

# A Systematic Review of Vocational Interventions for Young Adults With Autism Spectrum Disorders

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## KEY WORDS

autism spectrum disorders, supported employment, vocational training

## ABBREVIATION

ASD—autism spectrum disorder

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## abstract

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**BACKGROUND AND OBJECTIVE:** Many individuals with autism spectrum disorders (ASDs) are approaching adolescence and young adulthood; interventions to assist these individuals with vocational skills are not well understood. This study systematically reviewed evidence regarding vocational interventions for individuals with ASD between the ages of 13 and 30 years.

**METHODS:** The Medline, PsycINFO, and ERIC databases (1980–December 2011) and reference lists of included articles were searched. Two reviewers independently assessed each study against predetermined inclusion/exclusion criteria. Two reviewers independently extracted data regarding participant and intervention characteristics, assessment techniques, and outcomes, and assigned overall quality and strength of evidence ratings based on predetermined criteria.

**RESULTS:** Five studies were identified; all were of poor quality and all focused on on-the-job supports as the employment/vocational intervention. Short-term studies reported that supported employment was associated with improvements in quality of life (1 study), ASD symptoms (1 study), and cognitive functioning (1 study). Three studies reported that interventions increased rates of employment for young adults with ASD.

**CONCLUSIONS:** Few studies have been conducted to assess vocational interventions for adolescents and young adults with ASD. As such, there is very little evidence available for specific vocational treatment approaches as individuals transition to adulthood. All studies of vocational approaches were of poor quality, which may reflect the recent emergence of this area of research. Individual studies suggest that vocational programs may increase employment success for some; however, our ability to understand the overall benefit of supported employment programs is limited given the existing research. *Pediatrics* 2012;130:531–538

The number of children diagnosed with an autism spectrum disorder (ASD) began rising rapidly nearly 20 years ago, in the early 1990s,<sup>1,2</sup> and it is presently estimated that 1 in 88 children in the United States has an ASD.<sup>3</sup> Many of these children are now transitioning to adulthood. Adults with ASD incur substantial public costs<sup>4–6</sup>; thus, there is an urgent public health and scientific need to identify which services and interventions are most effective in increasing the quality of life of these individuals and their potential for independent functioning. While historically there has been a scientific and clinical focus on early identification and intervention in the field of ASD research, core social communication and repetitive behavior symptoms typically last throughout the life course for most individuals. Furthermore, the limited extant research on outcomes for adolescents and young adults with ASD documents difficulties in achieving markers of functional independence, including employment, for the vast majority.<sup>7</sup> Specifically, most adults with ASD live dependent lives; fewer than one-third have regular employment; most live with their parents or in supported living; and those who are employed are often in jobs that pay below a living wage.<sup>8–12</sup> In part because of these high levels of dependence, the majority of individuals with ASD will require some sort of support or intervention, often at intensive levels, throughout adolescence and adulthood.<sup>4–6,13,14</sup> The transition out of high school and into the adult service system is a time of particular vulnerability for individuals with ASD. Although few studies have examined this stage of the life span specifically, 1 study suggests that improvements in symptoms and problem behaviors observed while youth with ASD were in high school slowed down or stopped after they left high school.<sup>15</sup> Furthermore, a study using the National Longitudinal Transition Study–2

found that youth with ASD were at increased risk for no employment or educational activities in the first 2 years after exiting high school.<sup>16</sup> Upon high school exit, these individuals lose all mandated special education services, and they enter a world of adult services that is plagued by long waiting lists and which is unprepared to meet their unique needs.<sup>15,17,18</sup>

To date, the specific programs and interventions that underlie more positive functional, adaptive, social, and employment outcomes for individuals with ASD during the transition to adulthood and beyond are poorly understood. Furthermore, it is unclear how such outcomes are best assessed in the face of the inherent heterogeneity and wide scope of impairments associated with ASD.<sup>19,20</sup> This lack of information potentially limits the ability of individuals, families, practitioners, and service systems to provide the appropriate care to optimize quality of life and minimize the costs associated with ASD over an individual's life span.

The goal of this report was to review the literature on the effectiveness of vocational interventions for individuals with ASD, with a particular focus on the transition to adulthood. This review was conducted as part of a larger systematic review of therapies for adolescents and young adults (ages 13–30 years) with ASD. Information on other therapies (eg, behavioral, educational, allied health, medical) addressed in the full review can be found at <http://www.effectivehealthcare.ahrq.gov>.

## METHODS

### Search Strategy

We searched Medline via the PubMed interface, PsycINFO (psychology and psychiatry literature), and ERIC (educational literature) from 1980 to December 2011 using relevant controlled vocabulary terms and key terms related to ASD (eg, autistic disorder) and therapy

(eg, therapeutics). The reference lists of all included articles were also hand-searched to identify additional studies and of recent narrative and systematic reviews related to therapies for ASD to identify potentially relevant articles.

### Study Selection

Study inclusion and exclusion criteria were developed in consultation with an expert panel of clinicians and researchers involved in ASD. We included all study designs and required that studies include at least 20 participants with ASD between 13 and 30 years of age. A cutoff sample size of 20 was selected a priori to balance the need to identify studies able to assess effectiveness with our ability to identify enough studies to review. In addition, studies had to be published in the year 1980 or later, after the publication of standardized diagnostic criteria for ASD in the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition*.

Two investigators independently assessed each study against these inclusion criteria, with disagreements resolved by a senior investigator.

### Data Extraction

Using standardized forms, 2 investigators independently extracted data regarding study design; descriptions of the study populations, intervention, and comparison groups; and baseline and outcome data, as well as data about harms or adverse effects. Data were also captured on the conduct and timing of assessments to inform the assessment of quality. Principal outcomes of interest included effects on core symptoms of ASD and comorbid symptoms and conditions, including sleep, anxiety, hyperactivity, and challenging behavior (eg, irritability/agitation), as well as effects on vocational, independence, and family-related outcomes.

### Study Quality Assessment

Two investigators independently assessed each study by using a quality assessment form developed by the review team with input from experts in the field. A number of elements were evaluated with a series of yes/no questions in each domain (eg, Were outcomes coded and assessed by individuals blinded to the intervention status of the participants?). These elements were: study design; diagnostic approach; participant ascertainment and characterization; intervention description; outcomes measurement; and statistical analysis.

Disagreements between assessors were resolved through discussion to reach consensus. Overall assessment of quality was determined by using a prespecified algorithm that is available in the full report.

The strength of evidence of the current research was assessed by using methods established in the Agency for Healthcare Research and Quality Effective Health Care Program's Methods Guide for Effectiveness and Comparative Effectiveness Reviews.<sup>21</sup> Assessments were based on consideration of 4 domains: risk of bias, consistency in direction of the effect, directness in measuring intended outcomes, and precision of effect (Table 1). We determined the strength of evidence separately for major intervention-outcome pairs by using a prespecified approach described in detail in the full review.

### Data Synthesis

Given the considerable heterogeneity in the interventions and outcome measures used in studies meeting our inclusion criteria, we did not conduct any meta-analyses. We summarized characteristics of study populations and interventions and used descriptive statistics to report study outcomes.

**TABLE 1** Domains Used to Assess Strength of Evidence

Domain	Description
Risk of bias	Reflects issues in study design and conduct that could result in biased estimates of effect
Consistency	Reflects similarity of effect sizes seen across studies. Consistency cannot be assessed when only 1 study is available
Directness	Reflects the relationship between the intervention and the ultimate health outcome of interest
Precision	Reflects the level of certainty around the effect observed

## RESULTS

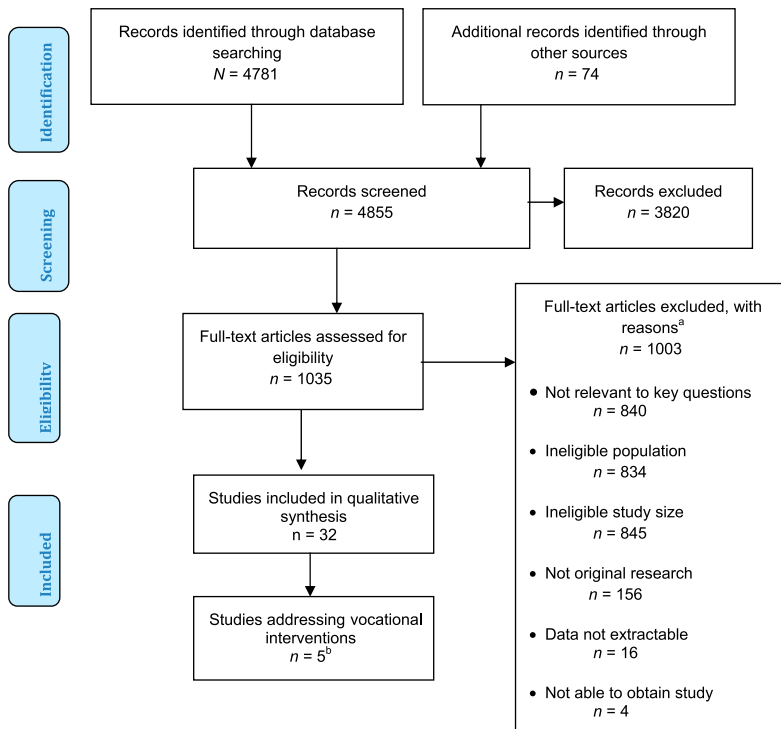
Figure 1 outlines the flow of papers retrieved for the review. We identified 6 papers reporting on 5 unique study populations and addressing the impact of supported employment/vocational interventions on outcomes for adolescents and young adults with ASD. Studies included 1 nonrandomized controlled trial reported in 2 publications,<sup>22,23</sup> 2 prospective cohort studies,<sup>24,25</sup> 1 case series,<sup>17</sup> and 1 cross-sectional study.<sup>26</sup> Interventions addressed in the studies all involved finding and implementing on-the-job supports for young adults with ASD, and studies were conducted in the United States,<sup>26</sup> United Kingdom,<sup>17,25</sup> Spain, and Germany.<sup>22–24</sup> All studies were considered to be poor quality; Table 2 outlines quality considerations and key outcomes for each study.

Among studies targeting outcomes related to core symptoms of ASD, 1 nonrandomized trial<sup>22,23</sup> examined the impact of supported employment (community-based jobs with a job coach) versus sheltered workshops (defined as “piece work being performed in segregated programs with only disabled coworkers”) on autism symptoms<sup>23</sup> and quality of life.<sup>22</sup> Participants were 55 young adults who had received a clinical diagnosis of autism (mean age: 21 years; mean IQ: mid-50s). Investigators assigned 26 participants to a sheltered workshop group and 21 to a supported work group. It is unclear why the sum of number of participants in each group does not match the total sample size. All of the jobs for those in the supported

group were in the community with no more than 2 individuals with ASD in the same workplace. Youth in the supported group worked between 15 and 30 hours a week, were paid competitive wages, and each had a job coach.

The average length of community employment at follow-up was 30 months.<sup>22,23</sup> Differences between the supported work and sheltered workshop groups in autism symptoms or quality of life were not significant before intervention. At follow-up, young adults who had participated in the supported work program had reduced (ie, improved) autism symptom scores and higher quality of life scores relative to those who were in a sheltered workshop. Furthermore, the autism symptom differences were due to deterioration in the sheltered group over time; the supported group had no difference in autism symptoms scores from before to after intervention. In contrast, the sheltered workshop group had no difference in quality of life over time; the supported work group had quality of life scores that improved from before to after intervention.

A related prospective cohort study from the same research group<sup>24</sup> examined the impact of supported employment in the community (supported work group) versus vocational activities in a sheltered setting (no supported work group) on the cognitive development of 44 young adults with autism. Participants were randomly selected from the Spanish Program of Employment for Autistic People; however, individuals were selected for the supported



**FIGURE 1** Study flow diagram. <sup>a</sup>Numbers do not tally because studies could be excluded for multiple reasons. <sup>b</sup>One study<sup>22,23</sup> was reported in 2 separate publications.

work group based on enrollment in previous sheltered workshops, no previous participation in other supported work programs, lack of severe behavioral problems, and acceptable vocational abilities. Thus, treatment assignment seems to have been nonrandom.

The mean age of participants was  $25.52 \pm 3.35$  years for the supported work group and  $24.32 \pm 4.34$  years for the no supported work group.<sup>24</sup> Similar to the aforementioned studies, all of the jobs for those in the supported work group were in the community, with no more than 2 individuals with autism in the same work place. Youth in the supported work group averaged 20 hours of work per week, were paid competitive wages, and each had a job coach. The average length of community employment at follow-up was 30 months. In contrast, the no supported work group was on a waiting list for supported work and participated in non-competitive vocational activities during

the study period.<sup>24</sup> It is unclear how many participants were in each group. At the start of the study, there were no significant differences between the supported work and no supported work groups in vocabulary, IQ, or autism symptoms. There were also no differences between groups at this time on any of the 12 cognitive performance tasks; these tasks are used to measure constructs such as psychomotor speed, spatial recognition memory, and executive functioning. Results suggested that, relative to the control group, the supported employment program was associated with improvements over time in 8 of the 12 measures of cognitive functioning.<sup>24</sup>

Two cohort studies<sup>17,25</sup> and 1 cross-sectional study<sup>26</sup> examined the impact of employment/vocational interventions on outcomes related to independent functioning. One study examined the outcome of a 2-year supported employment scheme for high-functioning

adults with autism or Asperger syndrome in the United Kingdom.<sup>25</sup> The 30 participants in the supported employment scheme had a formal diagnosis of autism or Asperger syndrome, a performance or verbal IQ score  $>70$ , were actively seeking work and able to travel independently, were capable of eventually maintaining employment with minimal support, and had no psychiatric or physical problems that would adversely affect employment. An additional 20 individuals who met the study criteria were contacted and enrolled into a no-treatment comparison group. The supported employment scheme included job finding and work preparation, educating potential and existing employers and colleagues about ASD, and on-the-job supports. On-the-job supports included assistance from a support worker with dealing with the social and occupational requirements of a job and education about ASD for employers and work colleagues. The frequency of supports decreased over the study period.

Over the 2-year evaluation period, young adults in the supported employment group were significantly more likely to find paid employment than those in the comparison group (63.3% vs 25%), and they spent a greater amount of the study time employed (27.09% vs 12.35%).<sup>25</sup> For those who were employed, the number of hours worked per week did not differ between the supported work versus the comparison group; however, the supported work group had higher wages per hour on average. There were no significant differences in IQ, vocabulary, social understanding, or age between those who were and were not able to find work. The investigators noted that the most important aspect of their supported work program, as well as the most expensive, was the “job finding” aspect, which included many hours of making presentations to, meeting with, and negotiating with potential employers.

**TABLE 2** Key Outcomes of Studies Assessing Medical Interventions in Adolescents and Young Adults With ASD

Study (Author, Year, Country, Groups, N Enrollment/N Final Study, Quality)	Age (y) and IQ <sup>a</sup>	Key Outcomes
Garcia-Villamizar et al, <sup>22,23</sup> 2000; Spain and Germany	G1: 21.07 ± 4.18; G2: 21.64 ± 3.75	<ul style="list-style-type: none"> <li>• Adults with ASD participating in a community work program had lower autism symptoms and higher quality of life scores relative to those who participated in a sheltered workshop.</li> <li>• Follow-up assessment was ~30 months after the start of the intervention.</li> <li>• Quality considerations: nonrandom assignment to groups; inclusion/exclusion criteria not clearly stated; intervention not fully described; measure of treatment fidelity not reported; differences in concomitant interventions not reported; outcomes not coded by masked assessors.</li> </ul>
G1, sheltered work, 26/26	IQ (Leiter): G1: 55.52 ± 14.43; G2: 57.41 ± 15.01	
G2, supported work, 25/21		
Quality: poor		
Garcia-Villamizar and Hughes, <sup>24</sup> 2007; Spain	G1: 25.52 ± 3.35; G2: 24.32 ± 4.34	<ul style="list-style-type: none"> <li>• Adults with ASD participating in a community work program versus a wait-listed group who participated in noncompetitive (ie, sheltered) vocational activities.</li> <li>• Follow-up assessment was ~30 months after the start of the intervention.</li> <li>• Relative to the wait-listed group, the supported employment group experienced improvements over time in 8 of the 12 measures of cognitive functioning.</li> <li>• Quality considerations: nonrandom assignment to groups; attrition not reported; intervention not fully described; measure of treatment fidelity not reported; differences in concomitant interventions not reported; outcomes not coded by masked assessors.</li> </ul>
G1, supported employment	IQ (Raven): G1: 41.14 ± 4.45; G2: 42.23 ± 5.43	
G2, Wait list; Overall N: 44/44		
Quality: poor		
Mawhood and Howlin, <sup>25</sup> 1999; United Kingdom	G1: 31.1 ± 9.1; G2: 28.0 ± 6.1	<ul style="list-style-type: none"> <li>• Two-year supported employment scheme for high-functioning adults with autism or Asperger syndrome.</li> <li>• Adults in the supported work group were more likely to find paid employment (63% vs 25%) and had higher wages per hour on average than a control group.</li> <li>• No differences between groups in number of hours worked per week for those who worked.</li> <li>• Quality considerations: nonrandom assignment to groups; systematic diagnostic approach not reported within study; differences in concomitant interventions not reported; outcomes not coded by masked assessors.</li> </ul>
G1, supported employment program, 30/30	IQ (WAIS full scale): G1: 98.8 ± 16.3; G2: 97.7 ± 20.4	
G2, control, 20/20		
Quality: poor		
Howlin et al, <sup>17</sup> 2005; United Kingdom	G1a: 31.1 ± 9.1; G1b: 31.4 ± 9.3	<ul style="list-style-type: none"> <li>• For adults in the 8-year follow-up (1995–1996 sample), 13 of 19 (68%) who had been previously employed remained employed.</li> <li>• For adults in the additional sample (2003–2005), employment ranged from 70.5% to 54.3%, depending on regional site.</li> <li>• Quality considerations: no comparison group; attrition not reported; differences in concomitant interventions not reported; outcomes not coded by masked assessors.</li> </ul>
G1a, pilot-supported employment program participants (1995–1996), 30/30	IQ (Raven nonverbal): G1a: 110.2 ± 17.6; G1b: 110.7 vs 19.5	
G1b, supported employment program participants (2003–2005), 117/89		
Quality: Poor		
Lawer et al, <sup>26</sup> 2009; United States	Age: 18–25 y, 73.4%; 25–34 y, 15.5%; 35–44 y, 8.1%; 45–54 y, 2.5%; 55–65 y, 0.5%	<ul style="list-style-type: none"> <li>• Presence of on-the job supports was related to a higher likelihood of employment in the community (competitive or supported) for adults with ASD.</li> <li>• On-the job supports were as effective in promoting employment for adults with ASD as for adults with other developmental disabilities.</li> <li>• Quality considerations: no comparison group; systematic diagnostic approach note reported within study; participants not clearly characterized (no cognitive or developmental measures); intervention not fully described; measure of treatment fidelity not reported; differences in concomitant interventions not reported; outcomes not coded by masked assessors.</li> </ul>
G1, vocational rehabilitation service users, 1707/1707		
Quality: poor	IQ: NR	

G, group; NR, not reported; WAIS, Wechsler Adult Intelligence Scale.

<sup>a</sup> Data are presented as the mean ± SD.



This same research group conducted a longer-term follow-up of their supported employment scheme, now titled "Prospects."<sup>17</sup> The study examined whether the gains in employment made during the first 2 years of the project<sup>25</sup> persisted for up to 8 years in a larger cohort (recruited from 3 regional sites in the United Kingdom). In addition to the 30 young adults with ASD reported on in the earlier study, an additional 117 young adults with autism or Asperger syndrome who began receiving services between 2002 and 2003 were added to the cohort. Thirteen of the 19 young adults in the original sample who found employment remained employed 7 to 8 years later. For the young adults who were added since the original cohort, the rate of employment remained high, ranging from 70.5% to 54.3% (depending on regional site). The majority of employed young adults with ASD (84.7%) were generally happy with their job.

A final cross-sectional study<sup>26</sup> examined the effectiveness of vocational rehabilitative services for adults with ASD compared with adults with other developmental disabilities. The investigators identified 1707 adults with ASD from national data obtained from the US Department of Education's Office of Special Education and Rehabilitative Services. The study reported that the presence of on-the-job supports (which could include counseling, on-the-job training, job search assistance, assessment and diagnosis, and assistive technology) was associated with a higher likelihood of employment in the community (with or without supports), and that on-the-job supports were just as effective in promoting employment for adults with ASD as they were for adults with other developmental disabilities.

## DISCUSSION

### Assessment of the Literature

We identified 5 studies reported in 6 publications and focused on supported

employment/vocational interventions.<sup>17,22–26</sup> All of the studies focused on on-the-job supports as the employment/vocational intervention; no other vocational interventions were reported in the literature meeting our study criteria. Our ability to assess the benefit of supported employment programs is limited, and no study used random assignment, making it difficult to draw conclusions about the effectiveness of the programs. The majority of the studies were small, and all were of poor quality. Thus, the strength of the evidence for positive benefits of vocational interventions on employment, core symptoms of ASD, and cognitive development is insufficient at this time, meaning that we cannot estimate the likely effect without further research.

Supported employment interventions are particularly understudied. Only 1 study examined rates of employment for programs that lasted  $\geq 3$  years.<sup>17</sup> Furthermore, this longer-term study did not include a control group, making it impossible to determine the rates of employment over time for young adults with ASD who were not participating in the supported employment intervention. Finally, none of the studies examined whether increased employment rates or improvements in other outcomes were sustained after the termination of the supported employment intervention.

### Future Directions

The transition from adolescence to early adulthood presents numerous challenges for individuals with and without neurodevelopmental challenges. During this interval, individuals with ASD are presented with additional complexities that require efforts to maximize the achievement of individual goals for independence. Nonetheless, little research addresses vocational and employment needs in this population.

It is unlikely that large-scale implementation of interventions will be consid-

ered until a stronger evidence base is developed, despite growing numbers of individuals with need and some small studies demonstrating initial promise. A promising area for future study may be identifying programs/interventions that are appropriate candidates for developing treatment manuals to encourage standardized replication of promising approaches. Interventions with demonstrated effectiveness in other populations with similar disabilities may inform the development of approaches for individuals with ASD.

Studies are also needed that illuminate which aspects of multifaceted supported employment programs have the greatest impact. Studies that do show evidence of effectiveness in this area should collect longer-term data to describe the degree to which findings, including the duration of employment, continue after the intervention itself is removed. These studies should also broaden the outcomes measured, to include other functional outcomes such as quality of life, educational attainment, residential outcomes, and social outcomes. Furthermore, it will be important for such studies to demonstrate and study the financial impact of specific programs over time on an individual, family, and systems level.

Research is also necessary to understand how individual differences such as the severity of ASD symptoms, sociodemographic factors, and physical and mental health comorbidities may affect the transition to adulthood as well as treatment over an individual's life span. For example, recent research not addressed in the full AHRQ systematic review suggests that youth with ASD who do not have an intellectual disability may be more negatively affected by the transition out of high school relative to those with a comorbid intellectual disability.<sup>12,27,28</sup> Furthermore, relative to families with higher socioeconomic status, youth with ASD from families with fewer socioeconomic resources are less

likely to receive formal services after exiting high school.<sup>29</sup> Determining the characteristics of individuals with ASD who receive and benefit from treatment may help to understand who is underserved, as well as allow for the targeting of specific treatments to those individuals for whom they are maximally effective. Finally, foundational research is necessary to understand the goals of individuals with autism and their families as future research studies are planned.

## CONCLUSIONS

Given shifts in our understanding of the increased prevalence of ASD, the increasing population of adolescents and young adults with ASD is a challenging public health issue.<sup>13</sup> There is a dramatic disparity between the estimated costs associated with ASD, including

unemployment, underemployment, impact on families, and health care utilization costs, and the evidence base for understanding what interventions can optimize employment and other important functional outcomes for individuals with ASD. In the current review, individual studies of different on-the-job supports reported increased rates of employment in the community relative to those without on-the-job supports; however, given the methodologic limits of such studies, the strength of evidence (confidence that future research will not change our understanding of the effect) for the effect seen is insufficient. Similarly, despite positive results related to other outcomes (ie, quality of life, autism symptoms, cognitive development) reported in individual studies, the poor quality of the studies, assessment of

unique outcomes in each study, and lack of replication lead to insufficient strength of evidence until further studies are conducted that may confirm the observed effects. Research to quantify the degree to which these interventions are effective, under what specific circumstances, and for which individuals with ASD is critical for the growing number of adolescents and young adults with ASD who are approaching the transition to adulthood.

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