Research Article

Stuttering and Labor Market Outcomes in the United States

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Purpose: The purpose of this study was to quantify relationships between stuttering and labor market outcomes, determine if outcomes differ by gender, and explain the earnings difference between people who stutter and people who do not stutter.

Method: Survey and interview data were obtained from the National Longitudinal Study of Adolescent to Adult Health. Of the 13,564 respondents who completed 4 waves of surveys over 14 years and answered questions about stuttering, 261 people indicated that they stutter. Regression analysis, propensity score matching, and Blinder–Oaxaca decomposition were used.

Results: After controlling for numerous variables related to demographics and comorbidity, the deficit in earnings

associated with stuttering exceeded \$7,000. Differences in observable characteristics between people who stutter and people who do not stutter (e.g., education, occupation, self-perception, hours worked) accounted for most of the earnings gap for males but relatively little for females. Females who stutter were also 23% more likely to be underemployed than females who do not stutter.

Conclusions: Stuttering was associated with reduced earnings and other gender-specific disadvantages in the labor market. Preliminary evidence indicates that discrimination may have contributed to the earnings gap associated with stuttering, particularly for females.

Over 90% of jobs in the United States require some amount of verbal communication (Dangermond, 2015). Employers rate verbal communication as the most important skill for job candidates (National Association of Colleges and Employers, 2016). Given the link between verbal communication and employment, we were interested in examining the relationship between oral communication disorders and occupational success. For the present investigation, we focused on stuttering and its relationships with labor market outcomes.

With a prevalence rate of approximately 1%, it is estimated that three million people stutter in the United States (Bloodstein & Bernstein Ratner, 2008; C. A. Boyle et al., 2011; A. Craig, Hancock, Tran, Craig, & Peters, 2002). Stuttering is a complex neurodevelopmental disorder that manifests in observable disruptions of speech fluency (e.g., sound/syllable repetitions and sound prolongations) as well as a host of cognitive and affective phenomena

(Bloodstein & Bernstein Ratner, 2008; Smith, Kelly, Curlee, & Siegel, 1997; Yaruss & Quesal, 2006). Many people with persistent stuttering also develop negative thoughts, attitudes, and emotions related to their ability to speak and their sense of efficacy as a communicator (A. Craig, Blumgart, & Tran, 2009; Manning, 2010; Ornstein & Manning, 1985). Considering the ubiquitous nature of communication, speaking differences and difficulties due to stuttering could influence labor market outcomes.

Labor Market Experiences of People Who Stutter

People who stutter (PWS) report encountering difficulties in the labor market in several qualitative and survey research studies (Bricker-Katz, Lincoln, & Cumming, 2013; C. Butler, 2014; A. R. Craig & Calver, 1991; Crichton-Smith, 2002; Hayhow, Cray, & Enderby, 2002; Klein & Hood, 2004; McAllister, Collier, & Shepstone, 2012; Palasik, Gabel, Hughes, & Rusnak, 2012; Rice & Kroll, 1994, 1997). In a survey study conducted by Klein and Hood (2004), 40% of the 232 PWS polled agreed that their job choice and earnings were negatively affected by stuttering. Similarly, 70% of participants reported that they believed their chances of being hired or promoted were reduced because of stuttering.

Several factors may contribute to occupational hardships associated with stuttering. Differences in demographic

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characteristics and educational attainment between PWS and people who do not stutter (PWNS) are two potential sources of hardship. Some direct (C. A. Boyle et al., 2011; N. R. Butler, Peckham, & Sheridan, 1973) and indirect (McAllister et al., 2012) evidence indicates that PWS are more likely to come from families with lower socioeconomic statuses or less parental education, but results from other studies indicate that this may not be the case (Keating, Turrell, & Ozanne, 2001; McKinnon, McLeod, & Reilly, 2007; Richels, Johnson, Walden, & Conture, 2013). The relationship between stuttering and educational attainment is also unclear, with some studies indicating that there is little to no difference in educational outcomes between PWS and PWNS (McAllister et al., 2012; Rees & Sabia, 2014) and one study indicating that educational attainment decreases as stuttering severity increases (O'Brian, Jones, Packman, Menzies, & Onslow, 2011).

Negative consequences of stigma associated with stuttering may also contribute to difficulties in the workplace. Current theories indicate that stigma occurs in at least two forms, public stigma and self-stigma (Corrigan, Larson, & Rüsch, 2009). Consequences of both forms of stigma may negatively impact labor market outcomes of PWS. Studies investigating perceptions of PWS in the workplace provide examples of the potential negative impact of public stigma (e.g., Gabel, Blood, Tellis, & Althouse, 2004; Hurst & Cooper, 1983). In Hurst and Cooper's (1983) study with 644 employers, 84% indicated that stuttering decreases a person's employability at least somewhat, 40% reported that stuttering interferes with promotion opportunities, and 43% agreed that PWS should seek employment where little speaking is required. PWS may also inhibit their own occupational success by applying public stigma associated with stuttering to themselves (e.g., "I am less competent because I stutter") and then behaving in ways that are consistent with their own self-stigma at work (e.g., "I am less competent because I stutter, and therefore I won't accept this promotion"). Some PWS report that they declined job offers and promotions because of their stuttering; others report that stuttering affected the type of occupation in which they were employed (M. P. Boyle, 2013, 2015).

Is There Quantifiable Evidence for Inequity in Labor Market Outcomes Between PWS and PWNS?

Although results from several studies indicate that PWS may be vulnerable to occupational hardships, there has been only one large-scale investigation of stuttering and labor market outcomes. McAllister et al. (2012) performed a secondary analysis on a large longitudinal data set that followed 18,558 British residents from the age of 16 years through adulthood. The authors found no association between stuttering and length of unemployment between leaving school and the age of 23 years, hourly pay at the age of 23 or 50 years, or having a job of lower socioeconomic status at the age of 23 years. The only association between stuttering and labor market outcomes was that, compared

with PWNS, PWS had jobs of lower socioeconomic status at the age of 50 years. The results from McAllister et al. are not consistent with findings from the qualitative and survey literature indicating that PWS encounter significant hardships in the labor market. Potential limitations inherent to the data set and methods of analysis in McAllister et al. warrant further investigation on the topic of stuttering and labor market outcomes.

First, the data set in McAllister et al. (2012) did not contain information on certain potentially important outcome variables, such as labor force participation and underemployment. Labor force participation measures whether a person is either employed or at least actively searching for a job while unemployed. Whereas being unemployed indicates that a person is without a job but actively looking for one, being out of the labor force indicates that an individual may have become discouraged and quit searching for a job altogether. Underemployment measures what type of job a person of a given skill or educational level ultimately obtains. As an outcome variable, underemployment indicates if individuals hold jobs that are typical for their education levels. If a person is overeducated relative to his or her job, then that may suggest that the person had difficulty being hired for other jobs more typical for his or her educational level.

These two variables may be important for capturing occupational disadvantages associated with stuttering. Many PWS believe that stuttering decreases their probability of being hired (Klein & Hood, 2004). Hardship related to being hired for a job could manifest in PWS becoming discouraged and quitting the job search. If this is true, then labor force participation may be a better measure of occupational hardship than length of unemployment. As another example, underemployment may capture hardships better than a measure of job socioeconomic status. In McAllister et al. (2012), job socioeconomic status was based on a 6-point scale: 1 = *unskilled*, 2 = *semiskilled manual*, 3 = *skilled manual*, 4 = *skilled nonmanual*, 5 = *intermediate*, and 6 = *professional*. These skill-based occupation categories likely have strong correlations with educational attainment. Therefore, they may be more indicative of the relationship (or lack thereof) between stuttering and educational attainment than the relationship between stuttering and labor market hardships. Thus, using underemployment to analyze whether PWS have a higher educational level compared with what is typical for their job would be a more direct indicator of labor market hardships.

Second, it is possible that the outcome variable for earnings in McAllister et al. (2012) lacked the level of sensitivity necessary to detect differences in earnings between PWS and PWNS. The investigators opted to recode the continuous hourly earnings variable into a dichotomous variable, indicating only whether the respondents earned above or below the average hourly wage in the data. The use of a continuous earnings variable could allow for a more comprehensive analysis of earnings along the entire wage distribution and could capture associations between stuttering and earnings that might be missed if earnings

were recoded into a dichotomous variable. The dichotomous variable from McAllister et al. only identified earnings differences between PWS and PWNS to the extent that PWS were much more (or less) likely to have below-average earnings. A continuous earnings variable analysis could capture more subtle earnings differences between PWS and PWNS. Even if PWS are not more or less likely to end up in one half of the earnings distribution versus the other, there could still be differences in earnings between PWS and PWNS who are in the same half of the earnings distribution.

The Current Study

The current study is the first quantitative investigation of relationships between stuttering and adult labor market outcomes in the United States. Data for this study come from the National Longitudinal Study of Adolescent to Adult Health (Add Health)—a large data set containing information from 20,745 respondents. Compared with the data set in McAllister et al. (2012), the Add Health data set allows for an analysis of a more recent birth cohort and includes novel labor market outcomes.

The statistical approach in the current study improves the methods of McAllister et al. (2012). Consistent with the methods in the British investigation, we use regression analysis to quantify differences in labor market outcomes associated with stuttering. We also use propensity score matching to increase the rigor of data analysis. In a study on associations between stuttering and educational attainment, Rees and Sabia (2014) found that significant results obtained with regression analysis were attenuated when propensity score matching was used. The authors described propensity score matching as a conservative approach that may account for more of the heterogeneity that is often difficult to measure between PWS and PWNS.

In addition to quantifying differences in labor market outcomes, we aimed to uncover potential sources of disparity between PWS and PWNS. After finding a significant difference in annual earnings, we used Blinder–Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973) to analyze the relationship between earnings differences associated with stuttering and other characteristics in the data. Blinder–Oaxaca decomposition separated the earnings gaps between PWS and PWNS into the fraction that could be explained statistically by differences in observable characteristics (e.g., education, occupation, self-perception, hours worked) versus the fraction that was unexplained. In studies on gender- and race-related earnings differences (N. Fortin, Lemieux, & Firpo, 2011; O'Neill & O'Neill, 2006), unexplained differences in earnings are often interpreted as being related to employer discrimination. Yet, unexplained differences also subsume variation in earnings due to differences in other unobservable characteristics between groups.

To understand the unique experiences of males and females who stutter and to eliminate gender as a confounding variable, we conducted analyses separately by gender. A gender-focused analysis is warranted because some evidence indicates that labor market outcomes associated with

stuttering may differ between males and females. Compared with females, males who stutter perceive that stuttering has a stronger negative impact on labor market outcomes (Klein & Hood, 2004). McAllister et al. (2012) combined males and females together in their analysis and included gender as a covariate to control for the relationship between gender and stuttering as well as gender and labor market outcomes. This produced an average association between stuttering and labor market outcomes across genders, but it may have masked any differences that existed in the association between genders. In the current study, we compared outcomes of PWS only with outcomes of PWNS of the same gender.

In summary, the current study was the first large-scale investigation of the associations between stuttering and labor market outcomes in the United States and was conducted with multiple statistical techniques using many nuanced labor market variables. The following research questions guided the study:

1. Are there differences in labor market outcomes (earnings, employment, labor force participation, underemployment, receipt of public assistance) between males who stutter and males who do not stutter in the data set?
2. Are there differences in labor market outcomes between females who stutter and females who do not stutter?
3. If a significant difference in earnings associated with stuttering for males and/or females exists, what factors (e.g., demographics, education, type of occupation, stigma) contribute to the difference and to what extent?

Method

Data Set

Data for this study came from the Add Health data set. Add Health is an ongoing longitudinal study following a nationally representative sample of adolescents who were in Grades 7–12 during the 1994–1995 school year in the United States. The study is being conducted by researchers at the Carolina Population Center at the University of North Carolina at Chapel Hill. Add Health combines longitudinal survey data on respondents' social, economic, psychological, and physical well-being with contextual data on family, neighborhood, community, school, friendships, peer groups, and romantic relationships. Participant responses from the Add Health survey have been used to study the relationships between labor market outcomes and a variety of worker characteristics, including obesity (Norton & Han, 2008), attractiveness (J. M. Fletcher, 2009), adolescent depression (J. Fletcher, 2013), attention-deficit/hyperactivity disorder (ADHD; J. M. Fletcher, 2014), and migraine headaches (Rees & Sabia, 2015). This data set was also used by Rees and Sabia (2014) to quantify relationships between stuttering and educational outcomes.

The Add Health cohort has been followed into young adulthood through four in-home interviews (Waves 1–4), with the most recent in 2008 when the respondents were aged 24–32 years. During Wave 1 of the in-home interviews, a core sample of 12,105 children and adolescents were randomly selected from 132 schools. In addition, the survey was given to every student enrolled at 16 of the 132 schools. Supplemental samples of students were selected with a special emphasis on collecting information from ethnic minorities, siblings, and students with physical disabilities, bringing the total number of respondents to 20,745. For additional information on the Add Health sampling process, see <http://www.cpc.unc.edu/projects/addhealth/design>.

Three subsequent waves of follow-up in-home interviews have been conducted since the initial wave. Wave 2 was conducted 1 year after the first wave, during the 1995–1996 school year. Wave 3 occurred in 2001–2002, when respondents were between 18 and 26 years old. The most recent wave of data collection, Wave 4, occurred during 2007–2008 when respondents were 24–32 years old and included detailed labor market information.

Inclusion Criteria

Participants for this study were 13,654 people who responded to the question “Do you have a problem with stuttering or stammering?” in both Waves 3 and 4 of the Add Health study. Of the sample, 3.96% of respondents were initially included in the group who stutters because they answered “yes” to this question in Wave 4. To eliminate respondents who intentionally or unintentionally misidentified as having a problem with stuttering, the group who stutters was further restricted to include only respondents who answered “yes” to this question in both Wave 3 and Wave 4 surveys. With the additional restriction, 1.91% of the respondents, or 261 respondents, were included in the group who stutters for the final analyses.

The prevalence of stuttering in the Add Health data set exceeds the commonly accepted 1% estimate (see Bloodstein & Bernstein Ratner, 2008, for a review), but it is consistent with results from some epidemiological studies indicating that the prevalence of stuttering may be higher than 1% (C. A. Boyle, Decoufle, & Yeargin-Allsopp, 1994; Gillespie & Cooper, 1973; Leske, 1981). Within the group who stutters, the male-to-female gender ratio was 1.84:1, which is similar to the 2.2:1 ratio among adults who stutter reported in A. Craig et al.’s (2002) epidemiological study. In a follow-up question, approximately 84% of respondents described their stuttering as “mild”; 15%, as “moderate”; and less than 1%, as “severe.”

Outcome Variables

The labor market outcome variables in this study included a continuous variable for annual earnings and indicator variables for employment, labor force participation, underemployment, and receipt of public assistance. Survey responses for each of these variables were obtained from Wave 4.

Annual Earnings

The annual earnings data came from the following question: “Now think about your personal earnings. In [previous year], how much income did you receive from personal earnings before taxes, that is, wages or salaries, including tips, bonuses, and overtime pay, and income from self-employment?”

Employment

If respondents indicated that they worked for pay for at least 10 hours per week at the time they participated in the survey, they were coded as employed.

Labor Force Participation

Respondents were coded as participating in the labor force if they indicated that they worked for pay for at least 10 hours per week or that they were unemployed but actively searching for a job.

Underemployment

Underemployment was determined by comparing each respondent’s reported level of educational attainment in Wave 4 with the most common educational level for his or her specific occupation. Data on the distribution of educational levels associated with each occupation came from the Bureau of Labor Statistics. If a respondent had a higher level of education than the most common level of education for that occupation, then the respondent was coded as underemployed.

Receipt of Public Assistance

Respondents were considered to have received public assistance if they indicated that they had ever been enrolled in a public assistance program, such as welfare.

Demographic Covariates

Demographic covariates included the respondents’ individual and family background characteristics and comorbidity statuses. Individual characteristics were respondents’ age, gender, race, ethnicity, attractiveness (as rated by interviewers), height, and weight obtained at Wave 4. Family background characteristics were respondents’ parental income, parental marital status, and parental educational level reported at Wave 1.

To control for difficult-to-measure differences in school and neighborhood quality, the school that the respondent was enrolled in during Wave 1 was included as a fixed effect. In the analyses, fixed effects change the reference group for each PWS from every other person in the sample to only people in the sample from the same Wave 1 school. Fixed effects produce what is known as a “within transformation” of the variables, in which variables are transformed to represent deviations from the average level of each variable within the unit of the fixed effect. Thus, by including school fixed effects in the analysis, the annual earnings variable was transformed to represent how much more or less earnings a respondent makes compared with the average level

of earnings for other respondents from the same school. Similar transformations occur for all other variables in the analysis. Fixed effects are useful for controlling for unobservable differences between respondents that may be fixed within Wave 1 schools. For example, students from a school that serves high-socioeconomic status students may not be the ideal comparison group for students from a school that serves low-socioeconomic status students. Differences in socioeconomic status are likely associated with disparity in abilities, skills, resources, and parental support that are unobservable in the data set. By only comparing PWS with PWNS from the same school, we control for more potential biases and generate a more reliable control group.

Consistent with the methods from Rees and Sabia (2014), we also included information about comorbid ADHD and learning disability statuses as demographic covariates. This is relevant because stuttering can co-occur with other speech, language, and learning problems. Estimates of the prevalence of concomitant ADHD in children who stutter range from 4% to 26% (Arndt & Healey, 2001; Conture, 2001; Riley & Riley, 2000). This is a larger range than the 5%–11% nationally reported range for children in the United States (American Psychiatric Association, 2013; Visser et al., 2014). Some evidence indicates that comorbidity of stuttering and language disorders and learning disabilities may also be higher than in the general population (Arndt & Healey, 2001; Blood, Ridenour, Qualls, & Hammer, 2003).

Respondents were coded as exhibiting attention-deficit disorder (ADD) or ADHD if they responded in the affirmative to the following question at Wave 4: “Has a doctor, nurse, or other health care provider ever told you that you have or had attention problems or ADD or ADHD?” Similarly, respondents were coded as exhibiting a learning disability if, at Wave 1, their parents or guardians responded that the child exhibited “a specific learning disability, such as difficulties with attention, dyslexia, or some other reading, spelling, writing, or math disability.”

Labor Market Covariates

To better understand and potentially explain why differences in labor market outcomes between PWS and PWNS might be occurring, we obtained additional data on labor market characteristics including respondents' educational levels, occupations, and hours worked per week. We also used responses to five items in the Wave 4 Personality Section as a proxy for the potential role of self-stigma.

Education

At Wave 4, respondents reported their educational levels as less than high school, high school, some college, college, or more than college.

Occupation

We accounted for the contribution of occupation, or specific job worked, to the annual earnings difference between PWS and PWNS by including fixed effects for

each occupation. Similar to the school fixed effects, occupation fixed effects transformed the variables to represent the amount of earnings, demographic covariates, education, and so forth relative to other respondents with the same occupation. Therefore, we were able to account for the contribution of occupation to the earnings difference between PWS and PWNS by calculating the change in the earnings difference between PWS and PWNS when the comparison group changed from all respondents to only respondents with the same occupation.

Self-Stigma

Some PWS report that stuttering-related self-stigma decreases the likelihood that they opt to work jobs that require talking or accept promotions (M. P. Boyle, 2015). If this is the case, then it is important to account for self-stigma as a potentially contributing factor to differences in labor market outcomes associated with stuttering. Similar to the approach other authors have used to account for the role of self-esteem in labor market outcomes (N. M. Fortin, 2008; Heckman, Stixrud, & Urzua, 2006), we used responses from five self-perception items in Wave 4 of the Add Health data to serve as a proxy measure of self-stigma. These Likert-scale questions gauging agreement/disagreement were selected because they align closely with documented stereotypes about PWS including that they are “quiet” (“I don’t talk a lot”), “nervous” (“I am relaxed most of the time”), “lacking assertion” (“I keep in the background”), “avoidant” (“I go out of my way to avoid having to deal with the problems in my life”), and “insecure” (“You feel you are just as good as other people”).

Responses to each of these items from both PWS and PWNS were recoded into a binary variable (1 or 0), with 1 indicating that the respondent provided an answer that aligned with the stereotype. Then, a chi-square test of independence was performed to examine the relationship between group membership (PWS or PWNS) and response type (consistent with stereotype, inconsistent with stereotype) for each of the five survey items. Compared with PWNS, PWS were significantly more likely to respond to survey questions in ways that were consistent with all five stuttering-related stereotypes. Compared with PWNS, PWS were more likely to agree or strongly agree with the statements “I don’t talk a lot,” $\chi^2(1, N = 13,005) = 16.30, p < .01$; “I keep in the background,” $\chi^2(1, N = 12,992) = 21.32, p < .01$; and “I go out of my way to avoid having to deal with problems in my life,” $\chi^2(1, N = 13,000) = 21.82, p < .01$, and more likely to disagree or strongly disagree with the statements “I am relaxed most of the time,” $\chi^2(1, N = 13,004) = 6.51, p < .05$, and “You feel you are just as good as other people,” $\chi^2(1, N = 13,017) = 38.64, p < .01$. Means and standard deviations for responses to each item are displayed in Table 1.

We cannot claim that the differences in self-perceptions observed between PWS and PWNS in the data were due to stuttering-related self-stigma specifically. It was not feasible to develop a scale specifically designed to measure stuttering-related self-stigma because we were analyzing a preexisting

Table 1. Descriptive statistics.

Variables	People who do not stutter				People who stutter			
	Male (<i>n</i> = 6,315)		Female (<i>n</i> = 6,988)		Male (<i>n</i> = 169)		Female (<i>n</i> = 92)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Outcome variables								
Annual earnings (\$10,000s)	4.21	5.02	2.93	3.90	3.36	7.77	1.91	1.57
Employed	0.85	0.36	0.74	0.44	0.78	0.41	0.69	0.47
In labor force	0.94	0.24	0.82	0.38	0.88	0.33	0.79	0.41
Underemployed	0.49	0.50	0.51	0.50	0.54	0.50	0.62	0.49
Received public assistance	0.16	0.37	0.27	0.44	0.24	0.43	0.43	0.50
Personal covariates								
Age	30.16	1.75	29.97	1.74	30.39	1.71	30.07	1.78
Black	0.20	0.40	0.24	0.42	0.24	0.43	0.33	0.47
Native American	0.01	0.12	0.02	0.12	0.04	0.20	0.03	0.18
Asian	0.07	0.26	0.06	0.24	0.06	0.24	0.07	0.25
Other race	0.08	0.28	0.08	0.27	0.12	0.33	0.09	0.28
Hispanic	0.16	0.37	0.15	0.36	0.21	0.41	0.22	0.41
Very unattractive	0.02	0.15	0.03	0.18	0.03	0.17	0.01	0.10
Unattractive	0.05	0.21	0.04	0.20	0.05	0.21	0.12	0.33
Average attractiveness	0.51	0.50	0.44	0.50	0.56	0.50	0.55	0.50
Attractive	0.34	0.47	0.38	0.48	0.30	0.46	0.26	0.44
Very attractive	0.08	0.26	0.11	0.31	0.07	0.25	0.05	0.23
Height (feet)	5.81	0.26	5.36	0.23	5.80	0.23	5.38	0.26
Weight (pounds)	201.3	49.16	172.7	50.19	201.1	46.21	175.3	50.20
Family income as adolescent (\$10,000s)	4.66	4.48	4.76	5.64	3.99	3.78	3.80	4.31
Parent: married	0.73	0.44	0.72	0.45	0.66	0.47	0.62	0.49
Parent: less than high school	0.18	0.39	0.22	0.41	0.28	0.45	0.29	0.46
Parent: high school	0.26	0.44	0.25	0.43	0.26	0.44	0.30	0.46
Parent: some college	0.31	0.46	0.29	0.45	0.26	0.44	0.32	0.47
Parent: college	0.15	0.36	0.15	0.35	0.14	0.35	0.06	0.23
Parent: more than college	0.10	0.30	0.10	0.30	0.06	0.24	0.03	0.18
ADHD	0.06	0.24	0.03	0.18	0.11	0.31	0.09	0.28
Learning disability	0.15	0.36	0.08	0.27	0.26	0.44	0.24	0.43
Labor market covariates								
Less than high school	0.09	0.29	0.06	0.24	0.12	0.32	0.13	0.34
High school	0.19	0.40	0.13	0.34	0.22	0.42	0.18	0.39
Some college	0.43	0.49	0.44	0.50	0.49	0.50	0.52	0.50
College	0.19	0.39	0.21	0.41	0.14	0.34	0.08	0.27
More than college	0.10	0.30	0.15	0.36	0.04	0.19	0.09	0.28
Weekly hours	43.91	11.70	38.95	15.50	42.06	13.65	40.28	9.81
Don't talk a lot	0.30	0.46	0.19	0.39	0.40	0.49	0.26	0.44
Not relaxed	0.10	0.30	0.18	0.39	0.16	0.37	0.27	0.45
Keep in background	0.26	0.44	0.23	0.42	0.40	0.50	0.30	0.46
Avoid problems	0.20	0.40	0.18	0.39	0.36	0.48	0.21	0.41
Not as good	0.18	0.39	0.23	0.42	0.36	0.48	0.37	0.49

Note. Summary statistics are based on a subset of the restricted-use version of the Add Health data, consisting of 13,654 people in Wave 4. ADHD = attention-deficit/hyperactivity disorder.

data set. We do, however, interpret the differences in self-perception as related to stuttering because the survey questions align with common stereotypes about PWS and because PWS were significantly more likely to provide responses consistent with stereotypes. By including responses to these items in the analysis, we attempted to account for the role that self-stigma could play in labor market differences between PWS and PWNS.

Statistical Analyses

Statistical analyses included descriptive statistics, ordinary least squares regressions, probit model regressions, propensity score matching, and Blinder–Oaxaca decomposition.

The descriptive statistics in Table 1 present a simple summary of differences in outcome variables and demographic and labor market covariates between PWS and PWNS by gender.

To replicate the approach of Rees and Sabia (2014), regression analysis and propensity score matching were used to quantify the effect of stuttering on labor market outcomes. Regression analysis is commonly used to estimate unknown parameters in a linear model, which represent the relationship between a given dependent variable and many independent variables. In this study, we used ordinary least squares regression to quantify the relationship between stuttering and the continuous variable of annual earnings, with controls added for demographic covariates including respondents' age,

gender, race, ethnicity, attractiveness, height, weight, parental income, parental marital status, parental educational level, and comorbid ADHD and learning disability statuses and fixed effects for school and neighborhood quality. Probit models are a type of regression used in analyses that contain a binary dependent variable. We used probit model regressions with the same controls to quantify the relationships between stuttering and binary outcome variables including employment, labor force participation, underemployment, and receipt of public assistance.

To increase the rigor of data analysis, propensity score matching was also used to quantify the effect of stuttering on labor market outcomes. Rees and Sabia (2014) found that using propensity score matching attenuated relationships between stuttering and education outcomes that were significant when regression analysis was applied. Propensity score matching can produce more reliable estimates than regression analysis if the two groups being compared (i.e., PWS and PWNS) lack similarity in other characteristics or if there are certain characteristics that strongly predict which group a respondent will belong in (Rosenbaum & Rubin, 1983). The propensity score matching procedure first estimated the probability, or propensity, that each respondent in the data set was a person who stutters, on the basis of his or her other observable characteristics. Then, nearest neighbor matching with replacement was used to match each PWS in the data set to three people who did not stutter but who had similar estimated propensities to stutter on the basis of their demographic and comorbidity characteristics. Finally, labor market outcomes were compared between the PWS in the data set and their matches. Consistent with the methods in Rees and Sabia (2014), we limited the sample to matches whose estimated propensity scores were within 0.004 percentage points and dropped the 2% of PWS whose propensity score was furthest from the propensity score of their nearest match.

After quantifying differences in labor market outcomes between PWS and PWNS using regression analysis and propensity score matching, we then used Blinder–Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973) to account for potential sources of the difference in annual earnings between groups. Blinder–Oaxaca decomposition parsed the total difference in annual earnings into the proportion explained by differences in observable covariates between the two populations (i.e., PWS and PWNS) and the proportion explained by differences in the effect of those covariates on earnings between the two populations. For this analysis, we added controls for labor market covariates to account for their respective roles in explaining some of the differences in earnings associated with stuttering.

Blinder–Oaxaca decomposition worked by estimating two different regression models: one for PWS and one for PWNS. Each model controlled for the same covariates, which included demographic and labor market covariates. Once the model made separate estimates for each group, the levels of the covariates and the estimated coefficients associated with those covariates were used to predict annual earnings for each group. Then, the effect of differences in

the levels of covariates between PWS and PWNS was estimated by replacing the covariate levels for PWNS with the covariate levels for PWS to get a predicted level of annual earnings. Any differences in predicted earnings that occurred in this step were due only to differences in the level of the covariates, because the coefficients from the PWNS model were held constant. The impact of differences in coefficients was observed by examining how the predicted annual earnings changed when the coefficients from the PWS model were replaced with those from the PWNS model. Any difference in predicted earnings at this step was due to differences in coefficients, which represented the returns, in terms of earnings, to each covariate.

Differences in the values of observable covariates represent the “explained” proportion of the annual earnings difference, whereas differences in the returns of those covariates represent the “unexplained” proportion of the earnings difference. The unexplained difference is often interpreted as being related to employer discrimination, although it also subsumes variation in earnings due to differences in other unobservable characteristics between groups. This approach is commonly used to account for potential sources of earnings differences associated with gender and race in analyses of data sets that contain several potential control variables. See O’Neill and O’Neill (2006) for an example of decomposition methods applied to gender and racial earnings differences and N. Fortin et al. (2011) for a detailed overview of decomposition methods.

In the current study, the total difference in annual earnings between PWS and PWNS was decomposed into the explained proportion because of differences in background (age, race, ethnicity, attractiveness, height, weight, parental income, parental educational level, parental marital status), comorbidity (ADHD and learning disabilities), and labor market (education, self-stigma, occupation, and weekly hours) covariates and into the unexplained proportion, which may be related to discrimination. Then, we further decomposed the explained proportion to identify the unique and relative contribution of the individual demographic, comorbidity, and labor market covariates. This provided a detailed account of the relative contribution of each of the covariates to the proportion of the difference in annual earnings that was explained.

Results

Descriptive Statistics

Table 1 displays descriptive statistics for outcome variables and demographic, comorbidity, and labor market covariates for PWS and PWNS by gender. The PWS in the data set appear to be at least minimally disadvantaged in all labor market outcome variables. On average, males who do not stutter earned approximately \$42,100 in annual earnings, and males who stutter earned \$33,600. Following a similar pattern, females who do not stutter earned approximately \$29,300 annually, and females who stutter earned \$19,100. Compared with the sample of PWNS, PWS in the

data set were descriptively more likely to have ADHD and/or a learning disability, to come from families with lower incomes, and to report lower levels of educational attainment.

Quantifying the Difference in Labor Market Outcomes

Regression analyses and propensity score matching were used to assess the relationships between stuttering and annual earnings, employment status, labor force participation, underemployment, and receipt of public assistance. Regression analysis included controls for demographic and comorbidity variables, and results are displayed in Table 2 by gender. Column 1 compares males who stutter with males who do not stutter in the data set, and Column 2 compares females who stutter with females who do not stutter. For brevity, only the coefficient for the stuttering variable is shown. Propensity score matching results are displayed in a similar format in Table 3. The first column for males and for females shows the mean difference in outcomes between PWS who are in the matched sample and all PWNS. This column shows a greater number of statistically significant differences because it pools all PWS and PWNS together and does not control for any demographics or comorbidities. The second column for each group shows the mean difference in outcomes between each PWS and only the PWNS to whom they are matched on the basis of observable demographic and comorbidity characteristics. The second column

represents an alternative test strategy to the regression results in Table 2. The finding that some labor market outcomes lose statistical significance from the first to second columns indicates that part of the difference in these variables between PWS and PWNS was explained by differences in demographics and comorbidities between groups.

Regression results in Table 2 indicate that, as a group, both males and females who stutter earned significantly less in annual earnings than their fluent counterparts ($p < .05$). The earnings gap associated with stuttering was \$7,627 for males ($p < .05$) and \$7,154 for females ($p < .05$). In contrast to the results in Rees and Sabia's (2014) study on differences in education outcomes associated with stuttering, the difference in annual earnings between males and females who stutter and their fluent counterparts remained significant when a second statistical method, propensity score matching, was applied. In fact, propensity score matching results yielded larger estimates of the difference in annual earnings associated with stuttering for both males and females. On the basis of propensity score matching results in Table 3, males who stutter earned, on average, \$10,766 less than males who do not stutter ($p < .05$) and females earned \$18,712 less than females who do not stutter ($p < .01$) annually. Regression results indicated that males who stutter were also 8.1% less likely to be participating in the labor force ($p < .05$) than males who do not stutter. Propensity score matching results indicated that females who stutter were 23.2% more likely to be underemployed than females who do not stutter ($p < .01$).

Table 2. Ordinary least squares and linear probability model estimates of the effect of stuttering on labor market outcomes.

Outcome variables	Male	Female
Panel 1: annual earnings		
PWS	-7,628* (3,574)	-7,154* (3,518)
<i>n</i>	2,747	2,511
<i>n</i> (PWS)	71	30
Panel 2: employed		
PWS	-0.071 (0.048)	-0.022 (0.073)
<i>n</i>	3,534	4,318
<i>n</i> (PWS)	107	62
Panel 3: in the labor force		
PWS	-0.081* (0.033)	-0.086 (0.061)
<i>n</i>	3,641	4,317
<i>n</i> (PWS)	107	62
Panel 4: underemployed		
PWS	0.004 (0.064)	0.146 (0.091)
<i>n</i>	4,293	5,025
<i>n</i> (PWS)	118	65
Panel 5: public assistance receipt		
PWS	0.036 (0.051)	0.078 (0.055)
<i>n</i>	4,410	5,134
<i>n</i> (PWS)	126	68

Note. Each panel-by-column is a separate regression. Standard errors (shown in parentheses) are clustered by school of residence in Wave 1. All estimates are based on weighted regression using the Add Health weights. PWS = person who stutters.

* $p < .05$.

Explaining the Differences in Annual Earnings

With controls added for demographics and comorbidities, results from regression and propensity score matching analyses indicated that stuttering was associated with a significant reduction in annual earnings for both males and females. To investigate potential sources of the differences in earnings between PWS and PWNS, we used Blinder–Oaxaca decomposition. Results from the Blinder–Oaxaca decomposition are displayed separately by gender in Table 4.

The first purpose of the Blinder–Oaxaca decomposition was to decompose, or parse, the total difference in annual earnings between PWS and PWNS into two components: the “explained” proportion and the “unexplained” proportion. The explained proportion results from differences in covariates between PWS and PWNS, and the unexplained proportion results from differences in earnings that exist even when the covariates for PWNS are used for PWS.

To decompose the annual earnings gap, the Blinder–Oaxaca decomposition method first quantified the total unconditional difference in annual earnings between PWS and PWNS or the mean difference in annual earnings calculated using regression with only a group indicator for stuttering. In the “Total difference” row of Table 4, the values in the first columns for “Male” and “Female” display the total difference in annual earnings between PWS and PWNS separately for each gender. Without any covariates in the model, males who stutter earned \$10,213 less

Table 3. Propensity score matching estimates of the effect of stuttering on labor market outcomes.

Outcome variables	Male		Female	
	Unmatched	PSM	Unmatched	PSM
Panel 1: log hourly earnings				
PWS	−10,931* (5,168)	−10,766** (3,528)	−12,043* (4,836)	−18,712** (4,088)
<i>n</i>	2,649	268	1,946	81
<i>n</i> (PWS)	67	67	27	27
Panel 2: employed				
PWS	−0.100** (0.035)	−0.073 (0.047)	−0.114 (0.056)	−0.094 (0.073)
<i>n</i>	3,562	400	4,198	228
<i>n</i> (PWS)	100	100	57	57
Panel 3: in the labor force				
PWS	−0.082** (0.023)	−0.047 (0.035)	−0.080 (0.049)	−0.076 (0.065)
<i>n</i>	3,562	400	4,197	228
<i>n</i> (PWS)	100	100	57	57
Panel 4: underemployed				
PWS	0.050 (0.047)	0.073 (0.056)	0.126* (0.065)	0.232** (0.074)
<i>n</i>	4,202	440	4,916	236
<i>n</i> (PWS)	110	110	59	59
Panel 5: public assistance receipt				
PWS	0.083* (0.034)	0.071 (0.045)	0.223** (0.054)	0.099 (0.073)
<i>n</i>	4,315	468	5,023	256
<i>n</i> (PWS)	117	117	64	64

Note. Each panel-by-column is a separate analysis. Standard errors (shown in parentheses) are clustered by school of residence in Wave 1. All estimates are based on weighted regression using the Add Health weights. PSM = propensity score matching; PWS = person who stutters. * $p < .05$. ** $p < .01$.

in annual earnings than males who do not stutter ($p < .01$), and females who stutter earned \$12,678 less than females who do not stutter ($p < .01$).

The next step of Blinder–Oaxaca decomposition was to parse the total annual earnings difference associated with stuttering into explained and unexplained proportions. Results for males, displayed in Table 4, indicate that a significant portion of the earnings gap associated with stuttering (89%) was explained ($p < .05$) or driven by differences in observable characteristics between groups and 11% of the total gap was unexplained. For females, the pattern was

reversed, with a significant portion of the earnings gap (64%) unexplained ($p < .01$) and 36% explained by differences in observable characteristics between females who stutter and females who do not stutter.

The second purpose of the Blinder–Oaxaca decomposition was to account for the extent to which each covariate (demographics, comorbidity, education, self-stigma, occupation, weekly hours) contributed to the explained proportion of the annual earnings gap associated with stuttering for males and females. Of the \$9,163 explained difference in annual earnings between males who stutter and

Table 4. Blinder–Oaxaca decomposition results for people who stutter by gender.

Earnings decomposition	Male		Female	
	Amount of earnings gap due to differences in characteristics	Percentage of total earnings gap	Amount of earnings gap due to differences in characteristics	Percentage of total earnings gap
Total difference	\$10,213.78	100.00	\$12,678.44	100.00
Explained	\$9,163.19	89.71	\$4,561.31	35.98
Background	\$1,644.43	16.10	\$ −94.52	−0.75
Comorbidities	\$30.30	0.03	\$751.93	5.93
Education	\$1,256.72	12.30	\$2,564.54	20.23
Self-stigma	\$1,715.04	16.79	\$443.75	3.50
Occupation	\$3,418.65	33.47	\$1,489.33	11.75
Weekly hours	\$1,098.05	10.76	\$ −593.71	−4.68
Unexplained	\$1,050.59	10.29	\$8,117.13	64.02

Note. “Background” includes the following variables: age, race, ethnicity, attractiveness, height, weight, and parental income, marital status, and educational level.

males who do not, approximately 33% was accounted for by differences in occupation; 16%, by background characteristics; 17%, by self-stigma (or self-perception differences, more generally); 12%, by education; and 11%, by weekly hours worked. That is, males who stutter worked lower-paying occupations; had poorer background characteristics (e.g., parental income), higher levels of self-stigma, and lower levels of education; and worked fewer weekly hours than males who do not stutter, and these differences in characteristics contributed to the explained proportion of the earnings gap. Another interpretation of these findings (using education as an example) is that, if males who stutter in the data set had the same level of education as males who do not stutter, the \$1,257 difference in earnings explained by education would no longer exist.

Of the \$4,561 explained difference in annual earnings associated with stuttering for females, approximately 20% was accounted for by differences in education; 12%, by occupation; 6%, by comorbidities; and 3%, by self-stigma. In other words, lower levels of education, lower-paying jobs, higher likelihood of attentional or learning comorbidities, and higher levels of self-stigma among females who stutter contributed to the explained earnings difference. Unlike the result for males, the number of weekly hours worked contributed negatively to the explained gap in earnings for females who stutter. This means that, on average, females who stutter worked more hours than females who do not stutter in the data set. It also means that, if females who stutter were not working more weekly hours than females who do not stutter, the disparity in annual earnings would become greater—increasing by approximately \$594 annually.

Discussion

In the current study, we conducted the first quantitative investigation of labor market outcomes associated with stuttering in the United States. We provide evidence that stuttering is associated with significant disadvantages in labor market outcomes. Males and females who stutter earned significantly less in annual earnings compared with their fluent counterparts. Males who stutter were also less likely to be participating in the labor force according to regression analysis, and females who stutter were more likely to be underemployed according to propensity score matching. We provide evidence that discrimination contributes to the earnings gap associated with stuttering, particularly for females. The results are preliminary due to threats from unobserved heterogeneity, but controlling for numerous variables relevant to labor market outcomes (e.g., demographics, comorbidities, occupation, and education) helps to alleviate concerns that the remaining unexplained differences in labor market outcomes associated with stuttering are entirely driven by differences in other unobserved characteristics.

First, we discuss the sources that contributed to the disparity in earnings between PWS and PWNS, emphasizing how sources of disparity differ by gender. Then, we

juxtapose our findings with results from McAllister et al. (2012) and provide potential explanations why labor market outcomes associated with stuttering differ between the two studies. Last, we discuss implications of the main findings and provide recommendations to improve occupational experiences for PWS.

Sources of the Earnings Disparity Associated With Stuttering

A novelty of the current study is that, after quantifying differences in labor market outcomes between PWS and PWNS, we used Blinder–Oaxaca decomposition to explain why the disparity in earnings associated with stuttering existed. The magnitude of the earnings gap associated with stuttering and the sources that contributed to the earnings disparity differed between males and females. For females, the earnings gap associated with stuttering was larger and a greater proportion of the earnings gap was unexplained.

For both males and females, differences in education and occupation between PWS and PWNS accounted for relatively large proportions of the disparity in earnings. Although the proportions of the earnings gap accounted for by differences in education and occupation are “explained” differences, it is possible that discrimination also contributed in these domains. For education, it could be that stuttering itself decreased the ability or motivation to achieve higher levels of education among PWS in the data set. However, it could also be that stuttering-related discrimination or lack of appropriate accommodations in the academic setting stunted achievement. For example, the academic success of PWS may have been jeopardized if teachers had low expectations for them to achieve, restricted their opportunities to participate in class, or did not intervene if they observed stuttering-related bullying.

In the occupation domain, there is evidence that stuttering influences job choices among PWS (M. P. Boyle, 2013, 2015; C. Butler, 2014). Specifically, some PWS intentionally seek out jobs that require less verbal communication or are lower in socioeconomic status (C. Butler, 2014). Yet, there is also evidence that employers restrict PWS’s occupational opportunities through role entrapment, particularly in hiring and promotion decisions (Gabel et al., 2004; Hurst & Cooper, 1983; Klein & Hood, 2004). McAllister et al. (2012) also noted the potential role of employer discrimination in labor market outcomes among PWS. If stuttering-related discrimination affects educational outcomes or results in restricted employment opportunities, it is possible that the true influence of discrimination on annual earnings for PWS is underestimated in the current model.

Differences in self-perceptions associated with stuttering (or, cautiously, self-stigma) also explained a relatively large proportion of the earnings gap, but only for males. Compared with their fluent counterparts, males and females who stutter were both more likely to report that they perceived themselves as quiet, nervous, passive, avoidant, and insecure. Females who stutter reported higher

levels of self-stigma than males who stutter on most of the self-perception items, but differences in self-perception associated with stuttering only accounted for a sizable proportion of the earnings gap for males. This may be explained by the fact that, compared with the trends among females, self-perceptions were more discrepant between males who do and do not stutter. Descriptively, on four of the five self-perception items, the difference in average scores between people who do and do not stutter was greater among males than females.

The larger discrepancy in self-perceptions between males who do and do not stutter is consistent with C. Butler's (2014) hypothesis that males who stutter may have more difficulty coping with stuttering or "not sounding right." She proposed that the act of stuttering and the stereotypes associated with stuttering contradict social norms of traditional masculine verbal communication. In the workplace, status and power are inferred by not only what people say but also how they say it and, specifically, what they sound like (Tannen, 1995). Social norms dictate that males' communication should be directive (Aries, 1987), assertive (Gallois, Callan, & Palmer, 1992), and aggressive (Pierce, 1996). The added pressure to "sound right" at work may result in self-stigmatizing attitudes weighing more heavily on day-to-day communication decisions for males than for females. In turn, job performance or productivity of males may be influenced by self-perceptions in ways that jeopardize occupational success more frequently (e.g., avoiding phone conversations at work) and result in earning less money. This notion also aligns with existing evidence that, compared with females who stutter, males who stutter are less likely to disagree that "stuttering interferes with job performance" and that they "would be better at their job if they did not stutter" (Klein & Hood, 2004, p. 263). Difficulties coping with self-perceptions that do not align with masculinity norms in the workplace may also explain why males who stutter were 8% less likely to be participating in the labor force than their fluent counterparts, according to regression analysis—a finding that was not significant for females.

Finally, compared with males who stutter, females who stutter are less likely to believe that stuttering adversely impacts occupational experiences (Klein & Hood, 2004); however, results from the current study do not provide evidence supporting that this difference in perceptions is true. In fact, females who stutter in the data set were more disadvantaged relative to their fluent counterparts than males who stutter in two labor market outcomes—underemployment status and annual earnings. These findings are particularly striking given that, regardless of stuttering, females in the general population are already more likely to be underemployed and have lower earnings compared with males (Altonji & Blank, 1999). It seems that females who stutter may be vulnerable to "double discrimination" (Lloyd, 1992). That is, even when compared with females in the general population (a group already documented as marginalized in the labor market), females who stutter were still significantly disadvantaged.

The finding that females are particularly vulnerable to disability-related discrimination is supported by literature both within and outside the field of speech-language pathology. Byrd, McGill, Gkalitsiou, and Cappellini (2017) proposed that one explanation for harsher perceptions of females who stutter could stem from misconceptions about the cause of stuttering. Nearly half of people who are unfamiliar with stuttering believe that it is psychogenic in nature (Van Borsel, Verniers, & Bouvry, 1999). In addition, PWS are commonly stereotyped as unintelligent (Kalinowski, Stuart, & Armson, 1996; Silverman & Bonge, 1997; Silverman & Paynter, 1990). Research from the psychology literature provides evidence that females with intellectual disabilities experience harsher social penalties than their male counterparts (Coleman, Brunell, & Haugen, 2015). Byrd et al. argued that, if people who are unfamiliar with stuttering assume that it is psychological in nature or that it negatively impacts intelligence, the stigmatization associated with stuttering may be more consequential for females than for males.

Relation to McAllister et al.'s Results

The results from the current study indicate that PWS face greater hardships on the labor market than previously reported in McAllister et al. (2012), who found only an association between stuttering and job socioeconomic status at the age of 50 years. There are several possible explanations for the discrepancy in results between studies, two of which we explore here. It could be that PWS in this specific American data set were more disadvantaged in the workplace than PWS in the British data set. It is also possible that similar disadvantages in the labor market did exist among the British respondents but went undetected in McAllister et al.'s study.

Compared with PWS in the American data set, PWS in the British data set may not have been as disadvantaged if there was less stigma associated with stuttering due to cultural or geographic differences at the respective times of data collection. If stuttering was not as stigmatized in Britain at the time of the study, labor market outcomes of PWS may have been unaffected or it may have taken longer for the consequences of stigma to significantly alter labor market outcomes. The latter interpretation would be consistent with the British investigators' finding of no difference in job socioeconomic status at the age of 23 years but statistically significant differences at the age of 50 years. Negative perceptions of stuttering may not have been strong enough to prevent many British PWS from obtaining an initial job in early adulthood; yet, they may have been strong enough to interfere with occupational mobility and promotion opportunities over the course of a few decades. By the time British PWS were 50 years old, enough of them may have been exposed to the negative effects of stigma at some point in their lives to result in a significant difference in job socioeconomic status.

Differences in economic climates at the times of data collection may have also contributed to stronger negative associations between stuttering and labor market outcomes

among PWS in the United States. Add Health Wave 4 data were collected during 2007–2008, with most interviews occurring during 2008. This coincides with the Great Recession, which, according to the National Bureau of Economic Research, began in December 2007 and lasted until June 2009. The Great Recession negatively impacted employment and earnings for many workers, and people with disabilities were particularly vulnerable to occupational hardship (Fogg, Harrington, & McMahon, 2010). If PWS were disproportionately more likely to lose their jobs or promotion opportunities during the Great Recession, then the magnitude of occupational disadvantage associated with stuttering may be larger than what is typical during times of greater economic stability. However, if PWS were more likely to be negatively impacted by an unstable economic climate, this itself would be evidence that PWS are treated differently and face unique hardships in the labor market in the United States.

Another explanation for the discrepancy in findings between studies is that significant differences in labor market outcomes did exist among the British respondents but went undetected because of limitations inherent to the data set and statistical approach used in McAllister et al. (2012). McAllister et al. did not have outcome measures for labor force participation or underemployment, which were two of the main outcomes associated with stuttering in the current analysis. Furthermore, it is possible that a significant relationship between stuttering and earnings among the British cohort was masked by the specifications of the statistical analysis. In addition to using a dichotomous earnings variable, which may have lacked the sensitivity necessary to detect a true difference in earnings, McAllister et al. opted to control for the respondents' highest academic qualification in the earnings analysis. It could be that attainment of academic qualifications is a channel through which stuttering impacts earnings. If this is the case, including highest qualification as a control may have resulted in overcontrolling and, in turn, attenuated a potential relationship between stuttering and earnings.

Finally, the way gender was incorporated into statistical analyses in McAllister et al. (2012) may have reduced the likelihood of uncovering existing relationships between stuttering and labor market outcomes. Results from the current study indicate that stuttering is associated with heterogeneous effects by gender. This finding is consistent with previous evidence that perceptions of how stuttering impacts labor market outcomes differ between males and females (Klein & Hood, 2004). McAllister et al. pooled observations for both genders, which might have masked these heterogeneous effects, even when gender was used as a control variable.

Implications of Main Findings

The findings in this study provide new evidence that stuttering is associated with quantifiable occupational disadvantages in the United States. Here, we discuss three implications to improve occupational experiences for PWS.

First, although there are organizations that lobby for equal opportunities for people with many types of disabilities in the United States, no such organization exists for PWS. The Employers Stammering Network (<http://www.stammering.org/esn>) is a model of an organization that promotes equal opportunity in the labor force for PWS in Britain. If a similar organization existed in the United States, employers might be more educated about stuttering and PWS might be more empowered to improve their labor market experiences and outcomes.

Second, speech therapy for PWS is typically not covered by federal or private insurance companies in the United States. Thus, paying for speech therapy is a financial burden for many PWS (Blumgart, Tran, & Craig, 2010; Zebrowski, 2016). Increased access to affordable speech therapy could improve labor market outcomes for PWS by providing them with opportunities to improve their communication skills and reduce self-stigmatizing attitudes.

Last, speech-language pathologists should ensure that stuttering therapy focuses not only on modifying speech behaviors and communication attitudes but also on developing self-advocacy skills to reduce the negative consequences of stigma. To promote self-advocacy skills in therapy sessions, speech-language pathologists could (a) educate PWS about the benefits of self-disclosure in reducing negative public attitudes associated with stuttering (M. P. Boyle, Dioguardi, & Pate, 2016; Byrd et al., 2017) and (b) encourage PWS to advocate for reasonable accommodations at work (e.g., increased time limits for oral presentations).

Strengths, Limitations, and Future Directions

The strengths of this study include the large sample size and use of multiple statistical approaches and an interdisciplinary research team, which included three speech-language pathologists and an economist. Because we conducted a secondary analysis of an existing data set, the measure of stuttering in this study was based on self-report survey questions. It is possible that the group who stutters contains fluent speakers who misidentified as having a problem with stuttering. Thus, results may reflect labor market outcomes associated with perceived problematic disfluency, including people with typical and stuttering-like disfluencies. Considering that 84% of respondents described their problem with stuttering as “mild,” it is likely that the current results best represent labor market outcomes associated with mild disfluency. Additional research on stuttering severity and labor market outcomes is warranted.

The validity of the self-stigma proxy measures is a potential criticism of the study methodology. We cannot claim that the differences in self-perceptions between PWS and PWNS (as measured by responses to survey items) were entirely due to stuttering-related self-stigma. However, because self-stigma is problematic for many PWS at work (M. P. Boyle, 2013, 2015) and because there were significant differences in responses to the survey items between PWS

and PWNS, we elected to include the items in the final analysis. In addition, not attempting to account for the role of self-stigma in the analysis would likely inflate the unexplained proportion of the earnings gap or the proportion that may be interpreted as related to discrimination.

Influence from unobservable variables is a threat to the results of any correlational study. Thus, we controlled for several variables that are often difficult to account for by including fixed effects for school and occupation as well as covariates for perceived attractiveness, parental marital status, self-stigma, and so forth. Nonetheless, caution should be taken before interpreting a causal relationship between stuttering and labor market outcomes on the basis of these results. Future work with other data sets or methods that can further address potential unobserved heterogeneity would be beneficial.

Given the significant disparity in labor market outcomes and heterogeneous differences by gender found in this study, a closer look at employer–employee relationships is warranted. The Add Health data do not have information on employer characteristics, but future research could investigate whether employer–employee dynamics, such as employer familiarity with PWS or the respective gender of the employer and employee, affects labor market outcomes of PWS. Understanding how employer–employee dynamics affect labor market outcomes for PWS could help inform how the impact of stuttering in the workplace can be mitigated.

Conclusion

In the United States, employers rate verbal communication as the most important skill for job candidates. PWS report experiencing hardships in the labor market, and this study provides quantitative evidence supporting their claims. A significant gap in annual earnings existed between PWS and PWNS in the data set. Preliminary evidence indicates that discrimination may be contributing to the earnings gap, particularly for females who stutter. Compared with their fluent counterparts, females who stutter were also 23% more likely to be underemployed.

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