

Intellectual and Developmental Disabilities

Work Participation of Autistic Adolescents

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Corresponding Author:	Michelle Menezes University of Virginia Charlottesville, VA UNITED STATES
First Author:	Michelle Menezes
Order of Authors:	Michelle Menezes Jessica Pappagianopoulos Micah O. Mazurek
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Abstract:	<p>This study sought to compare frequency of paid work by autistic adolescents to paid work by adolescents with other neurodevelopmental disorders and typically developing adolescents, and to examine whether demographic and clinical characteristics were associated with autistic adolescent employment with data from 2016-2019 National Survey of Children's Health. Rate of paid work was significantly lower in the autistic group (22.01%) than typically developing (49.38%) and other neurodevelopmental disorders (44.27%) groups. Younger age, lower household income, co-occurring intellectual disability, and more severe autism were associated with lower odds of an autistic adolescent having worked. This study indicates that work disparities impacting autistic individuals begin in youth and highlights the need for improved vocational support to address employment barriers for autistic youth.</p>



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Abstract

This study sought to compare frequency of paid work by autistic adolescents to paid work by adolescents with other neurodevelopmental disorders and typically developing adolescents, and to examine whether demographic and clinical characteristics were associated with autistic adolescent employment with data from 2016-2019 National Survey of Children's Health. Rate of paid work was significantly lower in the autistic group (22.01%) than typically developing (49.38%) and other neurodevelopmental disorders (44.27%) groups. Younger age, lower household income, co-occurring intellectual disability, and more severe autism were associated with lower odds of an autistic adolescent having worked. This study indicates that work disparities impacting autistic individuals begin in youth and highlights the need for improved vocational support to address employment barriers for autistic youth.

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Work is one of life's defining activities. It provides a role in society, affords financial independence, and is associated with improved physical and psychosocial well-being (Modini et al., 2016; Saunders & Nedelec, 2014; Waddell & Burton, 2006). A group that often does not experience the benefits of work are autistic individuals (Chen et al., 2015; Hendricks, 2010; Roux et al., 2013; Shattuck et al., 2012). Autistic individuals have far lower rates of employment than the general population (Roux et al., 2013, 2020; Shattuck et al., 2012), particularly autistic individuals who are from low-income households/families (Chen et al., 2015; Eilenberg et al., 2019; Hendricks, 2010; Shattuck et al., 2012), have more autism characteristics (e.g., more differences in social skills; Chen et al., 2015; Chiang et al., 2013; Hendricks, 2010), and have co-occurring conditions (e.g., intellectual disability [ID]; Chen et al., 2015; Chiang et al., 2013; Schaller & Yang, 2005). Although many studies have investigated prevalence and correlates of work experiences of autistic adults (e.g., Alverson & Yamamoto, 2018; Hayward et al., 2019; Holwerda et al., 2012; Roux et al., 2013), less research has focused on work participation of autistic youth (i.e., less than 18 years of age).

For many typically developing individuals, work begins early in adolescence (i.e., in middle school; Bornstein & Leventhal, 2015; Greene & Staff, 2012). By high school exit, most youth will have worked for pay (Bornstein & Leventhal, 2015). Studies have indicated that adolescent work experiences are associated with improved career readiness (Creed et al., 2006; Mortimor, 2003). Through work, adolescents develop skills such as reliability, punctuality, and social networking (Greene & Staff, 2012). Adolescents may additionally gain knowledge of various career opportunities and occupation-specific skills (Creed et al., 2006; Mortimor, 2003), thereby improving future employment prospects (Greene & Staff, 2012).

The workplace often involves complex social dynamics and requires flexibility in response to situational changes. These key features of employment likely pose a significant challenge for autistic adolescents, as difficulties with social communication and restricted/repetitive behaviors are the core characteristics of autism (American Psychiatric Association, 2022). Autistic adults have reported difficulties with understanding instructions and nonverbal social cues (e.g., facial expressions) while at work, and many also experience termination of employment due to workplace miscommunication and not understanding the social requirements of the job (Müller et al., 2003). Autistic adults have also reported difficulties with adapting to changes in workplace routines and termination due to taking too long to learn new tasks (Müller et al., 2003). Autistic adults have further identified social communication challenges as a significant barrier to obtaining employment (Giarelli et al., 2013; Müller et al., 2003). Specifically, autistic adults indicated that poor interview performance was the most problematic issue in getting hired for a job (Giarelli et al., 2013).

Nonetheless, when in supportive work environments, autistic individuals may thrive and be exceptional employees (Bury et al., 2020; Cope & Remington, 2022). Autistic individuals may possess cognitive advantages such as superior creativity, focus, and attention to detail (Cope & Remington, 2022). Autistic adults have identified that they are more efficient than their neurotypical coworkers and are dedicated and trustworthy employees (Cope & Remington, 2022). In addition, autistic individuals and their supporters, providers, researchers, and governmental and non-governmental organizations emphasize the value autistic individuals add to the workplace and promote full participation in employment (Bury et al., 2020).

Few studies have examined population-based prevalence of work participation of autistic youth (i.e., autistic individuals under the age of 18), particularly as compared to autistic adults. Studies have investigated prevalence of work utilizing samples of autistic youth participating in special education and/or vocational rehabilitation services, and these studies have indicated low rates of work for autistic youth (Chen et al., 2015; Roux et al., 2020; Wagner et al., 2003). According to data from the National Longitudinal Transition Study-2 (conducted in 2001), only 14.5% of autistic adolescents (13-17 years old) who received special education had a paid job in the past year compared to 36% of students with ID and 54% of all students with disabilities who received special education services (Wagner et al., 2003). Examining more recent data from the National Longitudinal Transition Study-2012, Roux and colleagues (2020) found that 30.8% of 16-19-year-old high school students with autism who received special education had worked for pay in the past year compared to 55.9% of non-special education peers. Of note, the non-special education group included both typically developing youth and those with other special healthcare conditions (including those with parent-reported autism) who were not receiving special education services within an Individualized Education Program.

Roux et al. (2020) additionally investigated correlates of work experiences among autistic high school students who received special education. Many potential correlates were examined including sex, race, household income, and indicators of functional ability (e.g., how well the youth could get to places outside the home [i.e., navigate], understand what is said, and converse with others). Only an indicator of functional ability, specifically how well the adolescent could navigate the community, was significantly associated with past-year paid work; no other examined variables were related to paid work of autistic adolescents. Findings

from Roux and colleagues (2020) contradict results of studies examining predictors of autistic adults' work for pay, which have consistently indicated that autistic individuals who are from low-income backgrounds have lower rates of work participation (Chiang et al., 2013; Kirby, 2016; Roux et al., 2013). These discrepancies may be due to Roux and colleagues (2020) only including autistic youth who received special education in their autism sample; Roux et al. (2020) additionally did not include co-occurring ID and level of autism characteristics as variables in analyses, which have been shown to impact whether autistic adults work (Cederlund et al., 2008; Chen et al., 2015) and may have influenced results.

Current Study

Given the benefits of early work experiences for typically developing individuals, consistently poor employment outcomes for autistic adults, and disparate research on prevalence and predictors of paid work in a population-based sample of autistic individuals younger than 18 years old, this study sought to: 1.) compare paid work by autistic adolescents to paid work by adolescents with other neurodevelopmental disorders and typically developing adolescents, and 2.) examine whether demographic (i.e., age, sex, race, and family household income) and clinical characteristics (i.e., autism severity and co-occurring ID) were associated with adolescent employment. To the authors' knowledge, no study has compared work participation across typically developing and autistic adolescents (i.e., younger than age 18) with a nationally representative sample. Additionally, to the authors' knowledge, no study has examined demographic and clinical characteristics associated with autistic adolescents' paid work with a population-based sample inclusive of autistic youth of varying levels of support and service need. As studies have found that autistic adolescents who received special education

had lower rates of work than non-special education peers (e.g., Roux et al., 2020) and research on autistic adults has consistently indicated lower rates of work compared to the general population (e.g., Chen et al., 2015), it was hypothesized that frequency of paid work would be significantly higher in the typically developing group and other neurodevelopmental disorders group than the autistic group. Based on findings from studies with autistic adults (Chen et al., 2015; Chiang et al., 2013; Shattuck et al., 2012), it was hypothesized that younger age, lower household income, co-occurring ID, and greater autism severity would be negatively associated with whether an autistic adolescent had worked for pay.

Methods

Participants and Procedures

Secondary data analysis was conducted utilizing data from the 2016, 2017, 2018, and 2019 National Survey of Children's Health (NSCH; United States Census Bureau, 2016, 2017, 2018, 2019). The NSCH is a nationally distributed caregiver-report survey of the health of children and adolescents in the United States. For the 2016-2019 NSCH surveys, households were randomly selected to receive mailed instructions to complete an online or paper-and-pencil screening questionnaire. The screener collected basic demographic and health information about all children in the household. One child from each household was randomly selected to be the subject of the full-length questionnaire (United States Census Bureau, 2016, 2017, 2018, 2019). Data were not longitudinal as the same households were not sampled across years. Analyses were limited to youth between 12 and 17 years of age as NSCH surveys inquired about work for pay in this age group.

The study sample included 1,681 autistic youth, 9,376 youth with other neurodevelopmental disorders, and 39,968 typically developing youth (see Table 1). Participants were included in the other neurodevelopmental disorders group if parents reported that the child had a neurodevelopmental disorder or genetic condition other than autism. Specifically, adolescents with the following diagnoses were included in the other neurodevelopmental disorders group: attention-deficit/hyperactivity disorder (ADHD), learning disability, speech or other language disorder, ID, developmental delay, Tourette's disorder, genetic or inherited condition (e.g., Down syndrome), and/or cerebral palsy. Participants were excluded from the typically developing group if parents reported that the child had been diagnosed with ADHD, learning disability, speech or other language disorder, ID, developmental delay, Tourette's disorder, genetic or inherited condition (e.g., Down syndrome), cerebral palsy, and/or autism.

Measures

Demographic Information

NSCH collected parent-reported demographic information about the child and their household, including child age, child sex, child race, and household income.

Clinical Information

NSCH respondents were asked whether they had ever been told by a qualified health care provider that the child had a neurodevelopmental diagnosis, such as autism, ID, and ADHD, and whether the child currently had the condition. Participants in the autistic group were reported to currently have autism. Participants in the other neurodevelopmental disorders group were reported to currently have ADHD, learning disability, speech or other language

disorder, ID, developmental delay, Tourette's disorder, genetic or inherited condition (e.g., Down syndrome), and/or cerebral palsy, and not have autism.

Additionally, parents of youth who indicated that the child currently had autism were asked to rate their child's autism severity. Response options were mild, moderate, and severe.

Work for Pay

For the NSCH, parents were asked if the adolescent worked for pay outside the home, including regular jobs, as well as babysitting, cutting grass, or other occasional work, during the past 12 months (i.e., worked for pay/did not work for pay).

Data Analytic Plan

Descriptive statistics were generated for the autistic, other neurodevelopmental disorders, and typically developing samples (see Table 1). Chi-square tests were utilized to compare autistic and other neurodevelopmental disorders groups, and autistic and typically developing groups in past-year work for pay. To examine the relations among demographic and clinical characteristics and work in autistic adolescents, a binary logistic regression was conducted with past-year paid work as the dependent variable. Independent variables were age, sex, race, family household income, co-occurring ID, and autism severity. Due to small sample sizes for racial identities other than White, race variable was dichotomized to White/non-White.

Results

Comparison of Paid Work by Autistic Adolescents, Adolescents with other Neurodevelopmental Disorders, and Typically Developing Adolescents

Chi-square test indicated that the frequency of paid work (i.e., the adolescent worked for pay outside the home during the past 12 months) was significantly higher in the typically developing group (49.38%) than the autistic group (22.01%) ($\chi^2(1) = 483.91, p < .001$). Similarly, chi-square test indicated that frequency of past-year paid work was significantly higher in the other neurodevelopmental disorders group (44.27%) than the autistic group (22.01%) ($\chi^2(1) = 292.28, p < .001$).

Associations Between Paid Work and Demographic and Clinical Characteristics of Autistic Adolescents

Binary logistic regression indicated that, accounting for sex, race, household income, ID, and autism severity, age was significantly associated with whether an autistic adolescent worked for pay during the past 12 months ($B = 0.45, p = < .001$) (see Table 2). With each year increase in age, the odds of an autistic adolescent having worked for pay increased by a factor of 1.57. In addition, controlling for all other model predictors, household income was significantly associated with whether an autistic adolescent had worked in the past year ($B = 0.001, p = .038$), accounting for all other considered variables. With each unit increase in family income, the odds of an autistic adolescent having worked for pay increased by a factor of 1.001. Binary logistic regression further indicated that, controlling for age, sex, race, family household income, and autism severity, co-occurring ID was significantly associated with whether an autistic adolescent worked for pay during the past 12 months ($B = -1.21, p < .001$). An autistic adolescent with ID was 70% less likely to have worked than an autistic adolescent without ID. Controlling for all other predictors, autism severity was significantly associated with past-year paid work, specifically parent-reported moderate ($B = -0.60, p < .001$) and severe autism ($B = -$

2.43, $p < .001$) as compared to parent-reported mild autism. Compared to autistic adolescents with parent-reported mild autism, autistic adolescents with parent-reported moderate autism were 45% less likely and autistic adolescents with parent-reported severe autism were 91% less likely to have worked for pay. Sex and race (i.e., White/non-White) were not significantly associated with work over and above the effects of all other variables in the model. Pearson χ^2 goodness-of-fit test indicated acceptable model fit ($\chi^2(1071) = 1096.69, p = .286$).

Discussion

This study compared rates of paid work of autistic adolescents to adolescents with other neurodevelopmental disorders and typically developing adolescents. This investigation additionally examined whether demographic and clinical characteristics were associated with paid work by autistic adolescents. Results indicated that frequency of paid work was significantly lower in the autistic group than the other neurodevelopmental disorders group and typically developing group. Results also indicated that age, household income, co-occurring ID, and autism severity were significantly associated with whether an autistic adolescent worked in the past year.

As predicted, frequency of paid work was significantly higher in the typically developing group as compared to the autistic group. Although this was the first investigation to compare work participation between autistic and typically developing adolescents, these results align with prior research indicating the low rate of employment among autistic adults (Chen et al. (2015; Hendricks, 2010). A review conducted by Chen et al. (2015) highlighted various barriers to successful employment for autistic individuals that may account for this difference in work frequency. Barriers included internal factors (e.g., social challenges during the interview process

or on the job, co-occurring diagnoses, and level of education) and external factors (e.g., attitude of employers towards autistic employees or job candidates, and inadequate vocational services and supports).

Findings additionally demonstrated that frequency of paid work was significantly lower among autistic adolescents compared to adolescents with other neurodevelopmental disorders, as predicted. These results align with past studies that have shown lower employment rates for autistic individuals when compared to adults with other special healthcare needs (Roux et al., 2013) and all adolescent students with disabilities receiving special education services (Wagner et al., 2003). As such, findings indicate that the unique, hallmark features of autism (i.e., social communication differences and restricted/repetitive behaviors) may be a main factor contributing to work-related disparities over and above other types of disability. This idea aligns with qualitative work conducted with autistic adolescents and adults (Giarelli et al., 2013; Müller et al., 2003). Specifically, a sample of 14 autistic adolescents reported challenges with socializing and making conversation, and rigidity (“getting stuck”) as the most common barriers to successfully transitioning out of secondary school into the community (e.g., enrolling in college and entering the workforce; Giarelli et al., 2013). In addition to the impact of autism-specific characteristics, the autistic group had a higher prevalence of ID than the other neurodevelopmental disorders group. As ID has been associated with poor employment outcomes (Chen et al., 2015; Lysaght et al., 2012), overrepresentation of ID in the autistic group may have partially driven this group difference. Given the benefits of employment paired with the lower rates of work among autistic adolescents, future research should continue to focus on identifying and addressing barriers to

employment for autistic youth. Barriers may include characteristics of the autistic adolescent (e.g., co-occurring ID); characteristics of the workplace (e.g., employer discrimination against autistic people; Cope & Remington, 2022); and familial, cultural, and societal practices and expectations (e.g., family dynamics, focus on school rather than work). For autistic youth to succeed in the workplace, they must have access to appropriate services and supports, and employers must value neurodiversity and recognize the strengths of autistic employees (e.g., detail-orientation and trustworthiness).

As hypothesized, age was significantly positively associated with whether an autistic adolescent worked. Older autistic adolescents may be more mature and had more opportunities to enhance job-related skills through experience and services (e.g., vocational rehabilitation; Chen et al., 2015). In addition, more work opportunities are available to older adolescents due to child labor laws restricting the types of work and working hours of youth, particularly those under the age of 16 (Hindman, 2016; Pollack et al., 1990).

Consistent with findings from previous studies with autistic adults (Chen et al., 2015; Eilenberg et al., 2019; Hendricks, 2010; Shattuck et al., 2012), this study indicated that autistic youth from lower income households were less likely to have engaged in paid work in the previous 12 months. This disparity may be due to families from lower socioeconomic backgrounds having fewer resources and connections to work opportunities for their autistic adolescents, as well as more limited access to services which could improve employment outcomes (Chiang et al., 2013; Shattuck et al., 2012). Research has consistently demonstrated that autistic adults from lower income families are less likely to be able to access vocational services (Chen et al., 2015; Chiang et al., 2013; Shattuck et al., 2012), and vocational services

are associated with improved employment outcomes for autistic individuals (Chen et al., 2015; Kaya et al., 2016).

Aligned with predictions, parent-rated autism severity was related to whether an autistic adolescent worked; moderate and severe autism as compared to mild autism was associated with decreased odds of having worked for pay. Autism severity likely impacts an autistic adolescent's ability to obtain and maintain paid work. Autistic adults have identified social difficulties during the interview process as a significant barrier to employment (Giarelli et al., 2013). Autistic adults have additionally reported challenges with maintaining employment due to workplace social communication differences (e.g., misunderstanding verbal instructions and nonverbal social cues), as well as difficulties with adapting to changes in the workplace (Müller et al., 2003). Studies with autistic adults have further indicated that greater autism characteristics, such as evidenced by more social skills differences, is associated with worse employment outcomes (Chen et al., 2015; Chiang et al., 2013). Autistic individuals with higher levels of autism characteristics (e.g., communication differences) may be more likely to have unmet vocational support needs and/or to experience anti-autistic bias when attempting to seek and maintain employment (Chen et al., 2015; Müller et al., 2003).

As hypothesized, co-occurring ID was significantly negatively associated with past-year paid work of autistic adolescents. The additional cognitive, communication, and behavioral impairments associated with ID likely exacerbate challenges autistic adolescents experience at work and negatively impact work opportunities (American Psychiatric Association, 2022; Chen et al., 2015). For example, an autistic adolescent with co-occurring ID would likely have more difficulty understanding work instructions and problem solving in response to changes at work

than an autistic adolescent without ID, depending upon the job type, setting, and/or supports. Previous research has found that autistic adults with ID were less likely to be employed than autistic adults without ID (Chiang et al., 2013; Howlin et al., 2004, 2005).

The current study adds to the existing literature base as it is the first investigation to compare work participation across autistic and typically developing adolescents and to examine characteristics associated with autistic adolescents' work participation in a large, population-based sample inclusive of autistic youth with varying levels of support needs. However, several limitations should be noted. Given the nature of the NSCH questionnaire, all measures were caregiver-report, including diagnoses of autism and other neurodevelopmental disorders; verification of diagnoses by records or instruments were not available. Future research would also benefit from inclusion of continuous measures of autism characteristics, support needs, and intellectual functioning. In addition, the authors did not have detailed information regarding the work experiences of autistic youth beyond the dichotomous responses of whether the adolescent worked for pay during the past 12 months. Future research should explore additional variables, such as job type, frequency, duration, and quality of work experience, as well as paid vs. unpaid work, which will likely vary based on clinical and demographic characteristics of youth. Furthermore, while Giarelli et al. (2013) included autistic adolescent voices in their investigation, future studies would benefit from qualitative work to provide a nuanced understanding of the unique perspectives, experiences, and needs of autistic adolescents regarding employment.

Limitations related to the sample also warrant discussion. As the NSCH employs an address-based sampling method, the findings do not capture the experiences of homeless or

transient families. Additionally, although the NSCH is a large, national survey, there was little diversity within specific racial identity categories. As such, the race variable was dichotomized to White/non-White, limiting the information that could be learned about potential disparities in employment based on race among autistic youth. As suggested by Budavari and colleagues (2022), future research should recruit a more diverse sample of autistic adolescents to explore this question in greater depth.

Overall, the study results indicate that autistic adolescents, especially those who are younger, from lower income backgrounds, have more severe parent-reported autism, and/or have co-occurring ID, are less likely to experience the benefits of work during adolescence. As such, practitioners and policy makers should consider promoting paid work experiences at younger ages for autistic individuals, which may involve an increased focus on paid work as part of high quality pre-employment transition services and/or earlier initiation of vocational rehabilitation services. In addition, vocational services should be individualized to the autistic youth's unique profile of strengths and challenges. For example, the autistic young person may demonstrate a strong attention to detail and excel at repetitious tasks with which their neurotypical coworkers struggle. The same autistic adolescent may benefit from direct instruction in communicating with coworkers and supervisors due to social interaction differences. While prior research has primarily focused on employment experiences and outcomes for autistic adults, findings of the current study indicate that discrepancies in rates of work begin at earlier ages. As such, future research is needed to identify and address barriers to employment that are specific to autistic youth, while also considering clinical and demographic characteristics associated with lower rates of employment. Such studies may contribute to

greater opportunities for vocational experiences earlier in life, thus increasing preparation for the transition to adulthood and improving long-term career trajectories.

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Table 1.

Sample characteristics

	Typically developing	Autistic	Other neurodevelopmental
	<i>M (SD)/Frequency</i>	<i>M (SD)/Frequency</i>	<i>M (SD)/Frequency</i>
n	39,968	1,681	9,376
Age	14.71 (1.70)	14.62 (1.66)	14.64 (1.71)
Sex			
Male	47.49%	79.60%	60.37%
Female	52.51%	20.40%	39.63%
Race			
White	77.61%	79.89%	80.73%
Black/African American	6.64%	7.14%	7.25%
American Indian/Alaska Native	0.78%	0.83%	0.97%
Asian	6.18%	3.33%	2.13%
Native Hawaiian/Other Pacific Islander	0.46%	0.24%	0.28%
Some other race	2.18%	1.25%	1.71%
Two or more races	6.15%	7.32%	6.93%
Household income ^a	299.92 (119.32)	272.36 (127.29)	282.74 (125.76)
Intellectual disability		19.34%	4.28%
Autism severity			
Mild		53.69%	
Moderate		36.04%	
Severe		10.27%	
Paid work	49.38%	22.01%	44.27%

^aIncome of household as percentage of federal poverty threshold

Table 2. Binary multiple logistic regression results examining associations between paid work and demographic and clinical characteristics of autistic adolescents

	<i>B</i> (SE)	OR (95% CI)	<i>p</i>
Age	.45 (.04)	1.57 (1.44-1.70)	<.001
Sex ^a	.11 (.16)	1.11 (.81-1.51)	.504
Race ^b	.21 (.17)	1.23 (.88-1.74)	.230
Household income ^c	.00 (.00)	1.00 (1.00-1.00)	.038
Intellectual disability	-1.21 (.25)	.30 (.18-.48)	<.001
Autism severity ^d			
Moderate	-.60 (.14)	.55 (.42-.73)	<.001
Severe	-2.43 (.52)	.09 (.03-.25)	<.001

^aReference category = male

^bReference category = non-White

^cIncome of household as percentage of federal poverty threshold

^dReference category = mild