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Factors Associated with Sustained Community Employment among Adults with Autism and Co-Occurring Intellectual Disability

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Abstract

Sustaining community employment is a challenge for adults with autism spectrum disorders, especially for those who have co-occurring intellectual disability, but factors contributing to this employment outcome have not been fully evaluated. The current study utilized longitudinal data to explore the impact of contextual influences, family factors, and individual characteristics on sustained employment over approximately 18 months ($N = 105$). Very few adults with ASD and ID achieved sustained employment (14.3%). Results indicated that more independent daily living skills, a higher family income, a larger maternal social network, an inclusive school environment in early childhood, and currently living in an area with a larger population size were associated with significantly greater odds of sustaining employment. Follow-up analyses suggested that managing personal care is particularly important for employment.

Abstract

It is challenging for adults with autism spectrum disorders (ASD) and intellectual disability (ID) to maintain working for pay in the community. Our study collected information over time to examine how contextual influences (e.g. the inclusiveness of the school that the person attended, the size of the population the person was living in), family factors (e.g. household income, the mothers' social support networks), and individual characteristics (e.g. daily living skills, levels of social difficulties) were related to sustaining employment in the community. Our data showed that very few adults with ASD and ID sustained employment approximately over a period of 18 months (just 14.3%). We also found that adults with ASD and ID who (1) had more independent daily living skills, (2) had a higher family income, (3) had a larger maternal social network, (4) lived in an inclusive school environment in early childhood, and (5) who were currently living in an area with a larger population size, were more likely than others to continue to work for pay in the

community. Follow-up analyses suggested that managing personal care is a particularly important aspect for employment.

Keywords

adult; autism spectrum disorders; intellectual disability; employment; adaptive living skills; personal care

Introduction

Adults with autism spectrum disorders (ASDs) have low rates of employment. Multiple studies have documented that fewer than one half of individuals with ASD are employed in any type of job (e.g. Taylor and Seltzer, 2012; Eaves and Ho, 2008; Gotham et al., 2015; Hendricks, 2010; Shattuck et al., 2012). When restricted to jobs in the community (as opposed to employment in sheltered or segregated settings), employment rates drop even lower (e.g. Ballaban-Gil et al., 1996; Howlin et al., 2004; Taylor and Seltzer, 2012). Although few studies have examined patterns of employment over time, there is emerging evidence to suggest that *sustaining* employment might be an even greater challenge for individuals with ASD (Levy and Perry, 2011). For example, Taylor and Mailick (2014) found that adults with ASD (80% of whom had co-occurring intellectual disability (ID)) tended to experience declining levels of vocational independence, on average, over a 10-year period. Note that although that study did not focus on maintaining community employment (instead examining patterns of independence over time), another study based on our longitudinal sample suggested that rates of sustained community employment are low. Specifically, when examining stability in vocational/postsecondary educational positions for adults with ASD who did not have ID (Taylor et al., 2015), about two-thirds of these adults were working in the community without supports or in a postsecondary educational program at some point over the 12-year study period, and only one-quarter were *consistently* participating in these activities.

Adults with ASD who have co-occurring ID are at greater risk for unemployment (measured at a single point in time) than adults with ASD with average IQ scores (for a review, see Holwerda et al., 2012). In a recent study using the National Longitudinal Transition Study 2 (NLTS2), for example, young adults with ASD and ID were considerably less likely to be employed than those without ID following high school exit (Chiang et al., 2013). Similarly, Taylor and Mailick (2014) reported that adults with ASD and ID had Vocational Index scores (representing independence in vocational position) that were 1 standard deviation (*SD*) lower than their counterparts with ASD without ID, with the majority spending their days in segregated work or day activity settings (Taylor and Seltzer, 2011). Thus, although there are a number of studies demonstrating that adults with ASD and ID are at greater risk for unemployment or less vocational independence at a single point in time, relative to adults with ASD without ID, their likelihood of sustaining employment positions once they are obtained is currently unknown. Furthermore, although some adults with ASD and ID undoubtedly achieve successful employment outcomes, almost nothing is known about the factors that may be associated with sustaining success over time for these individuals (or,

conversely, the factors that place these adults at risk for disruption in community employment). In this study, we extend past research to examine individual characteristics, family factors, and contextual influences that are associated with employment success, defined as working for pay in the community at two sequential points of data collection approximately 18 months apart, among adults with ASD and co-occurring ID.

Factors associated with paid work

Note that all the studies reviewed below examined contributors to employment measured at one point in time. As there have been no studies, to our knowledge, that have examined factors related to sustained employment for adults with ASD and ID, we draw our hypotheses from this body of work.

Individual characteristics

Multiple studies have shown that the degree of functional independence is associated with employment outcomes for individuals with ASD (Chiang et al., 2013; Shattuck et al., 2012; Taylor and Mailick, 2014; Taylor et al., 2015). For instance, Shattuck et al. (2012) assessed functional independence for youth with ASD in the NLTS2 using eight items measuring daily living skills (e.g. counting change, looking up telephone numbers and using a telephone, using public transportation) on an ordinal scale (1 = *not at all well*; 4 = *very well*) and obtained a total score (ranged from 8 to 32). They demonstrated that a one point increase in the total score of functional independence was associated with a 10% greater likelihood of having any paid employment after high school exit. In this study, we hypothesize that greater independence in daily living skills will be associated with sustaining employment over an 18-month period.

Moreover, as independence in daily living skills includes multiple domains, for example, personal hygiene, domestic skills, and money management (e.g. Hus et al., 2015; Maenner et al., 2013; Smith et al., 2012), each of which may be differentially associated with employment outcomes, understanding which specific domains of daily living skills are associated with sustaining employment can provide more targeted suggestions for interventions aimed at improving employment outcomes for adults with ASD and ID. We explore the specific daily living skill domains that predict sustained employment in this group.

In another national study using the NLTS2 data, the level of social difficulty was related to employment outcomes for adults with ASD. Chiang et al. (2013) showed that those adolescents and adults with ASD who had high levels of social skills were 70% more likely to have a job after high school than their counterparts with low levels of social skills. Similarly, better conversational skills and fewer social difficulties have been shown to increase the odds of having a paid job or engaging in postsecondary education after leaving high school (Liptak et al., 2011; Roux et al., 2013; Taylor et al., 2015). Thus, we predict that adults with ASD and ID who have low levels of social difficulty will be more likely to sustain employment.

Family factors

Family socioeconomic status (SES) may contribute to employment outcomes for adolescents and young adults with ASD. A growing body of evidence indicates that higher family income predicts greater likelihood of working for pay outside the home for young adults with ASD, controlling for other factors (Roux et al., 2013; Shattuck et al., 2012). Liptak et al. (2011) showed that adolescents and young adults with ASD whose family income was above the poverty level were about four times more likely to be employed or to receive postsecondary education than those whose family incomes were below the poverty level. In addition to household income, Chiang et al. (2013) indicated that higher parental education was associated with greater odds for their son or daughter with ASD to have a paid job after exiting high school. All the above studies examined broad samples of individuals with ASD, including those who did and did not have ID; how family SES specifically impacts employment outcomes for individuals with ASD and ID—and particularly sustained employment over time—has yet to be fully investigated. Based on these studies, we hypothesize that adults with ASD and ID whose families are higher in SES will be more likely to sustain employment.

Additionally, according to a social capital perspective (e.g. Smith, 2010), a family with a more extensive social network may provide greater opportunities for persons with ASD to achieve vocational success. Although a recent study found that the social networks of family members did not predict consistent employment for adults with ASD with average level of intelligence (e.g. Taylor et al., 2015), the mother's network of social relationships may play a more prominent role when an individual with ASD has ID as mothers are often the primary caregivers of individuals with ID (e.g. Rowbotham et al., 2011). Compared to individuals with ASD without ID, individuals with ASD and ID are likely to have greater challenges in independently seeking employment (e.g. more communication limitations) and parents may play a more central role in helping their child connect to resources for career development and job opportunities (e.g. Eisenman, 2007), making larger maternal social networks potentially advantageous. Thus, in this study we examine the association between the size of the mother's social network and employment outcomes for adults with ASD and ID and hypothesize that a larger maternal social network will be associated with greater likelihood of sustained employment.

Contextual influences

Contextual influences also impact prospects in adulthood. Studies have shown that inclusive education (defined as the extent to which students with developmental disabilities participate in the general educational curriculum and interact with non-disabled peers; Hunt and McDonnell, 2007) has beneficial effects. For instance, McDonnell et al. (2003) found that adaptive behaviors of students with developmental disabilities improved after participating in inclusive classes. Positive effects of an inclusive education on behaviors and functioning for individuals with ASD were also evident in and across adulthood for individuals with ASD (Woodman et al., 2016). In a similar vein, we hypothesize that experiencing inclusive education will be associated with a higher likelihood of sustained employment in adulthood.

Residential location may also play a role in successful employment for adults with ASD and ID. In the general population, living in a metropolitan area has been associated with about 80% greater likelihood of having a stable income after controlling for other factors (Yeung and Rauscher, 2014). For children with ASD, living in an urban area has been shown to be linked with greater availability of services (Hoogsteen and Woodgate, 2013; Rivard et al., 2015), and it is possible that the employment prospects of adults with ASD and ID might similarly be affected by their residential location. Thus, we hypothesize that living in an area with larger population size should be associated with higher odds of sustaining employment.

This study

This investigation builds on prior research on employment outcomes among adults with ASD. Although there are a growing number of studies examining correlates of employment outcomes at a single point in time (see review above), little is known about factors associated with *sustaining* employment over time. Two of the only studies examining patterns of employment for adults with ASD come from this research group, and this study builds directly on those findings, while extending them in new, important directions. Specifically, Taylor and Mailick (2014) examined patterns of employment over 10 years for adults with ASD, of whom 80% had ID. However, that study focused on *average* levels (not intra-individual levels) of vocational independence in the entire sample over time. Taylor et al. (2015) examined individual patterns of employment/post-secondary education for adults with ASD, but all adults in that analysis had average-level IQ. This study extends this research by applying the methods of Taylor et al. (2015) to a sample of adults with ASD and ID, to examine the range of factors that correlate with sustained employment in this group.

Notably, the focus on adults with ASD and ID is important, as these individuals have been understudied with respect to employment outcomes (e.g. Chiang et al., 2013; Taylor and Seltzer, 2011). Currently, it is unclear how previous findings on autism samples with various levels of ID may be generalized to populations with ASD and ID. Given that individuals with ASD and ID consist of approximately one-third of the population with ASD (e.g. Centers for Disease Control and Prevention (CDC), 2016), it is important to study this subgroup of individuals with autism and examine their employment outcomes during adulthood.

Research aims and hypotheses

This study had two research aims. First, we investigated the proportions of adults with ASD with co-occurring ID who were successful in sustaining community employment over an 18-month period of time. We anticipated that a low percentage of adults with ASD and ID would achieve sustained employment. Second, we examined how individual characteristics, family factors, and contextual influences contributed to sustained employment for this subgroup. We expected that multiple factors each should make a unique contribution to sustained employment. Specifically, we hypothesized that having greater independence in daily living skills, lower levels of social difficulty, a larger maternal social network, coming from a family with higher income, high levels of school inclusion, and living in an urban area would predict greater odds of sustaining employment among adults with ASD and ID.

Methods

Sample and procedure

This study used a subsample from a larger longitudinal study of families of adolescents and adults with ASD ($N = 406$; Seltzer et al., 2011). The inclusion criteria were as follows: (1) being at least 10 years old at the beginning of the study in 1998/2000 and (2) being diagnosed with ASD by a health or educational professional, as reported by parents. Based on the Autism Diagnostic Interview-Revised (ADI-R; Lord et al., 1994), the majority of participants met the criteria for an ASD diagnoses (94.6% of the larger study) while the other participants (5.4%) were reviewed on a case-by-case basis to determine that their ADI-R profile was consistent with an ASD diagnosis. The respondents resided in Massachusetts ($n = 204$) or Wisconsin ($n = 202$). We used identical protocols across study locations and recruited participants via clinics, service agency, schools, and so on. We followed up with these families for 10 waves, spanning approximately 14–16 years. Unless otherwise stated, data used for this analysis were from Time 9 (2011–2012) and Time 10 (2013–2014) of the larger study. We selected these time points because most individuals reached adulthood by these two waves (i.e. individuals with ASD could have been as young as 10 years of age at Time 1). Mothers reported on their adult son's or daughter's employment activities and other factors as part of two rounds of in-home interviews that were approximately 1.5 years apart.

Approximately half of the families continued to participate at Time 9 ($n = 212$) and Time 10 ($n = 193$). To be included in this investigation, the mother had to provide employment information about the adult at both these waves of data collection ($n = 178$) and the adult had to have been classified as having ID ($n = 125$). Among those 125 adults with ID, 10 cases were dropped from the analyses reported here because their employment status changed from Time 9 to Time 10 (i.e. from employed to not employed or from not employed to employed). We excluded those adults who changed employment status because our research goal was to compare those who sustained community employment at both points of data collection spanning an 18-month period versus those who were not employed at either point of data collection during this time. There were too few cases who changed employment status to examine as a separate group. Another 10 cases had missing data on key variables, so we dropped those cases from the analyses. The final sample for subsequent analyses ($n = 105$) had complete data on all predictors and covariates.

ID status was determined by standardized measures (the Wide Range Intelligence Test (WRIT); Glutting et al., 2000; Vineland Screener (VS); Sparrow et al., 1993), following diagnostic guidelines (i.e. scored 70 or below on both measures; Luckasson et al., 2002). Cases with incomplete information on these two measures or cases with either one measure falling within the marginal range (i.e. 71–75) were reviewed by psychologists on a case-by-case basis through a consensus procedure to assign ID status (see Orsmond et al., 2006; Shattuck et al., 2007 for details).

The individuals with ASDs were in their early 30s, on average, at Time 9 ($M = 33.38$ years, range = 21–59 years). All had exited high school by Time 9. Less than one half (41.9%) continued to live at home with family. Nearly all adults were non-Hispanic White (96.2%) and most were male (72.4%).

Measures

Employment outcome.—At each wave, mothers indicated whether their adult child participated in specific vocational activities and then reported the number of hours per week the adult was involved in each activity. Following a modified application of the Vocational Index (Taylor and Seltzer, 2012), those individuals who were “working for pay independently” and/or “working for pay with support” in the community greater than 10 h/week in total at both Time 9 and Time 10 were categorized as “sustaining community employment.” Since this study focused on the employment prospects in the community among adults with ASD and ID, paid jobs in sheltered or non-community settings were not counted as community employment. Conversely, those individuals who were not employed or who worked for pay for 10 h/week or less at those two time points were classified as “no/minimal community employment.” A dichotomous outcome for the community employment outcome was created (0 = *no*; 1 = *yes*).

Individual characteristics.—Current level of daily living skills of adults with ASD was measured at Time 9 by the Waisman Activities of Daily Living scale (W-ADL; Maenner et al., 2013; Smith et al., 2012). The W-ADL consists of 17 items measuring performance of personal hygiene (washing/bathing, grooming, dressing and undressing, toileting), housekeeping (making own bed, household tasks, doing errands, home repairs, laundry), meal preparation (preparing simple food, mixing and cooking, preparing complete meal, setting and clearing table, drinking from a cup, eating from a plate, washing dishes), and financial management (banking and managing daily finances) on a rating from 0 (*does not perform the task at all*) to 2 (*performs the task independently*), and summary scores were computed. The measure has excellent reliability ($\alpha = 0.91$). For this analysis, we used *z*-scores, with higher scores representing greater levels of independence.

The current level of social difficulty was measured at Time 9 by the Social Responsiveness Scale (SRS, Constantino and Gruber, 2005). Mothers indicated the extent to which each statement described their adult child’s behaviors over the past 6 months on a rating from 1 (*not true*) to 4 (*almost always true*). The measure demonstrated excellent internal consistency in this sample ($\alpha = 0.93$). A total *T*-score was calculated for the present analyses. Higher scores represented more severe difficulty.

Family characteristics.—Household income, as measured at Time 9, was a marker for SES. Mothers reported their family income in the previous year on a scale ranging from 1 (US\$1 to US\$9999) to 14 (US\$160,000 or more).

The size of the mother’s social network was measured at Time 9 using an adapted version of the Convoy Model of social support (Antonucci and Akiyama, 1987). Mothers were asked to list the people who provided them support; a count of all reported members was used as an indicator of mother’s social network size for the present analyses. Similar scoring was used in prior studies (e.g. Taylor et al., 2015).

Contextual influences.—Information on school inclusiveness was collected at the first wave of the larger study when individuals with ASD and ID were in their early 20s on

average ($M = 21.01$, $SD = 7.77$, ranged between 10 and 47 years old at Time 1). Mothers reported the extent to which their child experienced inclusion with peers without disabilities in school by indicating 1 (*no inclusion in school for both academic and non-academic activities*), 2 (*partial inclusion in school for either academic or nonacademic activities*), or 3 (*full inclusion in school for both academic and non-academic activities*), consistent with the approach reported in Orsmond et al. (2004) and Woodman et al. (2016).

Geocoding techniques were applied to collect data on the total population size of the location of residence (at Time 9) of adults with ASD and ID. We calculated population size at the Minor Civil Division (MCD) level. As defined by the US Census Bureau, MCD refers to the primary divisions of a county, such as a township or precinct (U.S. Census Bureau, 2013). As population size was highly skewed (skewness = 7.55) and its variability was very high in the current sample (ranged from 530 to 2,972,357), a dichotomous variable was created using median split half (i.e. a population size of 28,352 residents) to determine which sample members were living in a location with a smaller population size (coded as 0) versus a location with a larger population size (coded as 1).

Covariates.—We entered multiple demographic factors into the model as covariates. Gender (0 = *female*; 1 = *male*) and age at Time 9 were statistically controlled in all analyses, as these demographic characteristics have been found to be associated with employment outcomes (Chiang et al., 2013; Roux et al., 2013; Schaller and Yang, 2005; Taylor and Mailick, 2014; Taylor et al., 2015).

Childhood autism symptoms were measured by lifetime ADI-R (Lord et al., 1994). Three symptom domains were used for the current analyses, including impairments in social reciprocity, impairments in nonverbal communication, and repetitive behaviors and stereotyped interests. Each item was rated on an ordinal scale from 0 (*no abnormality*) to 3 (*severe autistic-type abnormality*). Items scored with 3 were converted to 2, resulting in a scaling from 0 to 2 for each ADI-R item (Shattuck et al., 2007; Lord et al., 1994). A summary score was then computed. Higher scores represented greater lifetime autism symptoms.

Data analysis

The means, SD s, and frequencies were used to understand descriptive characteristics of the adults with ASD and ID and their families. To address the first aim, we examined the frequency of adults who sustained community employment versus did not have community employment at either time point. We applied logistic regression techniques to predict the likelihood of sustained employment by adults with ASD with co-occurring ID (i.e. the second aim). We entered six predictors, that is, daily living skills, social difficulty, household income, maternal social network size, school inclusiveness, and population size of the living area. We also statistically controlled for sex, age, and childhood autism symptoms in the model. To examine our hypotheses, we calculated odds ratios (ORs) and evaluated multiple overall goodness-of-fit indices. Model statistics values suggested an approximate proportion of amount of variance explained by predictors (e.g. model χ^2 , Cox and Snell R^2 , Nagelkerke R^2 , and likelihood ratio index, Menard, 2002). In addition, we reported the

Hosmer and Lemeshow test to the degree to which the model fits to the data (e.g. Huang and Moon, 2013; Peng et al., 2002).

Results

Descriptive statistics

As shown in Table 1, few members of our analytic sample (14.3%) sustained community employment over a period of 18 months, defined as being employed for pay greater than 10 h a week in a competitive or supported position at both Time 9 and Time 10. On average, those adults who sustained community employment worked approximately 20 h a week ($M = 21.00$, $SD = 10.48$ at Time 9; $M = 27.80$, $SD = 17.43$ at Time 10). The majority worked for pay with support at Time 9 ($n = 10$, 66.7%) or Time 10 ($n = 10$, 66.7%), but less than one half worked independently ($n = 6$, 40% at Time 9; $n = 7$, 46.7% at Time 10).

The majority of adults with ASD and ID (69.5%) had severe social difficulty, as evidenced by scores on the SRS above a T -score of 75. The mean annual household income of their parents was about US\$60,000–69,999. The mothers had an average of eight members in their social network (range = 0–11). Almost two-thirds (62.9%) of the sample had partial or full levels of inclusion while they were in school. On average, they lived in locations with more than 100,000 people. The types of jobs held by sample members in the sustained employment group included factory work, cleaning, and retail work (see Table 2).

Multivariate models

The logistic regression results are presented in Table 3. Independence in daily living skills was strongly associated with sustained employment; 1 SD unit increase in daily living skills was associated with four times greater likely of sustaining a job with pay. Counter to our hypothesis, severity of social difficulty was not related to sustained employment in our current sample after controlling for other factors. Importantly, the likelihood that these adults sustained employment over the 18-month study period was significantly associated with their parent's household income and the size of their mother's social network, suggesting that the family context may contribute to employment achievement of adults with ASD and ID.

Other contextual influences also were strong predictors. Among adults with ASD and ID, having an additional level of school inclusiveness (i.e. full vs partial inclusion; partial vs no inclusion) was associated with a 4-fold increase in the likelihood of sustaining a paid job in the community, net of other factors in the model. Additionally, those adults with ASD and ID who were living in an area with a larger population size were nearly seven times more likely to remain employed than those who were living in an area with a smaller population size. Overall, the entire model explained a substantial amount of variance of the outcome (model $\chi^2 = 31.54$, $p < 0.001$; Cox and Snell $R^2 = 0.26$; Nagelkerke $R^2 = 0.46$; likelihood ratio index = 0.37). The model fits well to the data (Hosmer & Lemeshow (degree of freedom (df) = 8) = 1.78 not significant (ns)).

Follow-up analyses

Given that the level of daily living skills was associated with greater odds of sustained employment, we conducted a set of follow-up analyses to identify which specific domain of daily living skills made the greatest independent contribution to sustained employment, above and beyond other predictors and covariates. To address this question, we ran a series of logistic regression models identical to the one described above, except that we substituted the *z*-scores of each domain of daily living skills (i.e. housekeeping, personal care, meal preparation, and financial management) for the total daily living *z*-score.

The results for the specific domains of daily living skills that reached statistical significance are shown in Table 4. Three domains reached statistical significance above and beyond other factors in the model: housekeeping, personal care, and meal preparation. Of note, maintaining personal care yielded ORs markedly larger than others (OR = 7.53, 95% confidence interval (CI), 2.12, 26.78), suggesting that these skills may be particularly important for sustaining a community job with pay among adults with ASD and ID.

Discussion

This research is, to our knowledge, the first study to examine factors associated with sustained paid employment of adults with ASD with co-occurring ID using longitudinal data. We identified a set of factors that strongly predicted this outcome. The most powerful predictors were currently living in an area with larger population size, having participated in inclusive education as a child, and currently having more independent daily living skills. Additionally, family factors were predictive, including higher family SES and more extensive maternal social connections. These predictors were net of severity of childhood autism symptoms and suggested that the success of sustaining employment for this group hinges on environmental influences and family factors, as well as individual characteristics.

Consistent with prior research, very few individuals with ASD with co-occurring ID in this study sustained a paid job in community settings (14%). This proportion was much lower than those of a companion study of adults with ASD with average-range IQ (i.e. 24.7%; Taylor et al., 2015), corroborating the observation that having an ID in the presence of ASD may doubly jeopardize employment outcomes (e.g. Chiang et al., 2013; Liptak et al., 2011; Schaller and Yang, 2005). Most adults with ASD and ID who sustained paid work held lower paying jobs; thus, they remain in need of formal (services) and informal (family) support. Individuals with ASD and ID deserve special attention in intervention and vocational training programs, with such programs targeting factors that have been identified in this study and past research as associated with greater success.

Consistent with recent findings (e.g. Taylor and Mailick, 2014; Taylor et al., 2015), independence in daily living skills was found to be central to sustaining employment for adults with ASD and ID. Given that daily living skills are often the focus of training programs, we delved into the specific domains of daily living skills that are most strongly related to employment sustainability. Managing personal hygiene produced substantially larger ORs than those of other skills. This finding should inform the focus of future interventions. Our analyses suggested being able to maintain a clean appearance may be

more important in sustaining employment than an individual's level of social difficulty. Future employment training programs for individuals with ASD and ID may profitably prioritize teaching of self-care skills in addition to remediating core autism symptoms.

In addition, our results indicated that meal preparation and housekeeping skills are crucial for sustained employment. Although not directly related to job stability, meal preparation and housekeeping consist of self-directed routines, indicative of the ability and motivation for developing independence (e.g. Lancioni and O'Reilly, 2002; Schloss et al., 1996). These daily living skills consist of multiple behavioral components of executive functioning, including following directions, memory, planning, and organizing. All these higher order skills are highly valuable in the workplace. Moreover, meal preparation and housekeeping skills at home may be transferrable to multiple job settings (e.g. food preparation in a restaurant kitchen, stocking shelves in a grocery store). Intervention programs may consider incorporating training on housekeeping and meal preparation skills supplemental to personal care skills development for better employment outcomes.

Family resources also contributed to the sustained employment of adults with ASD and ID. A higher family income and a larger maternal social network predicted better odds of sustained employment. Individuals from families with a higher income may have greater access to services (e.g. Shattuck et al., 2011) that could likely result in better outcomes. Similarly, having a larger maternal social network may lead to greater information exchange about jobs and more opportunities and avenues for social support for individuals with ID and their families (e.g. Eisenman, 2007; Smith, 2010), including offering to help with transportation and informal job coaching.

Our findings indicated that contextual influences were significant predictors. Both having been in inclusive education during childhood and currently living in an area with a larger population uniquely contributed to sustained employment, suggesting that contexts throughout the life course may be consequential for outcomes in adulthood. A job in the community shares many of the same demands and opportunities found in an inclusive school context where individuals with developmental disabilities can be socially engaged with their typically developing peers. Exposure to an inclusive learning environment has been shown to foster social competency, adaptive behaviors, and reading skills of students with disabilities (Baker et al., 1994–1995; Daniel and King, 1997; Hunt and McDonnell, 2007; McDonnell et al., 2003), which all could be important factors in many jobs.

Additionally, living in an area with a larger population has been linked with better job availability for the general population (e.g. Yeung and Rauscher, 2014) and better public transportation options. Very few adolescents and adults with ASD and ID have a driver's license (Falkmer et al., 2015; Liptak et al., 2011), so having a long commute to work could be very challenging to these individuals and their families. In contrast, a more urban area usually has a more comprehensive system of public transportation that allows individuals to travel to the workplace. Living in a more urban area could provide adults with ASD and ID with more job opportunities and the infrastructure to remain employed. In the absence of these contextual factors, adults with ASD and ID may have a difficult time securing and sustaining employment. Future research should investigate what aspects of the urban living

context (e.g. transportation, job availability to individuals with developmental disabilities) are most strongly associated with the vocational outcomes of individuals with ASD and ID. Similarly, future research should address whether there are certain aspects of inclusive education (social interaction, academic preparation) at particular times (e.g. in elementary school, in secondary school) that are especially important for later employment success. Unpacking these contextual factors will be valuable to better preparing adults with ASD and ID for future employment.

Strengths and limitations

There are some notable strengths of our study. First, this study expanded the extant literature by considering earlier contextual influences and family characteristics as predictors of sustained employment among adults with ASD and ID. We were able to identify the specific domain of daily living skills that was most strongly linked to sustained employment, affirming the importance of functional independence for adults with ASD (Taylor et al., 2014; Roux et al., 2013). Second, our longitudinal design enabled an investigation of sustained employment over an 18-month period, informing an understanding of employment patterns of people with ASD over time. Third, this investigation incorporated geocoding information to assess the living context of adults with ASD.

Several study limitations should be acknowledged. First, we relied on a single item measured at one time point to assess global school inclusiveness, so we were not able to account for variability in duration, timing, and quality of inclusion. However, it did provide a general level of inclusion in both academic and non-academic settings with peers without disabilities which was significantly predictive of employment outcomes. Second, our list of predictors was not exhaustive. We did not have extensive information on the social networks of the adults with ASD and ID themselves. Third, the sample size was relatively small, limiting the generalizability of findings and power of analyses. Fourth, in this study, we used longitudinal data to examine the association between various factors and employment stability, but we did not fully address the direction of effects. Some evidence from our prior work showed that independence of vocational activities could also result in improvement of functional abilities (e.g. Taylor et al., 2014), suggesting bidirectional influences between employment and daily living skills. Finally, the study outcome was restricted to whether or not participants were employed at two points in time over an 18-month period. It is possible that individuals had a different specific job at Time 9 than at Time 10. Furthermore, because there were so few adults in this sample who had community jobs at one time point but not the other, we were unable to examine predictors of obtaining community employment *versus* sustaining community employment. There may be an entirely different set of factors that are associated with successfully maintaining community employment once it has been obtained; this will be an important issue to address in future research.

Conclusion

This study examined factors that promote sustained community employment of adults with ASD and ID. Since the vocational outcomes of this group are the least promising among adults with ASD, our findings may be particularly meaningful for intervention development. Independence in daily living skills, particularly personal hygiene skills, was a robust

predictor, suggesting that training in this area may maximize the employability of individuals affected by ASD and ID.

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Table 1*Sample Characteristics (N = 105)*

Variables	<i>n</i>	%	<i>M</i>	<i>SD</i>
Sustained community employment				
No	90	85.7		
Yes	15	14.3		
Individual characteristics				
Daily living skills ^a			18.39	6.57
Social difficulty ^b			84.54	14.48
Family characteristics				
Household income ^c			7.17	3.94
Maternal social network size			7.70	2.43
Contextual influences				
School inclusiveness				
No	39	37.1		
Partial	57	54.3		
Yes	9	8.6		
Population size at Minor Civil Division level (median = 28,352)			110,869.08	314,708.93
Equal or lower than the median	53	50.5	10,835.57	7,173.74
Higher than the median	52	49.5	212,826.31	425,343.04
Gender				
Female	29	27.6		
Male	76	72.4		
Age			33.38	7.83
Childhood autism symptoms			45.18	5.36

Notes.

^aRaw score.

^bT-score.

^cHousehold income categories ranged from 1 = \$1 to 9,999 to 14 = \$160,000 or more.

A code of 7 corresponded to a category of \$60,000–69,999.

Table 2

Types of community employment held by adults with ASD with co-occurring ID

Types of position	n
Cleaning/maintenance	3
Production/factory work	3
Office & administrative support	2
Retail	2
Education/training/library	1
Food preparation/serving	1
Installation/maintenance/repair	1
Others	2

Table 3

Logistic regression models on sustained community employment (n = 105)

Variables	B	SE	Odds Ratio
Individual Characteristics			
Daily living skills ^a	1.41 **	.47	4.10
Social difficulty	.03	.03	1.03
Family Characteristics			
Household income	.21 *	.10	1.23
Maternal social network size	.37 *	.18	1.45
Contextual Influences			
School inclusiveness	1.42 *	.69	4.13
Population size	1.92 *	.86	6.80
Controls			
Male	.60	.88	1.82
Age	.03	.06	1.03
Childhood autism symptoms	-.10	.07	.91

Notes.

^a z-score.* $p < .05$,** $p < .01$.

Table 4

Domains of daily living skills for the sustained community employment outcome

Activities ^a	B	SE	OR
Housekeeping	1.21 **	.43	3.34
Personal care	2.02 **	.65	7.53
Meal preparation	1.11 *	.44	3.04
Finance management	.51 †	.30	1.67

Notes.

^a z-score.† $p < .10$,* $p < .05$,** $p < .01$.