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## Employment and choice-making for adults with intellectual disability, autism, and down syndrome



Kelsey L. Bush\*, Marc J. Tassé

The Ohio State University Nisonger Center, 1581 Dodd Dr., Columbus, OH 43210, United States

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### ABSTRACT

**Background:** Adults with disabilities are employed at a significantly lower rate than adults without disabilities. Of adults with disabilities in the workforce, more individuals work in a facility setting rather than a community setting, despite efforts to improve community inclusion. Choice-making has been proposed as a predictive factor for employment for individuals with disabilities.

**Aims:** The purpose of this research was to examine the current state of employment for three groups of adults with intellectual disability (ID): individuals with autism spectrum disorder (ASD), individuals with Down syndrome (DS), and individuals with idiopathic ID. Choice-making and its relation to improved employment outcomes was explored.

**Methods:** This study used National Core Indicator's Adult Consumer Survey datasets from years 2011–2012 and 2012–2013. Factor analyses revealed latent variables from six choice-making questions in the Adult Consumer Survey. Ordinal logistic regression was used to identify factors related to employment status.

**Results:** Adults with DS had the highest rates of paid community jobs, but adults with ID had the highest rates of choice-making. ID severity level and short-term choice-making had the greatest effects on employment status in all three groups.

**Conclusions:** Employment rates remain low despite national efforts to find jobs for people with disabilities. Choice-making is a unique factor that was found to be associated with employment status and provides a target for interventions to increase employability.

### What this paper adds

This paper provides updated employment statistics for individuals with intellectual disability, autism spectrum disorder, and Down syndrome. Employment for individuals with disabilities is gaining national attention, and research examining possible variables associated with successful employment is steadily growing. This study furthers the investigation into unique factors associated with successful employment that can be targeted for intervention. This paper specifically examined whether making choices that effect day-to-day life, such as choosing your daily schedule, what to buy with spending money, and what to do in your free time, are correlated with positive employment outcomes. This skill can readily be increased through intervention, and could prove to increase the employability of adults with disabilities.

\* Corresponding author.

E-mail address: [Bush.415@osu.edu](mailto:Bush.415@osu.edu) (K.L. Bush).

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## 1. Introduction

In America, employment is considered to be important for adults at the individual and societal levels. For adults with disabilities, employment has been shown to improve quality of life (Eggleton, Robertson, Ryan, & Kober, 1999; Garcia-Villamizar, Wehman, & Navarro, 2009; Persson, 2000). Employment provides structure, a source of social supports, and income. With income, individuals are provided with opportunities to make more decisions and move towards greater independence. Research finds that adults with intellectual disability (ID) seek economic independence and rate community employment as an important goal (Migliore, Mank, Grossi, & Rogan, 2007).

Despite the importance of employment for adults with disabilities, unemployment rates for this population remain stubbornly high. The national rate of integrated community employment among all adults with disabilities during the 2013 fiscal year was just 18.6% (Butterworth et al., 2015). The Bureau of Labor Statistics reported that as of May 2016, the employment participation rate (those working or actively seeking employment) of workers without disabilities was 68.4%, whereas the participation rate of workers with disabilities (which includes a broad range of disabilities) was only 20.5% (Department of Labor, 2016). Adults with autism spectrum disorder (ASD) are one of the few etiologically known ID groups with a specific employment estimate; approximately 25% of adults with ASD are employed (Holwerda, van der Klink, Groothoff, & Brouwer, 2012). There are no current national rates of employment specifically for adults with Down syndrome (DS).

Despite policy efforts that placed a greater importance on employment outcomes, employment data continues to document a downward trend in community employment rates from a high of 25% reported in 2001 (Butterworth et al., 2015). Additionally, rates of facility-based work and community-based day programs have increased (Butterworth et al., 2015). In their national report on employment services and outcomes for individuals with disabilities, Butterworth et al. (2015) discuss findings that show individuals with disabilities experienced higher levels of job loss during the economic recession of 2007–2009, and did not benefit from recovery efforts as much as their non-disabled counterparts. Efforts to improve work participation include Individuals with Disabilities Education Act (IDEA) law of 2004, Workforce Innovation and Opportunity Act (WIOA) law of 2014, policy bulletins from the Centers for Medicare and Medicaid Services (CMS), and the national movement called “Employment First.” The purpose of IDEA is to provide educational opportunities for children with disabilities to, “prepare them for further education, employment and independent living” (Individual with Disabilities Education Act, 2004). Some of the major implications for individuals with disabilities that came out of the WIOA in 2014 mandated that states’ public vocational rehabilitation agency focus on pre-employment and transition services, along with more attention to the general workforce development system and American Job Centers. In addition to these other efforts, CMS issued a policy bulletin in 2011 with the purpose of establishing integrated employment as a priority goal for participants on Home and Community Based Services waivers (CMS, 2011). Employment First is a framework focused on bringing about system-level change and places a priority on community-based, integrated employment for adults with disabilities (Department of Labor, 2016).

Due to an increased spotlight on employment for adults with disabilities there is a need for research on the individual characteristics that are associated with employability. The National Longitudinal Transition Study—2 (NLTS-2) provides rich information on transition services, including factors associated with secondary and post-secondary school employment. Of note, the strongest predictor of post-secondary school employment for individuals with ID, ASD, or multiple disabilities two years past graduation was paid work experiences during high school (Carter, Austin, & Trainor, 2012). Specifically for students with ASD, increased social skills, lack of comorbid ID, successful high school graduation, and the receipt of career counseling were all associated with greater odds of employment within the two years after high school (Chiang, Cheung, Li, & Tsai, 2013). Other research on predictors of employment rarely uses job placement as a specific outcome; rather, it is one part of a global adult outcome variable that also includes residential status, social connections, etc. (see Eaves & Ho, 2008; Helles, Gillberg, Gillberg, & Billstedt, 2015; Howlin, Goode, Hutton, & Rutter, 2004).

Studies that have targeted factors associated with work participation consistently report on a variety of demographic characteristics and IQ scores. IQ has little clinical relevance for vocational training. IQ is thought to be stable throughout adulthood, thus increasing IQ scores is not a realistic treatment outcome (Neisser et al., 1996). Other characteristics that have been examined in relation to employment include social skills, the presence of a secondary disability, mental health, problem behavior, years of education, empowerment, intensity of support needs, work expectations, and self-determination (Esbensen, Bishop, Seltzer, Greenberg, & Taylor, 2010; Holwerda, van der Klink, de Boer, Groothoff, & Brouwer, 2013; Lawer, Brusilovskiy, Salzer, & Mandell, 2009; Martorell, Gutierrez-Recacha, Pereda, & Ayuso-Mateos, 2008; Schaller & Yang, 2005; Wehman et al., 2014; Wehmeyer & Palmer, 2003).

Wehmeyer (1997) identified the importance of self-determination on adult outcomes for individuals with disabilities and outlined a framework for self-determination. Self-determination includes autonomous functioning, for which choice-making skills are a critical first step (Wehmeyer, 1997). Choice-making skills of adults with disabilities have been analyzed in regards to their association with outcomes including employment, independent living, and community access (Shogren, Wehmeyer, Palmer, Rifenshark, & Little, 2015; Wehmeyer & Garner, 2003). Additionally, choice-making skills have a significant impact on personal functioning, including decreasing inappropriate behavior and increasing appropriate behavior (Cannella, O’Reilly, & Lancioni, 2005). Therefore, if increased choice-making ability is indeed associated with better employment outcomes, it would be an ideal skill to target as an intervention goal or educational objective.

In the present study, choice-making and employment outcomes were examined for three groups of adults with intellectual disability: 1) adults with ASD and ID, 2) adults with DS and ID, and 3) adults with idiopathic ID. The three research groups were chosen for several reasons. It has been mentioned previously that adults with disabilities have lower employment rates than their non-disabled counterparts, but many of these estimates group all developmental disabilities (Butterworth et al., 2015), or report on

adults with a wide variety of disabilities (Department of Labor, 2016). Estimates that specify a disability group tend to focus on autism. This research sought to expand what was known about the employment rates of adults with developmental disabilities by comparing rates of employment among those with autism to previously reported rates, while also comparing rates among autism and different developmental disability groups. As stated earlier, there are no nationally reported rates for individuals with DS, and DS serves as a reliable sub-group of individuals with ID. Additionally, those with DS are known to have fewer co-occurring mental health issues and less challenging behavior than individuals with ASD or idiopathic ID (Esbensen, Seltzer, & Krauss, 2008; Griffith, Hastings, Nash, & Hill, 2010; Tassé et al., 2016). While not all individuals with ASD in the population have co-occurring ID (Christensen et al., 2016), the current study limited the sample of individuals with ASD to only those who also reported an ID, consistent with the other research groups.

The main aims of this study are to examine employment statistics for each of the three disability groups based on NCI data, investigate any differences in employment status among groups, and identify factors which are linked to better employment outcomes, including choice-making variables. Based on previously mentioned research, it is hypothesized that challenging behavior, co-occurring psychiatric disorders, severity of intellectual disability, and extent to which individuals make choices will affect employment outcomes.

## 2. Methods

### 2.1. Sample

#### 2.1.1. State selection

This study examines data collected across the United States using the National Core Indicators' (NCI) Adult Consumer Survey. The Human Services Research Institute (HSRI) and the National Association of State Directors of Developmental Disabilities Services (NASDDDS) created the NCI as a system-wide quality assurance and outcome analysis measure for state developmental disability systems on several indicators, including: employment, choices, rights, service planning, community inclusion, and health and safety. The number of states participating in this voluntary measure has been steadily increasing over the years. The 28 states that participated in the NCI Adult Consumer Survey data collection for the years 2011–2012 and/or 2012–2013 included: Alabama, Arkansas, Arizona, Connecticut, Florida, Georgia, Hawaii, Illinois, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Maine, Michigan, Montana, Mississippi, North Carolina, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, South Carolina, Texas, Utah, and Wisconsin.

#### 2.1.2. State sample selection

For the NCI Adult Consumer Survey, states annually sample at least 400 randomly selected individuals receiving public services from their state developmental disabilities system. Individuals are at least 18 years old and receive case management and at least one additional service. The total number of participants for the years 2011–2012 and 2012–2013 that identified as having ID, ASD, or DS totaled 21,048. Cases of ASD with comorbid DS were excluded, along with any cases without ID. Cases with missing information regarding employment and cases with values above or below four standard deviations of the mean (i.e., operational definition of outlier) for any of the employment data (wages, hours worked, etc.) were excluded. The final sample included 19,880 participants; 2174 individuals with ASD, 1857 individuals with DS, and 15,845 individuals with idiopathic ID. Basic demographic data are presented in Table 1.

#### 2.1.3. Measure

The NCI Adult Consumer Survey consists of three sections; Background Information, Section 1, and Section 2. The Background section is completed through a review of agency records, computer systems references, or through interview with the case manager. Information regarding diagnosis is found in this section. Even though states vary on what type of documentation is required for eligibility, all states require some form of diagnosis verification in order for individuals to receive services through the state. Additional information gathered in the background section includes basic demographic information, type of residence, health care information, behavior support needs, etc.

Section 1 requires that the consumer be interviewed in person, as it contains subjective content known only to the respondent (e.g., Do you like where you live? Would you like to live somewhere else? Do you like where you work?). This section contains questions related to preferences and satisfaction for work, home, safety, friends/family, and supports. If the adult consumer is unable to answer the questions contained in Section 1, those items are left blank.

Section 2 contains questions that can be answered by the adult consumer or, in the case where the consumer is unable to answer the survey questions, an individual who knows the consumer well may provide responses for these items. The indicators addressed in Section 2 regard community inclusion, choices, rights, and access to needed services. The present study examined information contained in the background section and section 2 of the Adult Consumer Survey.

### 2.2. Variable selection

Employment status was measured through information collected in the background section. Questions on the NCI relating to employment can be differentiated based on paid or unpaid work status and whether the workplace was in the community or in a facility. Work that was unpaid was excluded from the composite variable, as these types of jobs were deemed to be fundamentally

**Table 1**  
Descriptive Statistics for Demographic Variables.

	Autism (n = 2174)	Down syndrome (n = 1857)	Intellectual Disability (n = 15,845)
<b>Age</b>			
Mean (Std. Dev)	34.53 (12.61)	40.87 (12.03)	44.77 (15.10)
Median	31	41	45
Range	18–87	18–75	18–96
<b>Gender</b>			
Male	76.70%	53.90%	54.30%
Female	23.30%	46.10%	45.70%
<b>Ethnicity</b>			
Mexican, Mexican American, Puerto Rican, Cuban or other Spanish/Hispanic/Latino	5.10%	4.40%	4.10%
<b>Race</b>			
American Indian or Alaska Native	0.50%	0.50%	0.70%
Asian	2.30%	2.80%	2.30%
Black or African American	22.40%	10.80%	20.50%
Pacific Islander	0.60%	0.40%	0.90%
White	67.90%	80.80%	71.20%
Other race not listed	3.60%	2.70%	2.40%
Two or more races	1.70%	1.30%	1.30%
Don't know	0.90%	0.60%	0.70%
<b>Level of ID</b>			
Mild ID	29.40%	24.70%	42.00%
Moderate ID	31.70%	51.50%	29.40%
Severe ID	23.10%	16.00%	14.50%
Profound ID	15.90%	7.80%	14.00%
<b>Medications Taken for:</b>			
Mood Disorders	44.50%	19.20%	38.70%
Anxiety Disorders	45.10%	14.10%	28.70%
Behavior Problems	48.10%	10.70%	24.80%
Psychotic Disorders	21.30%	6.00%	19.00%
No Medications Taken	32.00%	73.00%	48.50%
Medication Taken for 1 Condition	22.00%	14.20%	20.90%
Medication Taken for 2 Conditions	21.00%	7.60%	15.10%
Medication Taken for 3 Conditions	14.70%	3.50%	9.20%
Medication Taken for 4 Conditions	10.20%	1.60%	6.30%
<b>Behavior Support Needs</b>			
<b>Self-Injurious Behavior</b>			
Extensive Support Needed	56.90%	90.80%	78.60%
Some Support Needed	29.00%	7.80%	16.90%
No Support Needed	14.10%	1.40%	4.40%
<b>Disruptive Behavior</b>			
Extensive Support Needed	39.90%	73.90%	62.20%
Some Support Needed	40.80%	22.20%	29.50%
No Support Needed	19.30%	4.00%	8.30%
<b>Destructive Behavior</b>			
Extensive Support Needed	56.40%	86.00%	76.50%
Some Support Needed	28.20%	11.70%	18.00%
No Support Needed	15.40%	2.30%	5.40%

Note: Statistics presented as frequencies (percentages) of diagnostic group.

different than paid jobs. Employment status consists of individuals who were in one of three groups: paid community-based job, paid facility-based job, or not participating in any paid job.

Background variables of interest included age, ID severity level, amount of supports needed for behavior problems,<sup>1</sup> and number of mental health conditions for which the individual takes medication. Severity level of ID was reported in the background section and was coded on an ordinal scale: mild, moderate, severe, profound, or unknown level of ID.

Behavior support needs were documented based on type of problem behavior (i.e., self-injurious behavior, disruptive behavior, or destructive behavior) and level of support required for that behavior (i.e., no support needed, support needed, extensive support needed). The level of support needed for each type of behavior was then indicated on a scale of zero to two; “0” = no support needed, “1” = support needed and “2” = extensive support needed. The composite variable included a sum of supports across behavior type,

<sup>1</sup> The NCI uses the term, “behavior problems.” The authors acknowledge that this may not be the most current and respectful term.

**Table 2**  
Exploratory factor analysis loadings for six choice-making questions.

	Factor	
	1	2
Who decides your daily schedule (like when to get up, when to eat, when to go to sleep)?	<b>0.694</b>	0.088
Who decides how to spend your free time?	<b>0.864</b>	−0.099
Do you choose what you buy with your spending money?	<b>0.600</b>	0.086
Who chose (or picked) the place where you live?	0.092	<b>0.661</b>
Did you choose (or pick) the people you live with (or did you choose to live by yourself)?	−0.080	<b>0.834</b>
Did you choose (or pick) your case manager/service coordinator?	0.029	<b>0.367</b>

Note: Bolded numbers represent factor membership.

Extraction Method: Maximum Likelihood.

Rotation Method: Oblimin with Kaiser Normalization.

with the possible values of 0 (indicating no supports required for any behavior) to 6 (indicating extensive support needed for all three types of behaviors).

Information was collected about the number of mental and behavioral health conditions for which the individual takes medication. These mental and behavioral health conditions include: mood disorders, anxiety disorders, psychotic disorders, and behavior problems. This variable was included as an indication of underlying psychopathology, which might influence a person's ability to gain and maintain employment. This variable was also analyzed as a composite variable with possible values ranging from “0” = no medications required for mental health conditions, to “4” = medications taken for all four types of mental health conditions.

Questions from the ‘choices’ indicator in Section 2 were entered into exploratory and confirmatory factor analyses to identify latent variables representing choice-making. Exploratory factor analysis (EFA) was run on a random-split half of the study sample ( $n = 9940$ ) using maximum likelihood (ML) factor extraction, Oblimin rotation with Kaiser normalization, and list-wise deletion of missing values. The six choice-making variables were: 1) choosing where you live, 2) choosing the people you live with, 3) choosing your case manager, 4) deciding your daily schedule, 5) choosing how to spend your free time, and 6) choosing what to buy with your spending money. The total sample of responses after list-wise deletion of missing data resulted in  $n = 5572$ . EFA with these six variables revealed two latent constructs ( $\chi^2 = 28.06$ ,  $df = 4$ ,  $RMSEA = 0.033$ ). The model was determined to have good fit based on RMSEA (root mean square of approximation) values using the criteria set out by Browne and Cudeck (1989). Factor one was labeled “short-term choices” and factor two was labeled “long-term choices.” Factor loadings for each of the questions are presented in Table 2.

### 2.3. Analyses

#### 2.3.1. Confirmatory factor analysis

Confirmatory factor analysis (CFA) was completed to validate the factor structure found in EFA. Statistical Package for Social Sciences (SPSS) Amos version 23 was used for CFA on remaining half of the dataset ( $n = 9940$ ) not used for EFA. Maximum likelihood estimation was used with list-wise deletion of missing data ( $n = 5640$ ). Factor score weights produced from CFA were applied to the total study sample with list-wise deletion in SPSS ( $n = 11,212$ ) to create regression-based factor scores.

#### 2.3.2. Median analyses

Kruskal-Wallis test was used to compare the three disability groups (ASD, DS, ID) on number of mental and behavioral health conditions that necessitate taking medication, behavior support needs, age, short-term choices and long-term choices. Chi-square test for association was used to test independence between disability groups on the categorical variables of severity level of ID and job status. Additional pairwise comparisons using Bonferroni adjustment of  $p$ -values were used to further investigate differences between pairs of research groups to understand the nature of the significant differences across the three groups. A non-parametric test was chosen due to non-normal distributions.

#### 2.3.3. Ordinal logistic regression

Ordinal logistic regressions were performed for each of the three disability groups separately, with employment status as the dependent variable and age, severity level of ID, number of mental and behavioral health conditions that necessitate taking medication, support needs for behavior problems, short-term choices and long-term choices as independent variables. Forced entry was used to add all independent variables into the models at once. Odds ratios are reported with Wald 95% confidence intervals along with Wald chi-squared statistics and subsequent  $p$  values. To check the assumption of proportional odds necessary for these models, separate binomial logistic regressions were run and the odds ratios examined. These models revealed similar odds ratios comparing pairs of employment status categories, therefore it was concluded that these data met requirements of proportional odds. Additionally, there were no observed multicollinearity. An additional ordinal logistic regression analysis was run on the entire combined sample ( $N = 19,880$ ), with the added independent variable of disability group, to identify the effect that membership in a

**Table 3**  
Percent of individuals at each level of employment by disability group.

	ASD	DS	ID
No Job	71.1%	54.3%	61.6%
Paid Facility Work	18.5%	30.1%	24.6%
Paid Community Job	10.4%	15.6%	13.8%

Note: Statistics presented as frequencies (percentages) of disability group.

particular disability group had on employment status.

### 3. Results

#### 3.1. Demographic characteristics

All of the demographic characteristics examined, including age, severity level of ID, behavior support needs, and number of mental and behavioral health conditions that necessitate taking medication, all were found to statistically differ across disability groups. Individuals with ID had the highest median age, followed by individuals with DS, and finally individuals with ASD were the youngest,  $H(2) = 978.53, p < 0.001$ . On average, individuals in the ID-only group were the least cognitively impaired, followed by individuals with DS, and finally individuals with ASD were most cognitively impaired,  $\chi^2(6) = 522.09, p < 0.001$ . Individuals with ASD required the most support for behavior problems, followed by individuals with ID, and then individuals with DS,  $H(2) = 849.09, p < 0.001$ . Individuals with ASD had the greatest number of mental and behavioral health conditions necessitating taking medication, followed by individuals with ID, and then individuals with DS,  $H(2) = 675.53, p < 0.001$ . Statistics for these demographics are presented in Table 1.

#### 3.2. Analyses on job statistics

Employment rates were statistically different depending on disability group,  $\chi^2(4) = 124.58, p < 0.001$ . Adults with DS were most employed, followed by adults with ID, then adults with ASD. The closest group in this study to the integrated employment rate cited by Butterworth et al. (2015) of 18.6% in the fiscal year 2013 were adults with Down syndrome at 15.6%. Table 3 provides the percent of adults in each disability group employed at different levels.

Due to the mean age differences between disability groups, employment status was examined across age ranges to identify trends in employment. Individuals that fell within 18–20 years old were excluded for these specific age-related descriptive analyses. Twenty-one years of age was used as the cut point in order to keep the age brackets consistent. Figs. 1 and 2 show the age trends for paid community jobs and paid facility work, respectively. In paid community jobs, it is clear that the 21–30 and 31–40 age groups showed the highest rates of employment, and employment declines until the 60 and over age group. The decline is most rapid for individuals with DS, specifically between the ages of 30–50. Paid community employment rates converged between disability groups in the 60 and over age group.

In paid facility work, the age trends tell a different story. Rates of paid facility employment seem to peak for DS and ID groups in the 41–50 age group, and then decline until the 60+ age group. For the ASD group, however, rates of paid facility employment

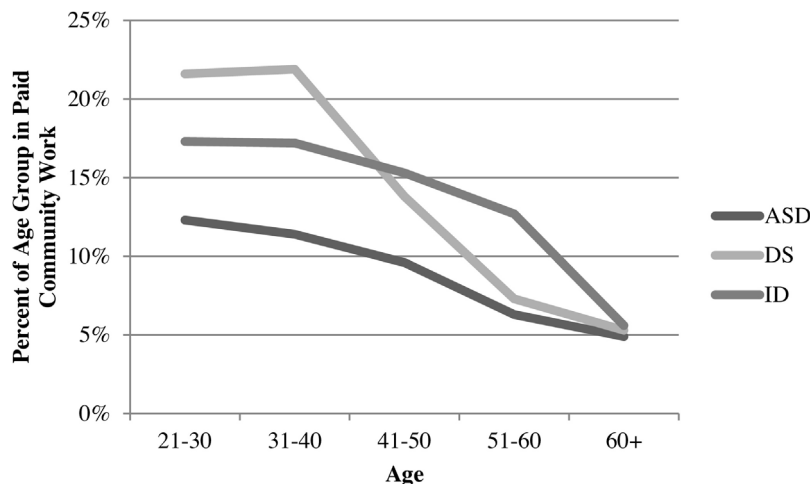


Fig. 1. Age trends of paid community work across three disability groups.



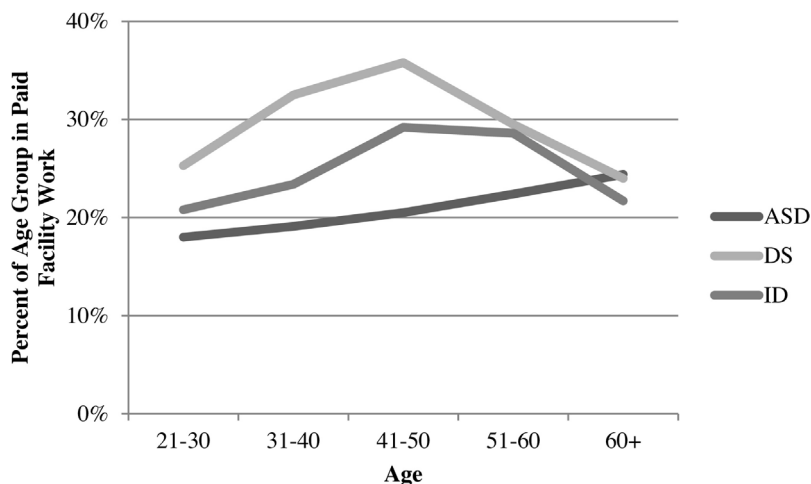


Fig. 2. Age trends of paid facility work across three disability groups.

demonstrated a steady increase from the 21–30 group to the 60 and over group. Rates of paid facility employment at the 60 and over group were similar to the rates in the 21–30 age group. Similar to paid community employment, all disability groups converged on rates of paid facility employment in the 60 and over age group.

Over a two-week period of time in a paid community job setting, average number of hours worked were statistically different between disability groups, but hourly wages were not. The number of hours worked during a two-week period in a paid community job statistically differed across disability group,  $H(2) = 14.83, p = 0.001$ ; individuals with ID worked more hours on average than individuals with DS,  $p = 0.003$ . Group differences did not exist between those with ASD and either those with DS or ID.

In a paid facility work, hourly wage differed by disability group, but number of hours worked did not. Hourly wage statistically differed by disability group,  $H(2) = 19.72, p < 0.001$ ; individuals with ID earned a higher hourly wage than individuals with DS,  $p < 0.001$ . Group averages for individuals with ASD on hourly wage fell between the averages for individuals with DS and ID, and did not statistically differ between the groups. Means and medians for employment variables are presented in Table 4.

### 3.3. Confirmatory factor analysis

Confirmatory factor analysis (CFA) with ML estimation validated the model found in exploratory analyses,  $\chi^2(8) = 124.51, p < 0.001, RMSEA = 0.038$ . Asymptotically distribution free estimation was also explored, and results were similar to ML, therefore the ML results are reported. Model fit for CFA was determined to be good by RMSEA criteria (Browne & Cudeck, 1989). Short-term and long-term choices had a small range in the study sample. Regression estimates and subsequent odds ratios were calculated using a one standard deviation change to aid in ease of interpretation. The total sample standard deviation was used for each three research groups. Therefore, instead of an odds ratio representing one unit increase in either of these variables, the odds ratios represent an

Table 4  
Employment rates by disability group and employment type.

Paid Community Job	Autism n = 208	Down Syndrome n = 269	Intellectual Disability n = 2039
Number of hours worked during previous two week period	(n = 185)	(n = 238)	(n = 1797)
Mean (Std. Deviation)	23.73(18.18)	21.58(16.04)	25.74(18.13)
Median	20.00	18.00	20.00
Hourly Wage	(n = 139)	(n = 184)	(n = 1454)
Mean (Std. Deviation)	7.14(3.33)	7.27(3.03)	7.64(3.34)
Median	7.40	7.25	7.50
Paid Facility Work	Autism n = 414	Down Syndrome n = 587	Intellectual Disability n = 4116
Number of hours worked during previous two week period	(n = 355)	(n = 528)	(n = 3641)
Mean (Std. Deviation)	32.25(21.16)	33.42(20.96)	33.28(21.03)
Median	30.00	30.00	30.00
Hourly Wage	(n = 276)	(n = 436)	(n = 2866)
Mean (Std. Deviation)	2.16(2.19)	1.86(2.03)	2.29(2.28)
Median	1.35	1.11	1.50

Note: Valid sample size for disability group in each category is presented in parentheses.

**Table 5**  
Summary of Ordinal Logistic Regression Results.

Parameter	B	SE	Wald $\chi^2$	OR	[95% CI]
<b>ASD Group</b>					
Increase in 5 years	0.03	0.01	0.97	1.03	0.97, 1.10
Decreased severity of level ID	0.58	0.09	37.69	1.78***	1.48, 2.14
Fewer medications taken for mental health conditions	0.17	0.07	6.15	1.19*	1.04, 1.36
Decrease in support needs for behavior problems	0.03	0.05	0.31	1.03	0.93, 1.14
One standard deviation increase in long-term choice-making	0.18	0.18	2.12	1.19	0.94, 1.52
One standard deviation increase in short-term choice-making	0.35	0.21	8.46	1.42**	1.12, 1.80
<b>DS Group</b>					
Decrease in 5 years	0.06	0.01	2.32	1.01	1.00, 1.03
Decreased severity of level ID	0.64	0.11	35.25	1.9***	1.54, 2.35
Fewer medications taken for mental health conditions	0.23	0.10	5.63	1.26*	1.04, 1.52
Decrease in support needs for behavior problems	0.01	0.08	0.02	1.01	0.86, 1.18
One standard deviation increase in long-term choice-making	0.13	0.17	1.28	1.14	0.69, 1.10
One standard deviation increase in short-term choice-making	0.42	0.24	9.20	1.52**	1.16, 1.99
<b>ID Group</b>					
Decrease in 5 years	0.02	0.002	77.04	1.08***	1.06, 1.09
Decreased severity of level ID	0.61	0.03	392.48	1.85***	1.74, 1.96
Fewer medications taken for mental health conditions	0.12	0.02	30.54	1.13***	1.08, 1.18
Decrease in support needs for behavior problems	0.01	0.02	0.10	1.01	0.97, 1.04
One standard deviation increase in long-term choice-making	0.17	0.05	25.88	1.19***	1.11, 1.27
One standard deviation increase in short-term choice-making	0.30	0.07	54.95	1.35***	1.24, 1.46
<b>Total Sample</b>					
Decrease in 5 years	0.07	0.00	71.49	1.07***	1.05, 1.08
Decreased severity of level ID	0.61	0.03	463.15	1.84***	1.74, 1.94
Fewer medications taken for mental health conditions	0.13	0.02	39.70	1.14***	1.09, 1.18
Decrease in support needs for behavior problems	0.01	0.02	0.41	1.01	0.98, 1.05
One standard deviation increase in long-term choice-making	0.17	0.05	28.32	1.18***	1.11, 1.25
One standard deviation increase in short-term choice-making	0.31	0.06	73.60	1.37***	1.27, 1.47
<b>Disability Status</b>					
ASD vs. ID	-0.17	0.09	3.59	0.85	0.71, 1.01
DS vs. ID	0.28	0.09	11.10	1.329**	1.12, 1.57

ASD Model  $\chi^2(6) = 138.84***$ ; ID Model  $\chi^2(6) = 1457.43***$ ; DS Model  $\chi^2(6) = 125.71***$ ; Total Sample Model  $\chi^2(8) = 1747.51***$ .

B, unstandardized beta estimate; SE, standard error; OR, odds ratio; CI, confidence interval.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

increase in one standard deviation of these variables.

### 3.3.1. Analyses on short-term and long-term choices

The extent to which individuals made short-term and long-term choices statistically differed across disability groups,  $H(2) = 199.57$ ,  $p < 0.001$  and  $H(2) = 181.14$ ,  $p < 0.001$ . On average, individuals with ID exercised the most choices, followed by individuals with DS, then individuals with ASD (differences between groups were statistically significant at the  $p < 0.001$  level for both variables).

### 3.4. Ordinal logistic regression

Ordinal logistic regressions (OLR) were run on each of the three disability groups, then on the total sample with disability group added to the model as an independent variable. Results are presented in Table 5.

## 4. Discussion

The main finding of this study is that adults with developmental disabilities continue to be employed at low rates. In our sample of adults served by state departments of developmental disabilities, we found that 16% of individuals with DS, 14% of individuals with idiopathic ID, and 10% of individuals with ASD were employed in the community. Social, cultural, and political practices may all



influence this finding. One significant barrier continues to be the financial incentives to earn a lower wage to qualify for benefits such as Medicaid or Social Security Income (SSI; Butterworth et al., 2015; Nord, Luecking, Mank, Kiernan, & Wray, 2013). In their national report on employment services and outcomes, Butterworth et al. (2015) found that employment for individuals with disabilities receiving SSI reached a 20-year low in 2013 (4.3%). In addition, SSI recipients with ID did not use work incentive programs, such as Ticket-to-Work and Plans for Achieving Self-Support, as frequently as adults with other disabilities (Butterworth et al., 2015).

Rates of paid employment in the community and facility settings were greater for individuals with DS than either individuals with ID and ASD. NLTS-2 data found a similar trend, where individuals with ASD experienced lower rates of paid work following high school compared to individuals with other disabilities (Roux et al., 2013). Individuals with DS worked fewer hours in the community than those with ID. In paid facility jobs individuals with DS were paid a lower hourly wage than individuals with ID. More research is needed to better understand why adults with DS work fewer hours in facility-based work programs and earn lower hourly wages in the community.

In addition, rates of paid facility work continue to overshadow rates of community paid jobs. This finding is troubling, since community employment is often the goal for adults with intellectual and developmental disabilities (Migliore et al., 2007). While the goal of facility-based work is to prepare individuals for future community employment, the literature has shown that this is not always accomplished, and that significant barriers exist in transitioning from facility-based to community-based employment (Brickey, Campbell, & Browning, 1985; Migliore, Grossi, Mank, & Rogan, 2008). In addition, individuals without workshop experience have had better success in the community-based job market than individuals who had workshop experience (Cimera, 2011).

#### 4.1. Group comparisons

The three research groups differed on several demographic variables, including age, medication usage for mental health conditions, behavior support needs, and severity of intellectual disability. Except for severity of intellectual functioning, all of these group differences reflect true group differences reported in the literature on population-based research. With regards to age, individuals with ASD were the youngest, followed by individuals with DS, then individuals with ID. Individuals with DS were expected to be younger than individuals with ID, as individuals with DS have a slightly reduced life expectancy (Yang, Rasmussen, & Friedman, 2002). Additionally, individuals with ASD were expected to be younger, as this diagnosis has only received increased awareness in the last 15–20 years (Matson & Kozlowski, 2011). It is possible that there exists a subset of older adults in the ID group who also have ASD but have gone undiagnosed, subsequently impacting the average age of individuals with ASD in this sample.

Individuals with ASD were taking medication for the highest number of mental health conditions and required the most behavior support needs, followed by individuals with ID, and individuals with DS. This finding is consistent with previous reported findings of increased rate of co-occurring mental health problems in people with ASD compared to individuals in the typically-developing population; approximately 70% of individuals with ASD have at least one comorbid mental illness and 40% have two or more (Simonoff et al., 2008). Adults with comorbid ASD and ID are at greater risk for behavior problems than individuals with ID alone (Matson & Rivet, 2008; Smith & Matson, 2010). Griffith et al. (2010) found that children with ASD had significantly more behavior problems than either children with DS or children with ID-alone. Esbensen et al. (2008) found that adults with DS had fewer behavior problems and less externalizing problem behaviors compared with adults with ID alone. Tassé et al. (2016) reported a similar trend in their sample of adults with DS, reporting a lower prevalence rate of co-occurrence of mental and behavioral health issues than a comparable group of adults with idiopathic ID.

Severity of intellectual impairment differed by disability groups; individuals with ASD were the most impaired. The NCI Adult Consumer Survey population represents adults receiving services from state developmental disability systems and a diagnosis of ASD alone is not always sufficient to receive state funded DD services (Mauch, Pfeifferle, Booker, Pustell, & Levin, 2011). Therefore, the subset of individuals in this dataset with ASD may represent a population of individuals with comorbid diagnoses and more complex service needs, beyond that of an individual with only an ASD diagnosis. The most recent epidemiological data suggests that approximately 32% of children with ASD have co-occurring ID ( $IQ \leq 70$ ), 24% fall within the borderline range ( $IQ = 71-85$ ) and 44% fall within the average range ( $IQ > 85$ ; Christensen et al., 2016). Table 1 shows that the ASD sample contains a larger proportion of individuals with severe and profound ID than seen in larger population-based epidemiological studies of ASD.

#### 4.2. Predictors of employment

For all three disability groups, lower severity levels of ID were associated with increased probability of paid community employment. ID severity level also had the highest effect sizes for employment status compared to all other independent variables. This suggests that intellectual functioning, and corresponding adaptive skill levels, are highly correlated with employment, regardless of age, behavior problems, mental illness or exercising choices. Holwerda et al. (2012) systematic review of predictors for work participation also find that IQ is consistently a significant predictor of employment for individuals with disabilities.

Taking medications for mental and behavioral health conditions and employment status were statistically related for all groups. That is, reporting fewer reasons for taking psychotropic medications was related to an increased probability of paid community employment. Martorell et al. (2008) found similar results, in that the presence or absence of psychiatric symptoms predicted work outcomes in adults with disabilities. Mental illness is more prevalent in adults with ID than the typical population (Eaton & Menolascino, 1982; Simonoff et al., 2008) yet they experience several barriers to adequate treatment (Krahn,

Hammond, & Turner, 2006). Mental illness can serve as a barrier to employment for adults in the typical population, and this may be exacerbated by the presence of intellectual.

Diagnosis (ASD, DS or ID) was also statistically related to employment status. When controlling for those variables known to significantly differ between groups (i.e., age, severity level of ID, number of mental and behavioral health conditions necessitating the taking of medication, and behavioral support needs), individuals with DS were still significantly more likely to be employed in a community paid job than individuals with ID or individuals with ASD. This implies that there are inherent differences within diagnostic groups that accounts for variability in employment status, regardless of differences in cognitive and behavioral functioning.

#### 4.3. Choice-making

Each disability group significantly differed from one another on the extent to which they made choices. On average, individuals with ID exercised the most choice-making, followed by individuals with DS, and then individuals with ASD. For each disability group, short-term choice-making had the second largest effect on employment status, only second to ID severity level. This unique variable out-performed indicators of mental illness and behavior problems in predicting employment status. The relationship between choice-making and employment is important, only partially because of its intervention implications. It is a skill that can be targeted for intervention and potentially expanded.

Choice-making is an important component of self-determination, which is linked to several adult outcomes, including residential setting, quality of life, and better quality employment (Lachapelle et al., 2005; Neely-Barnes et al., 2008; Shogren et al., 2015; Wehmeyer & Bolding, 1999; Wehmeyer & Palmer, 2003). Employment was chosen as the dependent variable in this study, as in previous research (Martoeil et al., 2008; Wehmeyer & Palmer, 2003), but choice-making and employment have an unclear causal relationship and future research is needed to better understand the relationship. Employment and choice-making are critical to understanding successful independent living and community inclusion (Shogren et al., 2015; Wehmeyer & Bolding, 1999; Wehmeyer & Palmer, 2003), which are top priorities of all developmental disability services.

#### 4.4. Limitations

Several limitations exist in this study. The first is that these data come from individuals receiving state developmental disabilities services, which may reflect a more impaired population than if one were to randomly sample from all individuals with ASD, DS or ID. The notion that the NCI dataset may under-represent individuals from higher IQ ranges may be attributable to the fact that state DD services are provided based on eligibility that is determined by an individual's level of care.

A second limitation of this study is the fact that all data were taken at a single time point. Information about individuals shifting from paid community employment to paid facility employment across time is unknown. Therefore, caution should be used when interpreting age trends and causal relationships.

A third limitation of this study is the nature of the variable "employment status". This variable is a three point ordinal variable (0 = no employment, 1 = paid facility work, 2 = paid community job), which may have less statistically sound metrics than if regression analyses used a dependent variable with additional levels or a continuous variable.

Finally, the choice-making questions, and their resulting latent variables, represent the extent to which all individuals make these choices, and not whether or not they had the opportunity to make these choices. Therefore, the variables represent if an individual had the opportunity and used it. This reflects a broader issue of possible third-variables that affect the interpretation of results.

#### 4.5. Conclusions

We found differences in employment trends between adults with ASD, DS, and ID. Butterworth et al. (2015) reported 19% of all individuals receiving services from state developmental disability agencies were in integrated community employment in 2013, a percentage that had dropped from 25% in 2001. Of our study sample, adults with DS were the closest group to approaching this previously reported percent of community-based employment with about 16% in paid community employment for the years 2011–2013. This study replicates previous findings indicating a downward trend of participation in paid community employment among individuals with developmental disabilities. Of individuals who made choices in their daily routine (i.e. what to do with free time, choosing a daily schedule, and what to buy with spending money), those who made more short-term choices had greater odds to be employed in the community.

#### 4.6. Implications for practice and future directions

Our sample showed that a majority of individuals aged 21–30 do not have any paid work. Further, those that do work, work in facility settings rather than community settings. While there have been recent efforts to adopt public policy aimed at increasing community-based employment participation (e.g., Employment First Executive Order, WIOA, and CMS policy bulletins), these efforts need to be bolstered and adopted across all states. Transition and job placement services should focus on community-based employment as a priority over facility-based work.

Future studies should update what is known about the long-term impact of facility-based work, and how often individuals transition to community-based paid work. Additionally, the relationship between choice-making interventions and successful

employment should be explored. Choice-making, particularly short-term choice-making, was strongly associated with employment. This is an area that could be targeted for intervention, with studies investigating the directionality of choice-making and employment. In addition, more studies need to include employment as a dependent variable of adult outcome, instead of one component of a global outcome variable. The field needs to better understand barriers and facilitators to employment and explore different factors that may account for the wide variability of employment rates in adults with developmental disabilities beyond simple demographic variables.

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