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## Longitudinal patterns of employment and postsecondary education for adults with autism and average-range IQ

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### Abstract

This study examined correlates of participation in postsecondary education (PSE) and employment over 12 years for 73 adults with autism spectrum disorders (ASD) and average-range IQ whose families were part of a larger, longitudinal study. Correlates included demographic (sex, maternal education, paternal education), behavioral (activities of daily living, maladaptive behaviors, autism symptoms) and family (size of maternal social network; maternal depressive symptoms, anxiety, and pessimism) factors. Although two-thirds of adults with ASD participated in competitive employment/PSE during the study, fewer than 25% maintained these activities over the study period. Behavioral characteristics distinguished those who never had competitive employment/PSE from those who sometimes or consistently participated in these activities. Women were considerably less likely than men to maintain employment/PSE over time.

### Keywords

Autism spectrum disorder; adult; employment; postsecondary education; longitudinal

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A growing body of research has demonstrated that adults with autism spectrum disorder (ASD) are substantially underrepresented in employment and postsecondary education (PSE) relative to those in the general population and those with other disabilities (Henninger and Taylor, 2013; Shattuck et al., 2012; Eaves and Ho, 2008; Howlin et al., 2004; Taylor and Seltzer, 2012). However, little is known about how vocational activities change over time for these adults – particularly for those who do not have an intellectual disability (ID) – nor about the factors associated with patterns of consistent engagement in employment and/or PSE. Most of the recent employment intervention studies target adults with ASD without ID (e.g., Smith et al., 2014; Morgan et al., 2014), and thus it is critical to understand their employment and educational patterns.

Adults with ASD and average-range IQ tend to have more independent vocational outcomes at a given time compared to those with ASD and ID (Taylor and Mailick, 2014; Taylor and Seltzer, 2011). However, they are also at higher risk of disengagement from (i.e., not participating in) paid employment/PSE. For example, Taylor and Seltzer (2011) found that such adults were three times more likely to have no daytime activities compared to those with ID. Similarly, Howlin and colleagues (2013) found that 28% of adults with ASD and average-range IQ were competitively employed; however, 55% of their sample had never had community, sheltered, or voluntary employment.

Examining patterns of PSE/employment activities over time for adults with ASD and average-range IQ can aid in understanding why they might be at higher risk for disengagement from these activities. Although a growing number of studies have examined vocational outcomes at one point in time for adults with ASD (for a review see Henninger and Taylor, 2013), only two studies have focused on patterns over time. In a sample of adults with ASD who predominantly had ID, Taylor and Mailick (2014) found small but significant declines in the level of independence in vocational/educational activities over 10 years, with little evidence of improvement. Similarly, Howlin and colleagues (2013) found stability in low rates of employment for adults with ASD across 20 years. To our knowledge, no study has examined change over time in PSE/employment for adults with ASD and average-range IQ. Thus, it is unclear whether increased rates of disengagement from vocational activities for these adults is driven by a subset who are consistently vulnerable to disengagement, or whether disengagement at discrete points in time is a common experience for many individuals.

In addition to examining patterns of vocational activities, it is also important to understand the factors that may promote consistent engagement in PSE/employment for adults with ASD. Although few studies have examined factors that predict patterns of employment/PSE over time, an emerging body of research suggests a number of important correlates related to vocational activities at a single point. In terms of demographic factors, adults with ASD whose parents have a lower socioeconomic position are less likely to participate in PSE and employment (Chiang et al., 2012; Shattuck et al., 2012), possibly because these families have less access to vocational services or different expectations for their son/daughter in adulthood. We expect the toll of low socioeconomic position on employment/PSE to be even more pronounced for adults with ASD and average-range IQ, who are less likely to qualify for publicly-sponsored services and supports.

Sex is another factor that may affect stability of employment/PSE over time. Our research has found that independence in vocational activities declines more sharply over time for women with ASD relative to men (Taylor and Mailick, 2014). Similarly, in a U.K. sample, only one woman with ASD (9%) had paid employment compared to 49% of men (Howlin et al., 2013). One explanation offered for sex disparities in employment is that women with ASD experience gender discrimination in the workplace (Taylor and Mailick, 2014). If this is the case, the impact of sex on employment activities might be even more pronounced for adults with ASD and average-range IQ, who are more likely than those with ID to work in community settings without the buffer of formal supports.

Behavioral characteristics of the adult with ASD have also been associated with vocational outcomes. Those with fewer maladaptive behaviors (Taylor and Seltzer, 2011) and autism symptoms (Taylor and Seltzer, 2011; Howlin et al., 2004; Eaves and Ho, 2008), and those with higher levels of functional independence (Farley et al., 2009; Shattuck et al., 2012; Taylor and Mailick, 2014; Taylor and Seltzer, 2011) are more likely to participate in PSE and employment. Because adults with ASD and average-range IQ are more likely than those with ID to be working without the benefit of on-the-job supports, autism symptoms such as difficulties in social communication or rigid behaviors, as well as lack of independence in daily living skills may have particularly detrimental effects on their employment.

Family characteristics may also affect participation in PSE and employment for adults with ASD and average-range IQ. In particular, distressed parents (i.e., those with greater anxiety or parenting stress) may be less effective in accessing the services needed to help their son/daughter secure work or PSE activities (Osborne et al., 2008; Taylor and Henninger, 2015). Finally, parents with larger social networks might be better at finding appropriate vocational activities for their son/daughter with ASD, as larger networks have the potential to provide parents with more sources of information about services and opportunities for their offspring.

## The Present Study

In the present study, we used longitudinal data collected over 12 years to examine post-high school employment and educational patterns for adults with ASD and average-range IQ. There has been some suggestion that, for adults with ASD, maintaining employment over time might be just as difficult, if not more so, than obtaining a job (Taylor and Mailick, 2014). Thus, investigation into the extent to which adults with ASD remain in integrated work/educational placements in the community is of importance. In addition, we examined the demographic (son/daughter sex, maternal education, paternal education), behavioral (activities of daily living, maladaptive behaviors, and autism symptoms) and family (size of maternal support network; maternal depressive symptoms, anxiety, and pessimism) correlates that differentiated patterns of employment/PSE over time.

## Method

### Sample and Procedure

The present analysis used a subsample ( $n = 73$ ) drawn from our larger longitudinal study of families of adolescents and adults with ASD ( $N = 406$ ; Seltzer et al., 2011). The criteria for inclusion in the larger study were that the son or daughter with ASD was age 10 or older (age range = 10 to 52 at the beginning of the study), had received an ASD diagnosis from an educational or health professional, and had a researcher-administered Autism Diagnostic Interview-Revised (ADI-R; Lord et al., 1994) profile consistent with the diagnosis. Nearly all of the sample members (94.6%) met the ADI-R lifetime criteria for a diagnosis of autistic disorder, with the remaining meeting cut-offs for Asperger disorder or PDD-NOS. Half of the participants lived in Wisconsin ( $n = 202$ ) and half in Massachusetts ( $n = 204$ ). Seven waves of data have thus far been collected from parents and are available for analysis: four waves collected every 18 months from 1998 to 2003, spanning a 4.5-year period; a fifth

wave collected in 2008; a sixth wave collected in 2010, and a seventh wave collected in 2012 (a figure summarizing the design is presented in the supplemental material). At each time point, data were collected from the primary caregiver, who was usually the mother, via in-home interviews and self-administered questionnaires. All study procedures were approved by the University's Institutional Review Board.

In the present analyses, we included 73 families who met the following criteria: their son or daughter with ASD had at least three time points of post-high school vocational/educational data (A minimum of three data points is required to provide a valid estimate of postsecondary educational and employment patterns), was verbal, and had an IQ score of 70 or above. Standardized IQ was obtained by administering the Wide Range Intelligence Test (WRIT; Glutting et al., 2000), a brief measure with strong psychometric properties and both verbal and nonverbal sections. For cases where the WRIT score was missing, a review of medical and psychological records by three psychologists, combined with a clinical consensus procedure, was used to determine whether the adult had ID.

Just over one-third of the individuals with ASD in this sample (35.6%,  $n = 26$ ) exited high school before the start of the study, and thus had vocational/educational data starting at the first time point of the study; 11 participants (15.1%) exited high school between Time 1 and Time 2 (and had vocational/educational data starting at the second time point of the study), 9 participants (12.3%) exited between Time 2 and 3, 11 (15.1%) exited between Time 3 and 4, and 16 (21.9%) exited between Time 4 and Time 5. Note that although this variability in the amount of vocational/educational data is an inherent limitation of the study design, the number of post-high school time points was not significantly related to employment/PSE patterns,  $F(2)=.24$ ,  $p=.79$ .

At their first time point of study participation after high school exit, adults with ASD in this sample averaged 23.83 years of age ( $SD = 6.83$ ). Over three-fourths (79.5%) were male. IQ scores ranged from 70 to 142; approximately 40% of adults had IQ scores of 100 or above. At the first data collection point after high school exit, over two-thirds (69.4%) of the adults were living with their parents or other relatives, 16.7% were living on their own with some support, 5.6% were living independently, 2.8% were living in a supported community residence with other adults with disabilities, one person (1.4%) was a hospital inpatient, and 4.2% had some other living arrangement.

At the first time point of the study after their son/daughter's high school exit, mothers averaged 53.89 years of age ( $SD = 8.82$ ). Just over 80% of mothers were married at this time (80.6%) and 94.5% were Caucasian. Around 60% of mothers (58.9%) had attained a postsecondary degree, with 35.6% of mothers earning a post-bachelor's degree. Similarly, two-thirds (67.3%) of fathers had attained a postsecondary degree and 44.3% attained a post-bachelor's degree. The median household income was between \$60,000 and \$70,000 in 1998 (at the start of the study) and there was considerable variability in the socio-economic position of this sample; one-quarter (26.0%) had annual household incomes below \$40,000, and 45.2% had annual household incomes of \$70,000 or above.

## Measures

**Outcome Variable: Employment/PSE Stability Categories**—Using the Vocational Index (Taylor and Seltzer, 2012; see supplemental materials for description), we coded the vocational/educational activities of the adults with ASD at each time point of the study into either a “1” – indicating current participation in competitive employment (i.e., working in the community without supports) or degree-seeking PSE for any number of hours (corresponding to a score of 8 or 9 on the Vocational Index) – or a “0” when the adult was not participating in competitive employment or PSE (corresponding to a score of 1 to 7 on the Vocational Index). We then used these data to code participants into one of three mutually-exclusive categories (termed “employment/PSE stability categories”): (3) those who were *consistently* engaged in competitive employment and/or a degree-seeking PSE program at each time point of the study (termed “consistently engaged”); (2) those who were *sometimes* engaged in competitive employment or PSE, but at other time points in the study participated in less independent vocational activities (e.g., supported employment, sheltered workshop) or were unemployed (termed “sometimes engaged”); and (1) those who were *never* competitively employed or in a degree-seeking PSE program at any point in the study (termed “never engaged”).

**Demographic Variables**—The age of the individual with ASD was recorded at each time point of the study, and age at the first time point after high school exit was used in the present analysis. At the first time point of the study, the sex of the adult with ASD was recorded, as well as maternal and paternal education. Note that the paternal education variable reflects the education of the mother’s current spouse, who in some cases was not the biological father of the child with ASD.

**Behavioral Indices**—The present analyses used behavioral and family indices measured at the first time point after high school exit, which was concurrent with the adult’s first time point of Vocational Index data and thus the start of their pattern of competitive employment/PSE. Time 1 behavioral and family variables were used for adults who exited high school before the start of the study.

**Independence in activities of daily living:** Independence in activities of daily living was measured using the Waisman Activities of Daily Living Scale (W-ADL; Maenner et al., 2013). Mothers rated their son or daughter’s level of independence on 17 items covering the domains of housekeeping, personal care, and meal-related activities. Each item was rated on a 3-point scale of independence – 0 (does not perform the task at all), 1 (performs the task with help), or 2 (performs the task independently) – and items were summed. Scores from the W-ADL have a correlation of .82 with scores from the Daily Living Skills subdomain of the Vineland Screener (Sparrow et al., 1993), and high levels of reliability and validity have been established (Maenner et al., 2013). Higher scores indicate greater independence. In the present analyses, we used the overall activities of daily living score, as well as scores on each of the subscales (housekeeping, personal care, meal-related activities).

**Maladaptive behaviors:** Mothers completed the Behavior Problems subscale of the Scales of Independent Behaviors – Revised (SIB-R; Bruininks et al., 1996) at all study time points.

This subscale measures maladaptive behaviors, grouped in three domains: internalized behaviors, externalized behaviors, and asocial behaviors. Mothers who indicated that their son or daughter displayed a given behavior problem during the past six months then rated the frequency (1 = *less than once a month* to 5 = *1 or more times/hour*) and the severity (1 = *not serious* to 5 = *extremely serious*) of the behavior. Standardized algorithms (Bruininks et al., 1996) translate the frequency and severity ratings into subscale scores (internalizing, externalizing, and asocial) and a general maladaptive behaviors score. The general maladaptive behaviors score and scores from each subscale were used in the present analyses. Higher scores indicate more severe maladaptive behaviors. Reliability and validity of this measure have been established by Bruininks et al. (1996).

**Autism symptoms:** We measured current autism symptoms at each time point of the study using the ADI-R (Lord et al., 1994). Thirty-three items from the diagnostic algorithm appropriate for adolescents and adults were administered. Ratings of current functioning were made at each time of measurement by interviewers who had participated in an approved ADI-R training program. Inter-rater agreement between the interviewers and two supervising psychologists experienced in the diagnosis of autism and in the use of the ADI-R averaged 89% at Time 1, and the average Kappa was .81. Past research has demonstrated the test–retest reliability, diagnostic validity, convergent validity, and specificity and sensitivity of the items used in the ADI-R diagnostic algorithm (Lord et al., 1997; Hill et al., 2001).

We recoded each ADI-R item to reflect either no impairment (coded 0, corresponding to an ADI-R code of 0) or some degree of impairment (coded 1, corresponding to an ADI-R code of 1, 2, or 3). This coding strategy has been used previously (Fecteau et al., 2003; Lounds et al., 2007; Shattuck et al., 2007; Taylor and Seltzer, 2010) and allowed us to capture the qualitative difference between having and not having a given autism symptom. In the present analyses we used an overall autism symptom score, as well as scores on the following subscales: restricted repetitive behaviors and interests; reciprocal social interaction impairments; non-verbal communication impairments; and verbal communication impairments. The scores were created by summing the number of items on which an individual was symptomatic, with higher scores indicating more autism symptoms.

**Family Indices**—Four indicators of maternal functioning were included. The size of *mothers' social support network* was measured at each time point by a modified version of the “convoy model” (Antonucci and Akiyama, 1987). Mothers were asked to list up to 10 persons who were important to them. A count of the number of people who were listed was used to indicate the size of the support network, which ranged from 0 to 10 in this sample.

*Maternal depressive symptoms* were measured with the Center for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977). The measure has been used extensively in adult samples (Gatz and Hurwicz, 1990). For each of 20 depressive symptoms, the respondent is asked to indicate how many days in the past week the symptom was experienced (0 = *never* to 3 = *5 to 7 days*). Higher scores reflect greater intensity of depressive symptoms ( $\alpha$  in this sample = .70).

*Maternal anxiety* was measured using the Anxiety subscale of the Profile of Mood States (McNair et al., 1981). This subscale measures the frequency of nine anxiety symptoms in the last week (0 = *not at all* to 4 = *extremely*). Higher scores indicate more anxiety ( $\alpha$  in this sample = .82). The Profile of Mood States has been shown to have strong construct validity in past research (Gibson, 1997).

*Maternal pessimism* about the future of the son or daughter with ASD was measured with 10 items from the Pessimism scale of the Questionnaire on Resources and Stress (Friedrich et al., 1983). Mothers rated each item as 0 (false) or 1 (true), with higher scores indicating more pessimism about the future of the son or daughter ( $\alpha$  in this sample = .74).

## Results

### Descriptive Findings

We first examined the frequency of employment/PSE stability categories for adults with ASD and average-range IQ. Types of competitive jobs held by this sample are presented in Table 1.

**Consistently engaged**—One-quarter of the sample ( $n = 18$ , 24.7%) consistently participated in competitive employment or PSE. Most of these adults ( $n = 15$ , 83.3% of this category) were enrolled in a PSE program during at least one time point of the study. Five individuals were still attending PSE at the last time point of data collection, and eight had earned a bachelor's or associate's degree, taking a range of three to eight years to complete his or her program. Only three adults with postsecondary degrees were working in a field relevant to their degree.

**Sometimes engaged**—Just over 40% of the sample (42.5%,  $n = 31$ ) participated in competitive employment or PSE during at least one time point of the study, but also had at least one time point when they were not engaged in these activities. Other types of vocational activities that adults in this group participated in included supported employment ( $n = 13$ , 41.9% of this category), sheltered settings ( $n = 3$ , 9.7%), and volunteering ( $n = 6$ , 19.4%). Just over one-half of adults in this category ( $n = 16$ , 51.6%) had at least one time point when they were unemployed (i.e., they had no educational or vocational activities).

Over one-half of adults in this category had attended a PSE program ( $n = 17$ , 54.8% of this category). Eleven people (35.5% of this category) had earned a PSE degree. At the time point immediately following PSE, none of these adults with degrees were employed or engaged in daytime activities for greater than 10 hour per week. More than half ( $n = 6$ ) of those who obtained a degree in this category were never competitively employed after completing their education.

**Never engaged**—One-third (32.9%,  $n = 24$ ) of adults with ASD never had competitive employment and never attended a PSE program during the study period. Nearly one-half of adults in this category ( $n = 11$ , 45.8%) did not have any type of employment in the community (supported or competitive) at any of the study time points. The remaining 54.2% ( $n = 13$ ) worked at a job in the community with supports during one or more time points of

the study. The majority spent some time in a sheltered setting ( $n = 15, 62.5\%$ ), and over one-third ( $n = 9, 37.5\%$ ) were disengaged (i.e., had no vocational or educational activities) at one or more time points after high school exit. One person earned a Bachelor's degree before the start of the study period, and spent most of the study period in supported employment.

### Demographic, Behavioral, and Family Correlates of Employment/PSE Stability Categories

We next examined demographic (son/daughter sex, maternal education, paternal education), behavioral (activities of daily living, maladaptive behaviors, and autism symptoms) and family (size of maternal support network; maternal depressive symptoms, anxiety, and pessimism) correlates of employment/PSE stability categories. For the demographic variables, all of which were categorical, chi-square tests were used, with ordinal regression equations controlling for age when the chi-squares were statistically significant. For the behavioral and family correlates, all of which were continuous, analysis of covariance, with follow-up pair-wise comparisons, was used to examine group differences by employment/PSE stability category. The age of the adult with ASD was statistically controlled in all analysis of covariance models; this is because adults who were never engaged tended to be older than the other two groups (M age for "never engaged" = 27.64 years, compared to 22.11 years for the "sometimes engaged" group and 21.71 for the "consistently engaged" group),  $F(2) = 6.44, p < .01$ . Given the relatively small sample size and the exploratory nature of our analyses, we chose not to employ multiple comparison procedures. However, we limited the number of statistical tests by only running follow-up contrasts when Omnibus tests were significant.

### Demographic Correlates of Employment/PSE Stability Categories

The sex of the adult with ASD was significantly related to employment/PSE stability category,  $\chi^2(2) = 6.31, p < .05$ . Of the 15 women in this study, *none* were in the consistently engaged group. In contrast, 31.0% of men ( $n = 18$ ) fell into this category. The remaining men and women were somewhat evenly divided between being sometimes or never engaged. That is, 60% ( $n = 9$ ) of women were sometimes involved in competitive employment/PSE whereas 40% ( $n = 6$ ) were never involved. Similarly, of those men who were not consistently engaged, 55% ( $n = 23$ ; 37.9% of all men) were sometimes engaged and 45% ( $n = 19$ ; 31.0% of all men) were never engaged.

Note that we were unable to examine the sex effect controlling for age (by using ordinal regression analysis) as there were no women consistently in competitive employment/PSE. Alternatively, we tested whether women in this sample significantly differed from men in: age; autism symptoms (total, repetitive behaviors, social impairments, nonverbal communication impairments, verbal communication impairments); maladaptive behaviors (general, externalized, internalized, asocial); activities of daily living (total, home, personal, meal-related); parental education (mother and father); maternal social support, maternal depressive symptoms; maternal anxiety; or maternal pessimism. There were no significant sex differences in any of these variables with the exception of the personal care subscale of activities of daily living, which was lower for women (7.33 for women vs. 7.77 for men),  $t(71) = 2.20, p < .05$ . Thus, the large difference in employment/PSE stability between men and women cannot be explained by differences in their behavioral profiles or family context.



There was a statistically significant relation between parental education and employment/PSE stability category,  $\chi^2$ s (6) = 16.59 and 14.57 for mothers and fathers, respectively,  $ps < .05$ . Every adult with ASD who was consistently engaged had a father with at least some college. Patterns were similar for maternal education. The relation between father's education and employment/PSE stability category remained statistically significant in the ordinal regression analysis controlling for the age of the son or daughter with ASD; specifically, fathers of adults with ASD who were consistently engaged had higher educational attainment relative to fathers of those who were never engaged,  $B = .54$ ,  $SE = .27$ , Wald  $\chi^2$  (1) = 4.12,  $p < .05$ . The relation between maternal education and employment/PSE stability category was not statistically significant after controlling for age.

### Behavioral and Family Context Correlates of Employment/PSE Stability Categories

Table 2 shows the results of analysis of covariance testing the relations between behavioral and family correlates and employment/PSE stability categories (controlling for son/daughter's age). Relative to adults who were never engaged, adults both in the consistently and sometimes engaged groups had lower levels of maladaptive behaviors (primarily asocial behaviors) and autism symptoms (all subscales except nonverbal communication impairments). Furthermore, those who were consistently engaged had greater meal preparation-related daily living skills compared to those in the "never engaged" group.

The only significant difference among groups with respect to the family context was maternal depressive symptoms. Having a son or daughter who was sometimes or consistently engaged was related to *greater* maternal depressive symptoms, relative to mothers of those who were not engaged in these activities.

### Follow-up Analyses

Our earlier analyses with a subsample of adults with ASD who primarily had ID suggested that the sex of the adult with ASD was related to change in vocational activities over time, but not vocational activities at one point (Taylor and Mailick, 2014). To determine whether this same sex pattern held for adults with ASD and average-range IQ, we tested whether the sex of the adult was related to competitive employment/PSE at the first time point after exit. Just under 50% (46.7%) of women were engaged in these activities, relative to 58.6% of men; this difference was not statistically significant,  $\chi^2$  (1) = .69,  $p = ns$ . Thus, consistent with our earlier work, sex appears to be related to *patterns* of employment/PSE over time, but not to employment/PSE at one point in time.

### Discussion

To our knowledge, this is the first study to examine patterns of employment/PSE activities over time for adults with ASD and average-range IQ. Although just over two-thirds were engaged in competitive employment/PSE at some point over the study period, only 25% of the adults with ASD in our sample were consistently engaged in these activities. Further, if we limit consistent employment/PSE to those who participated for greater than 10 hours a week, the percentage of the sample consistently engaged falls to 16.4%, and to 9.6% if limited to those consistently engaged for 30+ hours a week. This can be contrasted with the

employment rate in the United States general population, which in the last 20 years has ranged from 90% to 96.2% (United States Department of Labor, Bureau of Labor Statistics, 2015). Thus, individuals with ASD and average-range IQ have sharply elevated rates of unemployment, and even those who are able to secure competitive employment in the community or who are enrolled in a PSE program have difficulty maintaining these activities over time.

Although many of the adults with ASD who attended a PSE program obtained a postsecondary degree, their subsequent employment rates are cause for concern. Only three of the 31 adults who attended PSE were working in their field of study, and well over one-half (57.9%) of those who earned a PSE degree were minimally or unemployed for a period of time after receiving their degree. Across the entire sample, the majority of community jobs obtained by these adults were entry-level, non-skilled positions such as retail, cleaning/maintenance, and food preparation/serving (see Table 1). Thus, even when adults with ASD are successful in a PSE program, this is unlikely to lead to employment in their field of study and may not lead to employment at all. If employment is obtained, it tends to be in entry-level, menial jobs. Although our field has recently focused on encouraging PSE participation for adults with ASD, it is important to recognize that PSE does not necessarily pave the way for employment success in adulthood. Future research should consider factors to facilitate the transition from PSE into the workforce for these adults.

Our findings on behavioral correlates of employment/PSE patterns for adults with ASD and average-range IQ provide further evidence for the limited role of behavioral variables in promoting vocational activities over time. That is, behavioral variables influence what type of vocational activity a person has at a given point in time (Eaves and Ho, 2008; Farley et al., 2009; Howlin et al., 2004; Shattuck et al., 2012; Taylor and Seltzer, 2011; Taylor and Mailick, 2014), but more optimal behavioral characteristics do not seem to lead to improvement in vocational/educational activities, and conversely, more problematic behavioral characteristics do not seem to predict decline over time (Taylor and Mailick, 2014; Taylor et al., 2014). In the present analyses, behavioral characteristics were able to distinguish between the adults who have never had a competitive job or participated in PSE, relative to adults who are at least sometimes engaged in these activities. But they were unable to distinguish between those adults who were sometimes engaged from those who consistently had employment/PSE.

Alternatively, the sex of the adult with ASD *did* distinguish those who consistently participated in employment/PSE from those who obtained these activities but did not maintain them. None of the women in our sample were consistently engaged in competitive employment/PSE, compared to nearly one-third of the men. Although somewhat surprising, this finding is consistent with our earlier study finding that women with ASD have trajectories of vocational activities that significantly decline over ten years relative to men (Taylor and Mailick, 2014). In that earlier study, the majority of participants with ASD had ID, whereas in the present study none had ID, suggesting that the effect of gender on difficulties maintaining vocational/educational activities is present across the range of intellectual functioning for adults with ASD. In both studies, there were few behavioral differences between the men and women, suggesting that differences in patterns of activities

could not be attributed to functional or behavioral differences between sexes. As detailed in our earlier paper, it may be that gender stereotypes lead to lowered societal or familial achievement expectations for women with ASD. Further, workplace environments might be less understanding and responsive to the needs of women with ASD, especially those with asocial behaviors, which may be seen as more deviant in women than in men.

The familial context was also related to patterns of employment/PSE activities over time; adults with ASD with educated fathers were more likely to obtain and maintain these activities, relative to adults whose fathers had less education. This is consistent with recent research (Chiang et al., 2012; Shattuck et al., 2012) and suggests that the social context of ASD should be considered in studies examining vocational/educational activities. Although studies examining adult outcomes have almost exclusively focused on the behavioral phenotype of the adult, contextual factors may be just as influential.

Contrary to our hypotheses, mothers of adults with ASD who engaged in competitive employment/PSE reported higher levels of depressive symptoms relative to mothers of adults who did not participate in these activities. Studies have suggested that students with ASD who are in inclusive educational settings (relative to those in segregated educational settings) tend to have few friendships with their same-age peers and experience greater stress (Orsmond et al., 2004; Richdale and Prior, 1992). It may be that difficulties making friends and higher levels of stress extend past the school years into community employment positions in adulthood, ultimately taking a toll on parental mental health.

As with any study, there are limitations that are worth noting. Although the majority of participants exited high school during the study period, there were some adults who were substantially older at the start of the study. Therefore, we chose to control for the age of the adult with ASD in all analyses. The racial/ethnic diversity of the sample was limited; however, there was variability in socioeconomic position. We did not control for multiple comparisons, which could increase the likelihood of chance findings, but the overall consistency of the patterns of findings within the study and with extant research suggests that this should not influence interpretation. Finally, as in any study, period and cohort effects should be considered when interpreting the findings. Many in our cohort may not have benefitted from the early intervention services available to families of young children today. Further, this study was ongoing during the great recession of 2008, which may have limited employment and PSE opportunities. Thus, it is unclear to what extent findings from this cohort will generalize to future cohorts of adults with ASD and average-range IQ.

In sum, our findings suggest that many adults with ASD and average-range IQ are able to *obtain* competitive employment positions or gain admittance to a PSE program, but far fewer are able to *maintain* these activities over time. Maladaptive behavioral characteristics, being female, and family socioeconomic position are all likely critically important to the ability of these adults to obtain and maintain employment/PSE. Future research should move beyond a focus on employment at one point in time, and begin to investigate the factors associated with maintenance of employment positions for adults with ASD. Further, it is important that future studies expand their focus to the effects of *both* social/contextual factors and individual characteristics on outcomes for adults with ASD.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1**

Types of competitive employment positions held by adults with ASD in this sample

Type of position	N
Retail	9
Office and Administrative Support	7
Production/Factory work	6
Cleaning/Maintenance	5
Food Preparation/Serving	4
Personal Care and Service	3
Education/Training/Library	2
Art/Entertainment/Sports	2
Computer/Mathematical	1
Community/Social Services	1
Healthcare support	1
Installation/Maintenance/Repair	1
Other	1

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**Table 2**  
Age-adjusted means, F-tests, effect sizes, and significant contrasts for behavioral/family variables by employment/PSE stability categories

Behavioral or Family Variable	Never Adjusted Mean (1)	Sometimes Adjusted Mean (2)	Consistent Adjusted Mean (3)	F	Partial Eta Squared	Significant contrasts
<i>Activities of Daily Living</i>						
Total	25.89	27.88	29.30	2.34	.06	
Housekeeping subscale	6.59	7.15	7.63	.75	.02	
Personal Care subscale	7.58	7.71	7.76	.36	.01	
Meal-related subscale	11.01	11.90	12.70	3.06 <sup>†</sup>	.08	1 vs. 3*
<i>Maladaptive Behaviors</i>						
General	111.82	106.83	105.82	4.41*	.11	1 vs. 2*, 3**
Externalized subscale	104.02	100.54	99.32	2.08	.06	
Internalized subscale	113.07	110.10	107.91	1.72	.05	
Asocial subscale	111.26	105.27	103.40	3.25*	.09	1 vs. 2*, 3*
<i>Autism Symptoms</i>						
Total	16.95	13.80	11.70	5.86**	.15	1 vs. 2*, 3**
Repetitive behaviors subscale	3.80	2.77	2.61	3.07 <sup>†</sup>	.08	1 vs. 2*, 3*
Social impairments subscale	7.25	5.90	5.02	3.17*	.08	1 vs. 2 <sup>†</sup> , 3*
Nonverbal communication impairments subscale	2.65	2.57	2.21	.47	.01	
Verbal communication impairments subscale	3.25	2.56	1.87	4.06*	.11	1 vs. 3**
<i>Maternal functioning</i>						
Mother's support network	7.85	7.56	7.69	.07	.00	
Depressive symptoms	7.98	13.55	17.09	4.31*	.11	1 vs. 2*, 3*
Anxiety	8.30	9.81	12.68	2.06	.06	
Pessimism	6.11	6.17	4.79	1.67	.05	

<sup>†</sup> p < .10

\* p < .05

\*\* p < .01