition	0.63	0.80	0.78
Social	0.77	0.91	0.92
Academic	n/a (1 item)	0.85	0.75

n/a: not available.

based on parent preferences. A key teacher with knowledge of student skills, such as a case manager, classroom teacher, or autism support teacher, completed the SSSC about the assigned student via online survey site. School staff could complete SSSCs on multiple students if appropriate.

Measures

SSSC. The SSSC is a multi-informant transition planning tool designed to assess the unique skill profiles of high school students with ASD, identify priority skill targets, and compile this information across key informants. The SSSC was designed through an iterative process with frequent feedback from stakeholder groups, including focus groups (described in Hedges et al., 2014) and three pilot studies to examine consumer need and satisfaction as well as to measure instrument reliability. To provide evidence regarding the appropriateness of the item groupings for the scale, internal consistency of each informant version for each domain was examined with a subset of the current sample (those who enrolled in the 2014–2015 school year) of 237 adolescents, along with their parents and 217 staff members via calculation of Cronbach's alpha coefficients. Across all domains, the consistency was moderate to high (Cronbach, 1951). Alphas ranged from 0.63 to 0.92. See Table 3 for internal consistency data across domain and informant.

Adolescent version of SSSC. The adolescent version of the SSSC has 20 items, each of which is linked to key items on the teacher and parent versions (see below for description). The SSSC is read aloud by the assessor while the adolescent follows the text version and has visual cues including photographs and short phrases that clarify the responses that can be used to support adolescent respondents as needed. The adolescent version includes items that are representative of four key domains: independent behavior, transition, social, and academic (see Table 4 for all items on adolescent version). For each item, respondents indicate on a Likert-type scale if the skill is 2 (*very much like me*), 1 (*sort of like me*), or 0 (*not like me*). For example, an item in the independence and behavior domain states, "I respond appropriately to changes in schedule and routine." Adolescents rate whether this skill is *very much like me*, *sort of like me*, or *not like me*. Respondents could also

choose a "I have not had a chance to try this" or "Not sure." Respondents then provide a priority ranking for the importance of learning each skill. Adolescents rate the importance of each skill with a rating of 2 (*I really want to learn this skill*), 1 (*I sort of want to learn this skill*), 0 (*I would not like to learn this skill*), or N/A (*I already know how to do this*).

Parent-teacher version of the SSSC. The parent-teacher version of the SSSC has 105 items and is completed online or via paper copy. The parent-teacher version also includes items that are representative of the same four domains and is broken into subdomains that include organization, self-regulation of emotion and behavior, flexibility, self-monitoring, problem-solving and goal setting, personal presentation, understanding of school/community culture, social communication, interpersonal communication, recognizing emotions, cooperation, comprehension, and activating and applying knowledge.

For each item, respondents indicate on a Likert-type scale if the skill is 2 (*very much like my student/child*), 1 (*sort of like my student/child*), or 0 (*not like my student/child*). Respondents could also choose a "Not Observed" or a "Not Applicable" response. Parents and teachers then provided a priority ranking for only those skills that were rated as a 0 (*not like*) or 1 (*sort of like*). Their priority ratings were indicated by a score of 2 (*major concern*), 1 (*minor concern*), or 0 (*not a concern*).

The following measures were used to describe the adolescent participants and were administered to students (Leiter) or completed by the key teacher (Vineland, Social Responsiveness Scale (SRS)) during the fall of their school's first year of participation with CSESA.

Leiter International Performance Scale-3. The Leiter-3 is a test of nonverbal intelligence and cognitive abilities (Roid et al., 2013). The Brief IQ screener was administered, which includes four subscales: Figure Ground, Form Completion, Classification/Analogies, and Sequential Order. These yield a nonverbal IQ score (M = 100, standard deviation (SD) = 15). The Leiter-3 was administered entirely nonverbally and did not require any spoken or written output from the adolescents. The Leiter-3 is both valid and reliable, with internal consistency reliability ranges for the subtests between 0.67 and 0.95 (Roid et al., 2013).

Table 4. Model-based group means and between group estimates for SSSC items and subscales.

Item	Adolescent estimate (SE)	Parent estimate (SE)	Teacher estimate (SE)	Between-group contrasts		
				Adol.–par. difference (SE)	Adol.–teach. difference (SE)	Par.–teach. difference (SE)
Independence	1.38 (0.02)	1.05 (0.03)	1.14 (0.03)	0.34*** (0.03)	0.10* (0.03)	0.24*** (0.03)
Bring materials to class	1.66 (0.03)	1.21 (0.04)	1.35 (0.03)	0.45*** (0.04)	0.31*** (0.04)	-0.14** (0.04)
Complete assignments	1.44 (0.03)	0.76 (0.04)	0.92 (0.04)	0.67*** (0.05)	0.51*** (0.05)	-0.16** (0.05)
Ask for a break	1.48 (0.03)	1.17 (0.04)	1.02 (0.04)	0.31*** (0.05)	0.47*** (0.05)	0.15** (0.05)
Stay calm	1.24 (0.03)	1.09 (0.04)	1.13 (0.04)	0.14** (0.05)	0.11 (0.05)	-0.04 (0.05)
Respond appropriately to changes in schedule and routine	1.14 (0.04)	1.15 (0.04)	1.33 (0.04)	-0.01 (0.05)	-0.19*** (0.05)	-0.18** (0.05)
Keep trying during hard task	1.45 (0.04)	0.93 (0.04)	1.01 (0.04)	0.53*** (0.05)	0.44*** (0.05)	-0.08 (0.05)
Transition	1.59 (0.02)	1.21 (0.03)	1.33 (0.03)	0.37*** (0.03)	0.11** (0.03)	0.26*** (0.03)
Ask teachers for help	1.41 (0.03)	1.23 (0.04)	1.13 (0.04)	0.18*** (0.05)	0.28*** (0.05)	0.10 (0.05)
Solve problems in class	1.34 (0.03)	0.77 (0.04)	0.72 (0.04)	0.57*** (0.05)	0.61*** (0.05)	0.05 (0.05)
Have ideas about goals after high school	1.46 (0.04)	0.92 (0.04)	0.89 (0.04)	0.54*** (0.05)	0.58*** (0.05)	0.04 (0.05)
Look clean for school	1.71 (0.03)	1.41 (0.03)	1.67 (0.03)	0.30*** (0.04)	0.05 (0.04)	-0.25*** (0.04)
Follow rules	1.70 (0.03)	1.54 (0.03)	1.51 (0.03)	0.16*** (0.04)	0.19*** (0.03)	0.03 (0.04)
Navigate high school campus	1.72 (0.03)	1.66 (0.03)	1.72 (0.03)	0.06 (0.04)	0.00 (0.03)	-0.06 (0.04)
Social	1.45 (0.03)	0.96 (0.04)	1.09 (0.03)	0.49*** (0.04)	0.13** (0.04)	0.36*** (0.04)
Talk with others about things they like	1.36 (0.04)	0.80 (0.04)	0.97 (0.04)	0.56*** (0.05)	0.38*** (0.05)	-0.18** (0.05)
Listen to others during interactions	1.54 (0.03)	0.87 (0.04)	1.08 (0.03)	0.66*** (0.04)	0.46*** (0.04)	-0.21*** (0.05)
Ask teachers for clarifying information	1.39 (0.04)	0.97 (0.04)	0.97 (0.04)	0.41*** (0.05)	0.42*** (0.05)	0.00 (0.05)
Compliment others	1.54 (0.04)	0.94 (0.04)	0.90 (0.04)	0.60*** (0.05)	0.64*** (0.05)	0.04 (0.05)
Identify emotions	1.34 (0.04)	1.06 (0.04)	0.94 (0.04)	0.27*** (0.05)	0.39*** (0.05)	0.12 (0.05)
Offer to help others	1.33 (0.04)	1.09 (0.04)	0.98 (0.04)	0.24*** (0.05)	0.35*** (0.05)	0.11 (0.05)
Work well in a group	1.26 (0.04)	1.07 (0.05)	1.02 (0.04)	0.19** (0.06)	0.24*** (0.05)	0.05 (0.06)
Academic (single item)						
Understand reading for content areas	1.47 (0.03)	1.15 (0.04)	1.31 (0.04)	0.32*** (0.05)	0.15** (0.05)	-0.16** (0.05)

SE: standard error.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Social Responsiveness Scale-2. The SRS is a teacher-report measure of the various dimensions of interpersonal behavior, communication, and repetitive/stereotypic behavior characteristic of ASD (Constantino and Gruber, 2012). The SRS has 65 items using a 4-point rating scale and has been demonstrated to have high concurrent reliability with the Autism Diagnostic Interview—Revised (Constantino et al., 2003). A total T-score of 76 or higher is considered severe and strongly associated with clinical diagnosis of ASD, 66–75 = moderate deficiencies related to ASD, and 60–65 = mild deficiencies related to ASD. T-scores of 59 and below are considered to be within typical limits.

Vineland Adaptive Behavior Scale—II—Teacher Rating Form. The Vineland Adaptive Behavior Scale—II (VABS) was used to assess adaptive behavior observed in the classroom setting (Sparrow et al., 2005). It was completed by teachers who rated the degree to which the adolescents demonstrated skills from 0 (*Never*) to 2 (*Usually*) in three domains: Communication, Daily Living, and Socialization. An Adaptive Behavior Composite score is provided ($M = 100$, $SD = 15$) with higher scores indicating better adaptive functioning. The measure is valid and reliable, with content validity established for the subdomain and domain structure (Sparrow et al., 2005), and reliability coefficients for the Adaptive Behavior Composite score are in the 0.90+ range.

Data analysis

Analyses were primarily descriptive with statistical tests of key relationships. Summaries of individual responses to SSSC items were provided for skill estimates by three informants: adolescents, parents, and teachers. Tests of mean differences on each item enabled comparisons and contrasts between informants.

Skill ratings on the SSSC were assessed over a range of 0 (*Not like me*) to 2 (*Very much like me*), with higher scores indicating mastery of skills. The data were modeled as three-level hierarchical linear models (HLMs) with informant nested in adolescent and adolescent nested in school. The fixed effect for informant was the sole predictor of skill ratings. Post hoc comparisons allowed for specific contrasts between each informant group. Items scored “N/O” or “N/A” were not used in this analysis.

Priority ratings on the SSSC were collapsed from three levels (0, 1, and 2) to two categories (0 vs 1 and 2, combining *sort of want to learn* or minor concern and *really want to learn* or major concern) to provide a simple assessment of whether each item is or is not a priority. These analyses were descriptive. Items scored as *I already know how to do this* on the adolescent version were not used in this analysis.

Finally, we tested the level of agreement between sources via weighted Cohen’s Kappa where each respondent was considered a rater of the student’s skills. The relationships between informant groups on priority ratings were not examined because priority ratings were completed by a subset of parent and teacher respondents (i.e. those respondents who rated skill attainment as “0” or “1”), and analyses would have been impacted by the variability in number of respondents for each item.

Results

Skill ratings by each informant group (Aim 1)

Table 4 presents results related to our first aim, determining the level of transition-related skills of adolescents with ASD as reported by three informant groups. Respondents rated skills on a 0–2 scale, with 2 indicating the highest level of skill mastery. Differences between informants were estimated via three-level HLM analyses. Random effects for school were largely non-significant with z-scores ranging from 0.33 to 1.95 and only three tests significant at $p < 0.05$ (talk with others about things they like ($z = 17.52$, $p < 0.001$), work well in group ($z = 17.30$, $p < 0.001$) and follows rules ($z = 17.52$, $p < 0.001$)). The intercepts for student, however, did tend to be highly significant with z-scores ranging from 1.55 to 6.80 and only one non-significant, $p = 0.0602$ result (stay calm).

Highest and lowest rated skills. The top rated skills by adolescents were “navigate high school campus” (1.72), “look clean for school” (1.71), “follow rules” (1.70),

“bring materials to class” (1.66), and then tied in the fifth position were “listen to others during interactions” and “compliment others” (1.54). The lowest rated skills were “respond appropriately to changes in schedule and routine” (1.14), “stay calm” (1.24), “work well in a group” (1.26), “offer to help others” (1.33), and then tied for fifth lowest, “identify emotions” and “solve problems in class” (1.34). For parents, the top rated skills were “navigate high school campus” (1.66), “follow rules” (1.54), “look clean for school” (1.41), “ask teachers for help” (1.23), and “bring materials to class” (1.21). The lowest rated skills by parents were “complete assignments” (0.76), “solve problems in class” (0.77), “talk with others about things they like” (0.80), “listen to others during interactions” (0.87), and “have ideas about goals after high school” (0.92). Teachers highest rated skills for the adolescents were “navigate high school campus” (1.72), “look clean for school” (1.67), “follow rules” (1.51), “bring materials to class” (1.35), and “respond appropriately to changes in schedule and routine” (1.33). The lowest rated skills by teachers were “solve problems in class” (0.72), “have ideas about goals after high school” (0.89), “compliment others” (0.90), “complete assignments” (0.92), and “identify emotions” (0.94).

Agreement across informant groups. Although there was variability in the ratings, all three informant groups similarly identified four of the highest rated skills: bringing materials to class, looking clean for school, following rules, and navigating the high school campus. There was no agreement across all three groups when identifying the lowest rated skills; however, there was agreement between pairs of informants on the lowest rated skills. Two skills rated in the highest group by adolescents were rated in the lowest group by parents (listening to others) or teachers (complimenting others). Conversely, teachers rated “responding appropriately to changes in schedule and routine” in the group of highest rated skills, while adolescents rated it as their lowest skill across the instrument.

Perception of skill importance (Aim 2)

Table 5 provides findings related to our second aim, describing the perceived importance of each skill across informant groups. The table indicates the percentage of respondents who identified that learning the skill was a priority (rating of 1 or 2) as well as a percentage of respondents who identified the skills as a high priority (rating of 2). Across all respondents, a large majority indicated that each skill was a priority (range: 58.9%–85.8% adolescents, 77.4–94.7% parents, 68.4–91.5% teachers). The percentages for rating items as a high priority had the following ranges: 24.5%–60.5% adolescents, 18.9%–54.0% parents, and 16.0%–43.3% teachers. However, it is important to note that parents and teachers were only asked to

Table 5. Percentage of respondents indicating an SSSC item is a priority and high priority.

Item	Adolescent	Parent	Teacher
	% ^a (% HP ^b)	% ^a (% HP ^b)	% ^a (% HP ^b)
Independence			
Bring materials to class	83.7 (43.7)	89.5 (35.4)	77.3 (28.1)
Complete assignments	84.3 (47.1)	94.8 (53.6)	85.7 (37.5)
Ask for a break	79.9 (47.4)	90.2 (34.7)	79.0 (32.3)
Stay calm	80.9 (52.3)	91.3 (35.9)	81.2 (34.1)
Respond appropriately to changes in schedule and routine	58.9 (34.5)	84.4 (30.7)	77.1 (47.1)
Keep trying during hard task	82.6 (52.6)	92.7 (47.2)	91.5 (43.3)
Transition			
Ask teachers for help	80.5 (40.0)	93.4 (48.0)	91.3 (37.8)
Solve problems in class	70.5 (53.6)	93.8 (39.8)	85.9 (34.5)
Have ideas about goals after high school	85.8 (60.5)	92.1 (54.0)	88.1 (33.6)
Look clean for school	77.5 (47.9)	88.4 (36.1)	71.0 (18.7)
Follow rules	74.8 (44.1)	82.4 (22.4)	84.2 (29.6)
Navigate high school campus	84.1 (53.0)	77.4 (24.7)	75.0 (31.8)
Social			
Talk with others about things they like	78.9 (40.4)	92.0 (39.5)	86.6 (31.1)
Listen to others during interactions	80.8 (40.6)	94.7 (41.2)	90.0 (36.4)
Ask teachers for clarifying information	81.5 (38.0)	93.3 (38.0)	88.7 (35.8)
Compliment others	69.4 (37.2)	77.5 (18.9)	73.6 (18.5)
Identify emotions	69.7 (45.5)	90.8 (32.9)	85.1 (22.8)
Offer to help others	75.9 (42.5)	83.4 (19.7)	68.4 (16.0)
Work well in a group	79.2 (39.7)	90.3 (31.8)	87.2 (28.7)
Academic			
Understand reading for content areas	79.8 (48.3)	89.4 (31.9)	86.2 (30.0)

^aPercent rated as a priority (rated as 1 or 2).

^bPercent rated as a high priority (rated as 2).

rate the *priority* if the *skill* was rated as a “0” or “1,” so the percentages are only from a subset of parents and teachers for each given item.

Most and least frequently rated priorities. The items that adolescents most frequently rated as priorities were “ask teachers for help” (85.8%), “complete assignments” (84.3%), “navigate high school campus” (84.1%), “bring materials to class” (83.7%), and “keep trying during hard task” (82.6%). Adolescents were least likely to identify the following skills as priorities: respond appropriately to changes in schedule and routine (58.9%), compliment others (69.4%), identify emotions (69.7%), solve problems in class (70.5%), and understand reading for content areas (73.3%). The priorities that were rated most frequently by parents were “complete assignments” (94.8%), “listen to others during interactions” (94.7%), “solve problems in class” (93.8%), “ask teachers for help” (93.4%), and “ask teachers for clarifying information” (93.3%). The least frequently rated priorities by parents were “navigate high school campus” (77.4%), “compliment others” (77.5%), “follow rules” (82.4%), “offer to help others” (83.4%), and “respond appropriately to changes in schedule and routine” (84.4%). For teachers,

the top priorities for the adolescents were “keep trying during hard task” (91.5%), “ask teachers for help” (91.3%), “listen to others during interactions” (90.0%), “ask teachers for clarifying information” (88.7%), and “have ideas about goals after high school” (88.1%). Their lowest rated priorities were “offer to help others” (68.4%), “look clean for school” (71.0%), “compliment others” (73.6%), “navigate high school campus” (75.0%), and “understand reading for content areas” (76.8%).

Agreement across informant groups. There were no agreements that spanned all three respondent groups in the top rated priorities; however, parents and teachers agreed on three priorities (ask teachers for clarifying information, ask teachers for help, and listen to others during interactions), students and teachers agreed on two priorities (keep trying during hard task and have ideas about goals after high school), and parents and students agreed on one priority (complete assignments). All three groups had “compliment others” in the lowest priorities. Parents and teachers had two other overlapping items as lowest priorities, “offer to help others” and “navigate high school campus” (which was a top priority for students). Students and teachers both

Table 6. Inter-rater reliability on skill ratings for students, parents, and teachers using weighted Cohen's kappa.

	Adolescent–parent	Adolescent–teacher	Parent–teacher
M	0.10	0.11	0.20
Median	0.10	0.11	0.22
SD	0.07	0.06	0.08
Range	0.00–0.24	0.01–0.24	0.05–0.35

SD: standard deviation.

had “understand reading for content areas” in the lowest priorities; students and parents both had “respond appropriately to changes in routine” in the lowest priorities.

Differences in skill levels between informant groups (Aim 3)

The relationship between informant group ratings on skill proficiencies and needs was examined in two different ways. First, the tests of mean differences presented in Table 4 provide data on the differences between the informant groups for the subscales and the individual items. For each of the four subscales, the adolescent informant group rated their skills the highest, followed by teachers, and then parents. This trend was similar for individual items. The adolescent informant group tended to rate their skills significantly higher than either parents (18 of 20 comparisons significant at $p < 0.01$ or less) or teachers (17 of 20 comparisons significant at $p < 0.01$). Parents and teachers were much more consistent with only eight significant differences. The direction of differences between teachers and parents was not as consistent as between students and either parents or teachers, but where there were differences, parents tended to rate the students lower than did teachers. Second, tests of inter-rater reliability (weighted Cohen's kappa, see Table 6) indicated very low agreement across raters. The results indicated that adolescents had very low, but similar, agreement with both parents (0.10) and teachers (0.11), while parents and teachers had higher agreement (0.20), which supported our hypothesis.

Discussion

In summary, the study findings indicate that adolescents rated themselves as higher skilled on SSSC items than did parents or teachers. Teachers rated most skills higher than parents. There were significant differences across the informant groups, with differences on up to 18 of 20 items (adolescent–parent). Although the ratings varied, there was some agreement in the ranking of the highest and lowest rated skills across all three groups. Adolescents consistently had lower percentages on items marked as a priority across skills and informant group; however, even the lowest percentage on the priority ratings from adolescents was close to 70%. Parents were most likely to rate skills as a priority for

learning. Again, though variable, there was agreement across all three groups on the rankings of several of the highest and lowest priority skills. These findings inform the field in a number of ways as described below.

Multiple perspectives in transition planning

The discrepant findings are not surprising and support our related hypothesis, as previous studies have identified meaningful discrepancies between parent- and self-reported social skills in individuals with ASD (Lerner et al., 2012; Stratis and Lecavalier, 2014). These findings are similar to other studies examining parent and adolescent reports of the importance and demonstration of skills (McMahon and Solomon, 2015; Rankin et al., 2015). These indicate that adolescent reporters with ASD vary significantly from parents in identifying current skill levels, with adolescents with ASD frequently indicating they have a skill when parents report the skill is absent, and reporting that skills are less important than their parents report (McMahon and Solomon, 2015). Informant discrepancies between teacher and parent respondents are also common in the special education literature for reasons that likely contributed to the low agreement between SSSC teacher and parent reports (e.g. Hartman et al., 2007; Wolraich et al., 2004). One possibility is that skill areas and settings may be less familiar to teachers or parents given the settings in which they most frequently see the adolescent. Adolescents, parents, and teachers may have different perceptions of performance—a teacher may consider the adolescent's performance relative to the other high school students with disabilities while a parent may be comparing their adolescent's performance relative to a sibling or the adolescent's own previous skill levels. The low agreement confirms that parents, teachers, and students each bring unique perspectives to the SSSC.

Thus, the discrepant findings lend support to the long-standing, yet not frequently implemented, legal requirements of IDEA and Indicator 13 (outlines the transition IEP compliance guidelines) to prioritize the involvement of adolescents and their families in the transition planning process (Shogren and Plotner, 2012). The discrepancies between informant groups clearly indicate that each offers a diverse perception of student strengths, needs, preferences, and learning priorities. Best practice requires that the transition plan is developed around student skills,

goals, and interests (measured in the SSSC through the skill and importance ratings) which are then linked to preferred postsecondary outcomes. Research indicates, however, that adolescents with ASD are less likely than students in any other disability group to be involved in the transition planning process—thus limiting their contribution in the development of the transition plan. Instead, the teacher perspective is often favored, as staff members have proven to be the most active participants in transition planning with this population (Shogren and Plotner, 2012).

One factor that may contribute to the exclusion of adolescents with ASD from the transition planning process, as well as their limited voice in this research, is the historical view that discounted the ability of adolescents with ASD to provide a meaningful self-report of skills (e.g. "... these [self-report] data are in sharp contrast to the perceptions of their parents and teachers and suggest a lack of awareness or denial on the participants' part relative to their disability," Barnhill et al., 2000: 162). More current research, however, has found that individuals with ASD are able to report on their own quality of life and skills in a valid and reliable manner (e.g. Shipman et al., 2011). These study findings do in fact support this notion. Although the ratings were found to be discrepant through formal analysis, the rankings of the skills were quite similar, indicating that the adolescents with ASD across the spectrum have insight and awareness related to their areas of strength and the relative importance of skills. For example, four of the highest rated skills were the same across informant groups, along with overlap between two groups on several skills identified as most important. These findings align with other studies of self-report which indicate that the most comprehensive and complete picture of an adolescent's functioning will be ascertained through multiple informants (Sheldrick et al., 2012).

Goal and intervention selection

The study findings have important implications that can guide IEP teams in the selection of transition-related goals for adolescents, as well as the selection of interventions to target those goals. This is the largest current sample of adolescents with ASD (i.e. most recent sample from the National Longitudinal Transition Study-2 was followed until 2009), as well as one of only a few studies that includes individuals with ASD both with and without intellectual disability in a study using a self-report measure. Thus, the findings related to skill ascertainment and skill importance provide a timely snapshot for the field into the performance of key transition-related skills for adolescents across the full spectrum. This profile of strengths and needs as reported by more than 1000+ informants (including parents and teachers) can guide the field broadly and local IEP teams, in selecting IEP goals that are truly reflective of the strengths, needs, and priorities of adolescents with ASD. Research indicates that the most common IEP goals for

adolescents with ASD target six primary domains: communication, self-help, motor/sensory, social, academic, and behavior (Kurth and Mastergeorge, 2010). These domains do not reflect several of the highest priority goal areas identified by adolescents and parents participating in this study, including identifying goals related to life after high school, problem-solving, trying during hard tasks, and completing assignments, thus indicating a potential mismatch between the goals prioritized and selected by teachers and those identified by the adolescents and their parents.

The findings provide unique insight into goal and intervention selection in several ways. Adolescents did not choose their lowest rated skills as their highest priority skills. Two of the lowest rated skills were also the lowest rated priorities (responding appropriately to change, identifying emotions), suggesting that selecting deficit areas and/or core deficit areas related to ASD as intervention targets may not be the most compelling or effective launching point for intervention. Research indicates that the degree to which an individual supports the importance or social validity of an intervention may influence his or her willingness to participate (Bottema-Beutel et al., 2015). Gathering insight across stakeholders into the importance and potential impact of an intervention or intervention target will increase the likelihood of successful and sustained implementation (Kucharczyk et al., 2015). As such, selecting intervention targets that were priorities across at least two informant groups, such as "asking teachers for clarifying information" and "completing assignments," may be the most effective starting point for teams and researchers to consider, in addition to considering other skills that are more likely to correlate with improved postsecondary outcomes (e.g. adaptive behavior; Klinger et al., 2015).

In addition, the findings indicate that adolescents with ASD have a high level of willingness to work on transition-related skills. The priority ratings indicate the percentage of adolescents who selected that they "really want to learn" or "sort of want to learn" each skill, and ratings ranged from 67.8% to 88.7%. The notion that adolescents with ASD are highly motivated to work on a variety of skills intended to enhance their postsecondary outcomes may be counter to common teacher and parent perceptions (e.g. Ashburner et al., 2010; Barnhill et al., 2000). Further exploration of the perceptions of adolescents with ASD across informant group is required, as is a better understanding of how parents and teachers can better capitalize on the stated desire of adolescents to learn a number and variety of skills.

Impact on postsecondary outcomes

A recent qualitative study by Anderson et al. (2016) found that adolescents with ASD had multiple goals and diverse expectations for their life after high school including attending postsecondary schooling, working in a wide range of occupations, and forming new friendships. Yet, the literature on adults with ASD suggests that achieving

these goals has been illusive for many individuals on the spectrum (e.g. Shattuck et al., 2012). The SSSC has potential to impact postsecondary outcomes for adolescents with ASD in several ways: (a) including skills that have been linked to improving high school and postsecondary outcomes for adolescents on the autism spectrum (Test et al., 2009a); (b) increasing the likelihood that those skills identified as predictors for improved employment, education, and independent living will be targets for intervention; and (c) facilitating an opportunity for adolescents and parents to participate in the transition planning process, which is a predictor of both education and employment outcomes (Test et al., 2009b).

Limitations and future directions

There are several limitations to this study. The SSSC was created as part of the larger CSESA study, and thus has not been previously validated. Although beyond the scope of this study, additional psychometric analyses will be helpful, including a factor analysis to determine whether the measure is assessing a single underlying construct or multiple constructs and examining the reliability of the measure over time. Additionally, the SSSC relies exclusively on informant report, and there is no direct observation of the skills to validate the adolescent, parent, or teacher report. Finally, the study did not include a group of adolescents with typical development to assess expected rate of skill attainment across the SSSC's domains.

There are a number of areas for future study related to the SSSC. First, the SSSC data will be collected again 2 years after its initial completion from each respondent group. Although designed as a transition planning tool rather than an outcome measure, capturing data at a second time point will allow for examination of skill changes over time, as well as to examine the SSSC's utility to capture change as the result of the CSESA intervention. Next, further examination of skill identification and importance ratings across the various subgroups of adolescents with ASD may yield important information for the field. For example, better understanding how responses across informant groups differ for students both with and without intellectual disabilities may support the development of socially valid intervention targets or help practitioners select relevant goals and interventions for different groups of adolescents. Finally, linking the SSSC skill data to postsecondary outcomes for adolescents is an important future direction. The research team will be following a subset of students in their first year beyond high school and will examine the relationship between skill ascertainment and outcomes related to employment, postsecondary education, independent living, and social relationships.

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