

# JobTIPS: A Transition to Employment Program for Individuals with Autism Spectrum Disorders

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**Abstract** This study evaluated the effectiveness of an internet accessed training program that included Theory of Mind-based guidance, video models, visual supports, and virtual reality practice sessions in teaching appropriate job interview skills to individuals with high functioning Autism Spectrum Disorders. In a randomized study, twenty-two youth, ages 16–19, were evaluated during two employment interviews. Half received a training intervention following the initial interview and the half who served as a contrast group did not. Their performance pre and post intervention was assessed by four independent raters using a scale that included evaluation of both Content and Delivery. Results suggest that youth who completed the JobTIPS employment program demonstrated significantly more effective verbal content skills than those who did not.

**Keywords** Autism · Interviewing · JobTIPS · Employment · Theory of Mind

## Introduction

With 1 in 88 children diagnosed with Autism Spectrum Disorders (ASD) in the United States (Centers for Disease Control and Prevention 2012) and approximately 50,000 adolescents with ASD turning 18 this year (Shattuck et al. 2012), the need for employment support for youth with ASD as they transition from federally mandated school services to the workplace has become crucial. Surveys indicate that adults with ASD work fewer hours and earn less in wages per week than adults with other disabilities and are among the most costly individuals to support in vocational training programs (Cimera and Cowan 2009). A recent summary tracks the 2 years after high school when more than half of young adults with ASD did not participate in either work or education (Shattuck et al. 2012). The poor employment outcomes for adults with ASD are well documented and have resulted in calls to examine more effective ways of providing supports (Hendricks 2010; Migliore et al. 2012; Taylor and Seltzer 2011).

## Factors Influencing Poor Employment Outcomes

Shattuck et al. (2012) reported that youth with an ASD are uniquely at risk for negative post-school outcomes, as indicated by the fact that while only 55 % of those with an ASD are employed in the 6 years beyond high school, 86 % of those with a speech or language impairment, 94 % of those with a learning disability, and 69 % of those with an intellectual disability have found employment. The risk for unemployment may be higher among those characterized as having “high functioning autism” (Volkmar et al. 2009) and those diagnosed with Asperger’s Disorder (American Psychiatric Association 2000) who display average or above average intellectual abilities. Such young

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adults are up to three times more likely to have no employment or other daytime community-based activities than those individuals with ASD who do have an intellectual disability (Taylor and Seltzer 2011). Considering the qualitative impairments that many individuals with ASD display in the intersecting areas of communication, social perception and cognition, and social skills (American Psychiatric Association 2000), it is not surprising that without intensive intervention, they are at high risk for negative employment outcomes. Research suggests that up to 90 % of job losses in individuals with disabilities are due to deficits in social communication (Elksin and Elksin 2001), emphasizing the critical importance of skills in this domain.

The initial job interview is the first hurdle to getting into the workplace; thus, social competence in this setting is a specific skill critical to a positive occupational outcome. For that reason, many job interviews include questions that are designed to evaluate the interviewee's social problem-solving and teamwork skills. In some cases, social skills and behavioral tendencies are rated more frequently in interviews than any other construct (Huffcutt et al. 2001; Posthuma et al. 2002). Socially-based skills, including response content, composure, and even appearance, influence how the interviewer perceives and evaluates a candidate (Barrick et al. 2009, 2012).

#### Intervention to Improve Outcomes

In designing an intervention to help individuals with ASD with job interviewing skills, it was important to be concerned not only with teaching the appropriate verbal and nonverbal skills required for such an interaction (e.g., making eye contact, using appropriate language) but with supporting an understanding of the reasons for these behaviors. Deficits in this area are believed to occur because individuals with ASD are impaired in the ability to attribute mental states to themselves and to others (Baron-Cohen et al. 2000), that is, to lack what has been labeled a Theory of Mind (ToM). Thus, they struggle to recognize how their ideas, beliefs, and feelings might differ from those of another person (i.e., to recognize that other's perspective is different from their own). Lacking this insight, they often do not understand the effect of their behavior on others. Fortunately, research has shown that explicit instruction in emotion recognition and social cognition skills can improve an individual's performance on tasks that require them to attribute mental states to self and others (Golan and Baron-Cohen 2006; Kandalaf et al. 2013; Ozonoff and Miller 1995; Turner-Brown et al. 2008).

Another important element of a successful intervention with youth with ASD involves direct instruction of social skills that are shaped via prompting and reinforcement

across repeated practice opportunities (Reichow and Volkmar 2010). Effective social skills programs include such elements as explicit instruction, modeling, role-play, feedback on performance, and systematic transfer of the skill to new conditions to promote generalization (Lopata et al. 2010). Using such methods, individuals with ASD can be taught to respond more appropriately in common social situations by being given repeated opportunities to enact possible scenarios with feedback and guidance.

Technology has been used successfully to deliver these program elements to individuals with ASD. Instructional interventions that employ visual stimuli delivered via electronic media to help individuals with ASD understand and practice social situations have proven both engaging and effective (DiGennaro Reed et al. 2011; Mineo et al. 2009). Social modeling can be taught using a technology-based intervention that allows an individual to watch a videotaped demonstration of a person (himself or someone else) performing a skill and subsequently to perform that skill under practice or in vivo conditions. Video modeling has shown positive effects on a wide variety of behaviors in individuals with ASD (Bellini and Akullian 2007; Gelbar et al. 2012; National Autism Center 2009; National Research Council 2001), including complex social cognition skills (Bernard-Ripoll 2007; Charlop-Christy and Daneshvar 2003).

Finally, there is a small yet growing body of research related to the application of virtual worlds, a technology allowing users to practice context-based social and adaptive skills, facilitated in real time by an instructor, within computer generated environments. In these environments, the user with ASD assumes the role of an avatar, where he can safely rehearse initiations and responses (Parsons and Mitchell 2002; Mitchell et al. 2007; Strickland et al. 1996). Virtual learning environments have been used to improve social understanding and social reciprocity skills, to promote the development of empathy and perspective-taking skills, and to enhance emotion recognition skills (Moore et al. 2005). Kandalaf et al. (2013) found with multiple simulated job interviews in virtual spaces, eight high functioning young adults with ASD demonstrated improved social skills. Although the literature supports the use of virtual reality for a range of practice scenarios, research has not measured the effects in real job employment situations involving subtle physical and emotional interactions such as reading faces and responding to body motions that cannot be duplicated with computer generated characters in virtual space.

#### Employment Transition Programs for ASD

Although there are some promising methods for training individuals with ASD and while IDEA 2004 mandates a postsecondary transition plan for individuals with ASD age

16 and older to include outcome-oriented activities designed to facilitate adjustment from school to adult living, currently, there are no standard employment transition programs and limited research on effectiveness. A range of community coaching and employment options across the country, such as Project SEARCH and TEACCH Supported Employment, provide intensive collaboration between employers and individuals with ASD for a closely monitored work experience (Rutkowski et al. 2006; TEACCH Supported Employment Program 2013). Several studies have evaluated a range of employment training methods such as auditory work prompts and self monitoring (Hume et al. 2009; Montgomery et al. 2011; Nuemberger et al. 2013). These studies generally address a limited subset of employment skills such as photocopying and isolated autism abilities that vary from low to high functioning, and none have been validated for general acceptance. A systematic review of research on the effectiveness of employment assistance interventions found only two quasi-experimental studies and no definitive interventions that predictably and positively supported the development of employment outcomes for individuals with ASD (Westbrook et al. 2012). Promising issues for future research were identified but no existing research provided definitive studies on what works for employment with this population (Westbrook et al. 2012). Lack of a validated and accepted employment skills measurement tool for ASD also hinders research on strategies effective across the range of job skills and abilities found within the spectrum. A newly developed Autism Work Skills Questionnaire (AWSQ) is an attempt to fill this gap, but has only been tested with forty-six individuals (Gal et al. 2013). This research void creates a gap in mandated and needed services that is presently being met by local, individualized and unproven programs. This study focuses on one aspect of the problem.

#### Purpose of the Current Study

The current study evaluated the effectiveness of a treatment package comprised of a web-based interviewing skills program (JobTIPS) and virtual reality practice on responses to employment interview questions by adolescents with high functioning autism and Asperger's Disorder. We hypothesized that youth who participated in the intervention program would demonstrate improved skills, both skills that involved the content of their interactions with job interviewers (e.g., verbalizations) and the way in which this content was delivered (e.g., improved eye contact approximations). We further hypothesized that there would be a relationship between the presence and degree of ASD symptoms as measured by the Social Responsiveness Scale (SRS; Constantino and Gruber 2005) and the amount of improvement demonstrated.

## Method

### Participants

Participants were twenty-two male adolescents with high functioning autism or Asperger's Disorder who were recruited from a large southeastern metropolitan area through postings and mailings. Recruitment flyers and letters, whose content was approved by the Emory University School of Medicine's Internal Review Board (IRB), were posted at two large autism treatment centers, and were mailed to other agencies serving adolescent and young adults with ASD. Inclusion criteria were that the participant was between the ages of 16 and 19 years, had a clinical diagnosis of a pervasive developmental disorder, and was characterized by the primary caregiver on the screening form as having a form of "high functioning autism" or Asperger's Disorder. Additionally we required that potential participants have regular access to a home computer with an internet connection, and could perform basic computer and website navigation functions independently. Any individual with vision, hearing, or motor problems that would prevent participation in the virtual reality practice session or interview simulations was ruled out and we required that the participant had never been competitively employed nor viewed the JobTIPS website. Criteria and basic demographic information were reported by the primary caregiver on the screening form or collected via scripted telephone interviews. Please see Table 1 for a description of the sample.

Consent forms, approved by the Emory University Internal Review Board (IRB), detailing the study were mailed if the caregiver and/or individual with ASD indicated interest in participating and met all criteria. If the participant was under 17 years old, these forms included consent for the parent/legal guardian to allow a minor to participate, a written assent form and an additional consent form for the parent/legal guardian to participate as a subject in answering a questionnaire.

### Employment Program Design and Materials

The intervention used the JobTIPS program, a multimedia employment training program ([www.Do2Learn.com/JobTIPS](http://www.Do2Learn.com/JobTIPS)) that offers five sections to guide the individual with ASD through the process of "Determining Career Interests," "Finding a Job," "Getting a Job," "Keeping a Job", and "Other Job Topics" like "Leaving a Job." The program includes step-by-step instructions often paired with icons to support comprehension, embedded video models and video scenarios, video quizzes, and printable scripts, worksheets, organizational tools, and social

**Table 1** Demographic characteristics of youth in JobTIPS intervention study

	Control (n = 11)	Intervention (n = 11)	Statistic	<i>p</i> value
Gender (% male)	100	100	–	–
Age (years)	17.66 (1.27)	18.21 (1.03)	$F_{(1,20)} = 1.68$	NS
Race/ethnicity %			$\chi^2_{(3)} = 2.27$	NS
African-American	27.3 %	18.2 %		
White	63.6 %	72.7 %		
Other	0	9.1 %		
Biracial	9.1 %	0		
SES/economic <sup>a</sup>	6.82 (1.47)	6.70 (1.16)	$F_{(1,19)} < 1$	NS
Years of school completed: M (SD)	11.00 (1.33)	11.32 (1.12)	$F_{(1,19)} < 1$	NS
Medication (yes/total)	7/11	7/11	–	–

Source: Hollingshead (2011)

NS not significant

<sup>a</sup> Parent occupational status, Hollingshead. Range is 1–9

narratives. This web-based program was released to the public in April 2011 prior to the implementation of the study.

For the purposes of evaluating the effectiveness of the transition to employment training in improving job interviewing skills, researchers collaborated with experts from the fields of Human Resources and Organizational Psychology to develop JobTIPS subsections that targeted responses to standard interview questions. These sections were: behavioral interview questions (Janz 1982), situational interview questions (Latham and Sue-Chan 1999), the nonverbal behaviors that accompany those responses, and concrete explanations of the norms and expectations (from the perspective of the employer) that govern those responses. These subsections were not released to the general public within the JobTIPS website until after this evaluation study was completed. The subsections centered on the following topics: “Interview Overview,” “Think Like the Interviewer,” “Respond Like a S.T.A.R.,” “Rehearsing Responses to Questions,” “Greetings and Handshakes,” “During the Interview” and “The End of the Interview.” To promote learning by comparison, most subsections included captioned videos depicting both the more and the less appropriate responses in a given situation. Also embedded within most subsections were printable summaries, graphic organizers, worksheets, and visual reminder cues, all of which were printed and compiled within a binder for each treatment group participant.

#### Procedure

Once consented, participants were assigned randomly to the treatment group (n: 11) or to the contrast group (n: 11). Members of both groups participated in two simulated “job

interviews” at a research facility at Emory University. At least 24 h prior to the first interview, each participant was provided with a brief written summary of the “pretend stock clerk position” for which he was interviewing. This sheet contained images of stock clerks in work settings, and written information about the job duties of stock clerks and locations in which stock clerks might work. This position was selected because it includes concrete duties that are easy to depict, it was hypothesized that adolescent participants may have some background knowledge of stock clerks if they are exposed to such retail settings in their daily lives, and it aligns with the type of part time or summer position that some adolescents might obtain.

Standardized interview simulations were carried out by an executive from the field of human resources in an office setting that permitted the interview to be observed and recorded. This professional was blind to the participants’ group assignments. The human resources professional greeted each participant and verbally presented a brief, scripted description of what was about to take place, and then presented each of ten interview questions in the same order across all interview simulations. There were five standard interview questions (e.g., “Tell me about any work or volunteer experience you have had”) and five situational interview questions (Janz 1982; Latham et al. 1980) that required the participant to describe how they responded in a particular situation, or to theorize how they might respond in a situation (e.g., “Describe a time where you helped someone out. Who were they, and what did you do to help them?”).

During the interview, the human resources professional completed the rating scales based on participant performance. The interviewer was instructed to remain neutral to responses, providing no positive or negative feedback on responses, and to repeat a question if asked to do so without

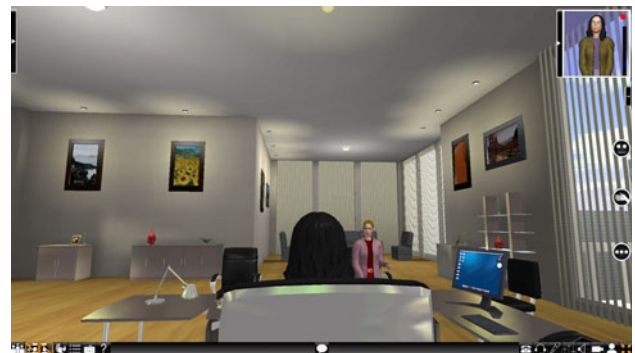
modifying the question. Although the interviewer scored most content response items as the participant responded to each question, some of the summary content delivery items were completed at the end of the interview after the participant exited the office setting.

Each interview simulation (44 in total) was videotaped. The videos were used for two purposes. First, viewing the participant's initial interview allowed the clinician who would lead the virtual reality practice session to identify areas of need within response content and response delivery prior to the interaction in the virtual world. The videotapes were also used to allow independent rating of the interview by three other professionals, one a human resources professional and two others with experience in autism intervention. All raters, including the in-person interviewer, remained blind to the group assignment of the participants. To more closely approximate the conditions under which the original interviewer evaluated responses, the three external raters were provided written instructions identifying the order in which each video should be viewed, the maximum duration of any rating session (2 h), as well as information regarding the prohibited use of certain controls (e.g., no rewinding to evaluate responses a second time, no second viewing of any video, no pause of any video). Similar to the original interviewing process, raters completed their evaluations of all participants across a 4 week period. Immediately following the first interview simulation, the participant and his primary caregiver were informed as to their group assignment (treatment or control group) and scheduled to return for the second interview simulation at least 7 days beyond the date of the initial interview. The second interview simulation was conducted in exactly the same way as the first.

Participants assigned to the treatment group were provided with written instructions for accessing the JobTIPS interviewing program from their home computers, unique usernames and passwords, and binders containing all of the printables from the interviewing web sections. Written instructions were issued to each treatment participant directing him to review all seven website subsections and usage history was tracked to ensure compliance during training. Completion and electronic submission of one worksheet containing twenty-five items presented in multiple-choice and true/false form was required when the participant finished reviewing all seven website subsections. Questions ranged from those assessing knowledge of standard interviewing procedures (e.g., typical length of an interview) to those evaluating the participant's ability to identify the most desirable response to an interview question, when given a set of potential responses from which to choose. Completion of this form ensured that participants had acquired basic knowledge about interviewing prior to moving on to the second phase of treatment, the virtual world practice session.

The virtual world practice session was conducted via the Venugen platform (<http://www.venuegen.com/>) in a basic office environment where individual interview practice simulations were led remotely by a clinician at a different physical location who had experience in autism intervention. The clinician assumed the avatar role of "interviewer" and the treatment group participant assumed the role of "interviewee"; no other avatars were present in this virtual office space. Each treatment group participant engaged in one 30-min virtual practice session in a room at the Emory University research facility and was supervised by a staff member there to ensure proper functioning of equipment (e.g., computer monitor, speakers, headphones). The treatment group participant and clinician engaged in dialogue via headphones and speakers, and viewed the avatars' actions and positioning via their respective computer monitors in different cities. Throughout the virtual reality practice session, the "interviewee" avatar and "interviewer" avatar were seated across from one another at a virtual office desk (see Fig. 1).

During the practice session, the clinician delivered direct, positive feedback on the participant's relative areas of strength observed in the initial interview and explicit instruction to target responses that were less than satisfactory in the initial interview (e.g., an off-topic response or a response with no relevance to the work environment, a response that presented his past behaviors or experiences in an unfavorable light, a disclosure of inappropriately personal information, et cetera.). In each case, the clinician presented the question, provided concrete explanations as to why one response might be more desirable than the original (from the perspective of the employer), and engaged the participant in repeated rehearsal opportunities across which guidance was gradually faded. The clinician also provided feedback and broken-down instructions for improvement on the participant's body language, facial expressions, and greeting/farewell and handshake responses emphasizing why such adjustments might influence an



**Fig. 1** VenuGen4 virtual reality interview space. Interviewer's avatar is seated at desk and shown in the upper right in *inset*. Participant's avatar (facing the viewer) is being interviewed



interviewer's evaluation. Following this practice session, the participant transitioned to the second interview simulation.

## Measures

### *Interview Skills Rating Instrument*

In collaboration with human resources experts, researchers developed an Interview Skills Rating Instrument with two sub-scales: Response Content: A 10 item scale that measures the content of the participant's responses to 10 interview questions; and Response Delivery: 20 items that measure behaviors related to greetings and farewells (handshakes, eye contact, verbal greeting, verbal expression of appreciation at end of interview), as well as the non-verbal behaviors (e.g., body positioning, facial expressions) that accompany verbal responses during the actual interview questioning period. Each response was scored on a Likert-type Scale with rating options ranging between 1 (Poor) and 4 (Excellent). Each rating definition contained descriptors to operationalize these measures. Operational definitions were developed with input from human resources experts, and from the common social communication issues that individuals with ASD often display, including limited or no social reciprocity, inability to sustain conversational exchanges, off-topic responses driven by encompassing preoccupations with a narrow area of interest (American Psychiatric Association 2000), and inappropriate responses that are indicative of limited insight into how particular response might be viewed by others (i.e., Theory of Mind; Baron-Cohen et al. 2000).

The Response Delivery Scale rates seven behaviors in the "Introductions/Greeting" section, seven in the "Q & A Non-Verbal Behaviors" section, and six in the "End of the Interview" section. Thirteen of the items in these sections were scored on a Likert-type scale from 1 ("Never or almost never") to 4 ("Almost always"). Items presented on this scale were those behaviors that might occur at multiple points across the interview (e.g., tone of voice, eye contact approximations, maintaining appropriate body posture, etc.). Seven operationally defined items were scored as either 1 (did not occur) or 4 (occurred) during the interview (e.g., verbal expression of appreciation at end of interview).

Figures 2 and 3 show examples of detailed breakdowns of the scoring guides from one item of each subscale. Copies of both measurement rating scales can be viewed and downloaded for individual use at the JobTIPS website: (<http://www.do2learn.com/JobTIPS/GettingAJob/Interviews/DuringTheInterview/AnsweringQuestions.html>).

### *Social Responsiveness Scale (SRS)*

To document the social and communication impairments characteristic of participants and because we anticipated that there would be a relationship between the constructs measured on this scale and the ability to benefit from the intervention, parents of all participants completed the SRS (Constantino and Gruber 2005). This 65 item questionnaire allows the quantification of symptomatology associated with ASD by characterizing the individual's severity of social impairment. It yields the following standard scores: SRS total score, as well as subscores for social awareness, social cognition, social communication, social motivation, autistic mannerisms and the SRS total score range which categorizes rates as: Normal, Mild to Moderately, and Severely Impaired. Scores are reported as T-score with the average T-scores for typically developing youth having a mean of 50 and a standard deviation of 10. Scores in the 60–75 range indicate mild to moderate impairment in social reciprocity; T-scores of 76 or higher indicate severe impairment associated with ASD.

### *Demographic Information*

Demographic information was collected from caregivers and included: Youth's gender, ethnic identification, date of birth and dates of interviews, years of schooling completed, occupation of the head of household and youth's medication use (Yes or No). These measures were used to ensure treatment and contrast groups were not affected by these differences.

## Results

### *Demographic Variables*

Demographic variables were examined using Analysis of Variance for continuous measures and Chi Square for ordinal variables. Demographic results are shown in Table 1 and indicated that there were no differences between Treatment and Contrast groups for gender (all participants were male), age, racial/ethnic identification, years of school completed, or use of psychoactive medication. Analysis of SRS variables using a multivariate analysis of variance also found no differences between these groups on this measure (See Table 2).

### *Interview Rating Scale Reliability*

Interview Rating Scale reliability was important to determine, since it documents the study's outcome. Therefore, results from each of the four raters for each of two



### Response Content Scale

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_

#### 1. "Tell me a little bit about yourself."

	Score: check one box
<b>Poor</b> Satisfied <u>no</u> portion of the question could be characterized by several of the following: <ul style="list-style-type: none"> <li>• limited or no response</li> <li>• fully off-topic response</li> <li>• highly personal / inappropriate content (personal health, religion, politics, narrow interest not related to job, personal conflicts, relationship status, etc.)</li> <li>• highly negative content (negative or disparaging comments about self, teachers, co-workers, peers, previous work, school, etc.)</li> <li>• examples and details are negative and portray subject in an unfavorable light</li> </ul>	
<b>Fair</b> Satisfied <u>limited portion</u> of the question could be characterized by several of the following: <ul style="list-style-type: none"> <li>• incomplete response, answered only part of the question</li> <li>• some deviation off topic</li> <li>• limited examples and details to support response</li> <li>• mildly negative references (about self, teachers, co-workers, peers, previous work, school, etc.)</li> <li>• examples and details are somewhat negative and portray subject in a mildly unfavorable light</li> </ul>	
<b>Good</b> Satisfied <u>adequate portion</u> of question could be characterized by several of the following: <ul style="list-style-type: none"> <li>• complete response without deviation from topic</li> <li>• examples and details are relevant to the question</li> <li>• adequate detail and examples to support response</li> <li>• examples and details are positive and portray subject in a favorable light</li> </ul>	
<b>Excellent</b> Fully satisfied <u>all aspects</u> of the question could be characterized by several of the following : <ul style="list-style-type: none"> <li>• examples and details provided are highly relevant to the question</li> <li>• examples and details are positive and portray subject in a highly favorable light</li> <li>• complete response without deviation from topic</li> </ul>	

**Fig. 2** Response content rating scale sample page for item 1. Interviewer scores from 1 (poor) through 4 (excellent) using the behavioral anchors as a guide

sub-scales were correlated using the Pearson Product Moment procedure. For both Scales, significant correlations were found between all raters, with the average correlation for Content being .71 ( $p < .01$ ) and for Delivery, .78 ( $p < .01$ ).

#### Effects of Intervention

As noted in the Methods, four raters viewed interviews with youth randomized to Treatment (Intervention) and Contrast (No Intervention) groups. Two interviews were done: (1) Pre



### Response Delivery Scale

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_

#### Introduction / Greeting

Behavior:	Score (circle one):	
1. <b>Smile:</b> At least one smile within context of greeting/ handshake / introduction that is directed towards the interviewer	1	Never or almost never displayed behavior
	2	Sometimes displayed behavior but not to defined criterion
	3	Often displayed behavior, meeting defined criterion
	4	Almost always displayed behavior, exceeding defined criterion
	N.O.	N.O. = No opportunity to assess behavior
2. <b>Subject initiates handshake at greeting:</b> Extends hand towards interviewer at appropriate distance  <b>OR, of equal value:</b>  <b>Appropriately responds to handshake initiation by interviewer:</b> Extends hand to interviewer immediately following interviewer's initiation reach (we want the interviewer to initiate the handshake if the subject does not do it first)	1	Never or almost never displayed behavior
	4	Almost always displayed behavior, exceeding defined criterion
	N.O.	N.O. = No opportunity to assess behavior
3. <b>Handshake is appropriate length:</b> 2-3 long seconds, then release	1	Never or almost never displayed behavior
	4	Almost always displayed behavior, exceeding defined criterion
	N.O.	N.O. = No opportunity to assess behavior
4. <b>Eye contact or eye contact approximation during handshake:</b> Looking into the interviewer's eyes, or at a point on their face (mouth) to approximate eye contact during handshake and verbal exchange for at least 5 seconds.	1	Never or almost never displayed behavior
	2	Sometimes displayed behavior but not to defined criterion
	3	Often displayed behavior, meeting defined criterion
	4	Almost always displayed behavior, exceeding defined criterion
	N.O.	N.O. = No opportunity to assess behavior

**Fig. 3** Response delivery scale sample page. The interviewer score from 1 (poor) through 4 (excellent) using the behavioral anchors as a guide

Intervention and (2) Post intervention. At both time points, raters completed two scales measuring: (1) Content (10 items) and (2) Delivery (20 items). The length of each

interview was recorded as was the number of days between interviews. No group differences were found for length of either interview (Interview 1: Treatment:  $M = 12.18$ ,



**Table 2** Ratings (T-scores)\* on the social responsiveness scale for youth in JobTIPS intervention study (M (SD))

	Control (n = 11)	Treatment (n = 11)	Statistic	p value
Social awareness	67.09 (13.06)	67.91 (11.53)	$F_{(1,20)} < 1$	NS
Social cognition	73.18 (14.27)	76.18 (12.29)	$F_{(1,20)} < 1$	NS
Social communication	73.82 (12.27)	72.82 (11.85)	$F_{(1,20)} < 1$	NS
Social motivation	71.91 (12.80)	74.00 (11.52)	$F_{(1,20)} < 1$	NS
Autistic mannerisms	79.55 (7.88)	81.18 (7.86)	$F_{(1,20)} < 1$	NS
SRS total	76.64 (11.15)	77.45 (9.15)	$F_{(1,20)} < 1$	NS

NS not significant

SD = 2.44, Control: M = 13.55, SD = 6.20,  $F_{(1,20)} < 1$ ; Interview 2: Treatment: M = 12.73, SD = 2.57, Control: M = 11.73, SD = 63.82,  $F_{(1,20)} < 1$ ) or for the number of days between interviews (Treatment: M = 9.45, SD = 3.86; Control: M = 9.09, SD = 2.63,  $F_{(1,20)} < 1$ ).

To evaluate whether the Interview Rating Scales were reliable and to measure the impact of the experimental intervention, the following approach to data reduction was taken. Summary scores were created for each Scale for each rater, using mean substitution within each rater's responses to each variable to avoid data loss. The range of possible scores for the Content Scale was 10–40 points, and for the Delivery Scale, 20–80 points. To examine the effects of the intervention, difference scores were created for each Scale for each interviewer by subtracting the Summary Score at Time 1 from the Summary Score at Time 2. Finally, to allow comparison of these two scales, a Mean Change variable was calculated by dividing each difference score by the total number of items that made up the scale.

Using the mean difference scores from all raters, a summary difference score was obtained representing the change on the Interview Rating Scale from Time 1 to Time 2. On this measure, the treatment group showed a significant positive change at the second interview on the Content Scale (M = .448, SD = .341; Control: M = -.034, SD = .17,  $F_{(1,20)} = 17.46$ ,  $p < .000$ , eta squared = .47), and a trend toward a positive change on the Delivery Scale (Treatment: M = .334 (SD = .229); Control: M = .0252 (SD = .463);  $F_{(1,20)} = 3.93$ ,  $p = .062$ , eta squared = .16). These scores are shown graphically in Fig. 4.

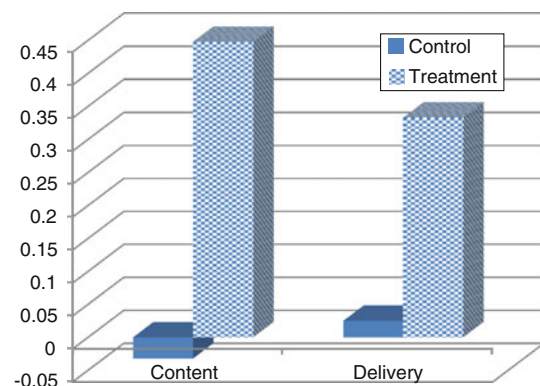
To determine if characteristics measured by the SRS were associated with these changes, Pearson's Product Moment Correlations were calculated between each of the rating scale outcomes and the SRS scores, finding that none of the SRS scores correlated significantly with outcomes on the Rating Scales.

## Discussion

Our hypothesis for this study was that youth with ASD who completed the JobTIPS training program would show

significant improvement in their job interviewing skills when compared to a contrast group who did not receive such training. The results suggest that this assumption is correct and demonstrate that an intervention package comprised of a web-based interviewing program and a virtual reality practice session is a useful method for working with youth with ASD who are at risk for poor performance in job interviews. It is notable that the program was more effective in teaching “content” rather than “delivery” skills; that is, participants were able to produce more appropriate *verbal* responses to interview questions following intervention, but the features that accompany those responses (e.g., posture, eye contact approximation, affect of facial expression) did not improve to the same degree. This difference between subscales may be the result of problems many individuals with ASD have in using multiple non-verbal behaviors to regulate social interaction (American Psychiatric Association 2000). However, it is also important to note that there was trend in the hypothesized direction and a larger sample size may have produced significant results.

Efforts to target “delivery” skills as well as “content” skills may require additional time or more feedback to achieve the same degree of improvement. The virtual reality platform provides the necessary environment for verbal responses to questions (i.e., “content” skills) within



**Fig. 4** Difference scores: mean change in content and delivery ratings from interview 1 to interview 2, summarized over 4 raters

this virtual space. However, the more subtle nonverbal cues are not provided by the Interviewer's avatar and are more difficult to replicate by the interviewee's avatar. This difference suggests that more focus on these behaviors may be necessary to achieve the same level of success.

### Limitations and Implications for Research

There are some limitations in the interpretation of these results. All of the participants in this study were male thus limiting the generalizability of the results. While the majority of those diagnosed with ASD are, in fact, male (Centers for Disease Control and Prevention 2012), it would be valuable to carry out further studies that include young women. In addition, it is likely that those who chose to participate were highly motivated since they volunteered for a research study and, therefore may not be representative of all individuals with ASD.

While the intervention appears to have been effective short term, it is not clear from this study how well the observed effects will be maintained over time. A second follow-up should be done to determine whether the changes noted in the treatment group persist. Furthermore, generalized responding under novel conditions (e.g., new interviewer, slightly adjusted questions) was not evaluated. While the Interview 1 and Interview 2 were standardized to allow direct comparison of pre and post intervention performance, future studies are needed to evaluate whether individuals with ASD adjusts responses to novel standard and behavioral interview questions. Perhaps more importantly, such studies are needed to identify the most effective strategies to support the individual in making such adjustments under generalized conditions.

### Implications for Practice

To support practitioners in preparing individuals with high functioning ASD for job interviews, it seemed prudent to identify some of the areas where many of the participants tended to struggle in the pre-intervention interviews, and within the post-intervention interviews in some. Many of the participants' responses to such questions as "Tell me a little bit about yourself" and "What are some of your strengths?" suggest a failure to recognize that the information provided ("content" skills) is viewed most favorably when it has some relevance to the work setting. Certain responses that revealed highly personal information (e.g., medication usage, relationship problems, therapy experiences) and responses to interview questions designed to assess the participant's ability to work with a group (teamwork) or their ability to cope with stressful situations suggest that the participant did not consider the perspective of the interviewer (i.e., employers seek employees who can

work well with others when necessary; employers seek employees who can accept negative feedback without escalation) and then use that information to craft a response; in other words, such responses are indicative of lack of Theory of Mind (Baron-Cohen et al. 2000).

To address these social cognition and social communication skill issues, it is important to note that practitioners should engage individuals in repeated opportunities to rehearse appropriate responses under conditions that approximate what the individual will encounter in a real situation. Yet it is unclear whether many individuals with ASD, particularly those who spend the majority of their day in the regular education high school setting, will receive the intensive instruction they often need in areas beyond academics, including social communication skills training and school and community-based occupational training. Such concerns regarding access to and intensity of direct instruction in the areas that impact employability extend beyond the high school classroom. While it has been shown that vocational rehabilitation services significantly increase the odds of gaining employment for individuals with ASD, data indicate that less than half of these adolescents and young adults receive such services (Migliore et al. 2012).

### Conclusion

Individuals with ASD appear uniquely at high risk for poor employment outcomes after leaving high school. This study established the potential value of a web-based program designed to support individuals training for job interview skills using a home computer and practicing these skills with a trained therapist at a remote location. The findings demonstrate that such a program can be effective as an intervention method to improve employment related interviewing skills for individuals with ASD. Both the training content and interview questionnaires developed in the study are accessible for public use from the JobTIPS website (<http://do2learn.com/JobTIPS>). Several virtual reality practice environments, including the Venugen platform used in this study, offer user subscriptions for job skill practice. Combining these web resources allows parents, educators, and other professionals to extend employment support options and provide needed services for individuals with ASD who may be located in geographically remote or poorly served areas of the world, or simply do not have access to trained professionals locally who can help them prepare for success in the job market.

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