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Adult Perceptions of Children with Dyslexia and Intellectual Disability in  
the US

A Thesis submitted in partial satisfaction of the requirements for the degree of  
Master of Arts in Psychological Sciences by Anabel Castillo

Committee in charge:

Professor Jeffrey Gilger, Chair  
Professor Jan Wallander  
Professor Linda Cameron

2017



The thesis of Anabel Castillo is approved, and it is acceptable in quality and form  
for publication on microfilm and electronically:

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## Abstract

### Adult Perceptions of Children with Dyslexia and Intellectual Disability in the US

by Anabel Castillo for the partial satisfaction of the requirements for the degree of  
Master of Arts in Psychological Sciences University of California, Merced 2017  
Dr. Jeffrey Gilger, Chair

This study examined adult perceptions of two developmental disabilities: dyslexia (DYX) and Intellectual Disability (ID). Participants ( $n=1258$ ) recruited through Mechanical Turk answered survey questions pertaining to symptoms, views, and possible causes of DYX and ID compared with obesity (OB) as a comparison condition. Exploratory factor analysis revealed 5 distinct factors across all three conditions: (1) psychosocial causes, (2) external causes, (3) biological causes, (4) consequence, and (5) controllability. Ethnic, gender and parental status (parent or nonparent) differences towards DYX and ID perceptions were examined. Three-way ANOVAs indicated effects of ethnicity, gender, and parental status on perceptions. Males endorsed psychosocial and external causes more often than females. Those who self-identified as Asian viewed DYX and ID as more highly controllable in comparison to Whites. Additionally, results revealed a three-way interaction regarding controllability, which suggests that Asian fathers and Hispanic mothers more often believe that a child with DYX can control his/her condition. Understanding the public's perceptions about developmental disorders helps distinguish accurate from erroneous beliefs. Furthermore, understanding differences that may exist in particular groups can help implement targeted actions to improve awareness, care, and interventions for families.

## Introduction

In the United States (US), 35% of children served under the Individuals with Disabilities Education Act (IDEA) have been diagnosed with a specific learning disability, and another 6.6% with intellectual disability (U.S. Department of Education, 2015). A specific learning disability, as well as intellectual disability, can affect basic skill development in areas of listening, talking, reading, writing, spelling, and arithmetic, these disorders can also adversely affect school and career success (Cortiella, 2014; Graziano, 2002), which, in turn, can lead to lower rates of high school completion and college enrollment, and put adults at higher risk for unemployment and lower wage rates (Cortiella, 2014; Queirós, Wehby, & Halpern, 2015).

Although there are federal laws and policies aimed at protecting individuals with intellectual and developmental disabilities (U.S. Department of Education, 2015; The Arc, 2017), misconceptions about these individuals persist and may have unintended consequences (Siperstein, Parker, Bardon, & Widaman, 2007). Negative perceptions and misconceptions towards individuals that have a disability may affect the success of inclusion policies (Scior, 2011). For instance, despite more students with disabilities attending college, they continue to be at a higher risk for unemployment, and are believed to be the largest minority with an economic disadvantage in the US (Meyers & Lester, 2016).

Perceptions towards people with disabilities may not only impact the success of inclusion policies but also may impact family planning and health care decisions. Perceived causes and assumed characteristics of childhood conditions provide the basis of beliefs about intervention and treatment (see Danesco, 1997 for a review). For example, families may employ alternative medical treatments due to personal health beliefs, whether they are accurate or not (Levy & Hyman, 2003). In addition, causal beliefs about a child's disability may even impact healthcare decisions for the family as a whole. For example, parents who believed that their child's autism spectrum disorder (ASD) was associated with immunizations often withheld or delayed immunizations for their other children (Harrington, Rosen, & Garnecho, 2006). Causal beliefs have also been associated with stigma toward the individual with the disability. For instance, Boyle (2016) found that psycho-behavioral causal beliefs for stuttering lead to more blame, higher levels of anger, and stereotypes toward people who stutter.

### **Perceptions of Developmental Disabilities**

Several studies have examined perceptions of specific developmental disabilities such as ASD and attention deficit hyperactivity disorder (ADHD) (Dardennes, Al Anbar, Prado-Netto, Kaye, Contejean, & Al Anbar, 2011; Furnham & Sarwar, 2011; Goin-Kochel, Mire, & Dempsey, 2015; Goin-Kochel, & Myers, 2005). However, far fewer studies have examined perceptions of developmental disabilities such as, dyslexia (DYX) or intellectual disability (ID).

**Perceptions of Dyslexia.** Past research regarding DYX has primarily focused on educator knowledge of DYX and the effect of teachers' attitudes towards DYX (Gibbs & Elliot, 2015; Gwernan-Jones, & Burden, 2010; Hornstra, Denessen, Bakker, van den Bergh & Voeten, 2010; Soriano-Ferrer, Echegaray-Bengoa, & Joshi, 2016; Wadlington, & Wadlington, 2005; Washburn, Binks-Cantrell, & Joshi, 2014). While it seems educators hold accurate knowledge about DYX, common misconceptions about the causes and characterization (e.g., DYX is a deficit in visual processing and a hallmark symptom of DYX is letter reversals) remain among educators (Wadlington, & Wadlington, 2005; Washburn, Binks-Cantrell, & Joshi, 2014). Such misconceptions may influence individual attitudes and perceptions of children with DYX. For example, students with DYX received a lower rating of writing achievement from teachers who

held a more negative implicit attitude toward DYX (Hornstra et al., 2010). In a British sample, the majority of participants believed that dyslexia is caused partly by genetic and not completely by neurobiological factors (Furnham, 2013). The authors conclude that lay British people show a modest understanding of DYX because participants were reluctant to view DYX as a complex multi-causally determined disability (Furnham, 2013).

**Perceptions of Intellectual Disabilities.** A systematic review on public awareness, attitudes, and beliefs about ID shows that public knowledge of ID is under-researched and only five studies have looked at the causal beliefs concerning ID (Scior, 2011). Conversely, the majority of this research focuses on social inclusion attitudes toward individuals with ID (Scior, 2011; Siperstein, Norins, Corbin, & Shriver, 2003). Siperstien and colleagues (2011) have found that middle school-aged youth in China and the US hold negative perceptions toward students with ID. This in turn may explain the lack of support for the inclusion of students with ID in their academic classes and can explain the disposition of not wanting to interact with students with ID at school (Siperstein Parker, Norins, & Widaman, 2011). Among high school students, female students and students who reported more frequent contact with students with ID were significantly more accepting of students with ID (Krajewski & Flaherty, 2000).

### **Differences Among Perceptions of Developmental Disabilities**

While it is important to become aware of perceptions that exist towards developmental disabilities, it is also important to become aware of differences in perception that may exist among groups. Some groups or individuals may be more at risk for misconceptions than others. For instance, ethnic differences exist in the way in which parents view the cause of their children's mental health problems (Yeh, Hough, McCabe, Lau & Garland, 2004), and minority groups are less likely to endorse biopsychosocial beliefs about mental illnesses (Yeh et al., 2004). With regard to DYX, Furnham (2013) found participants who self identified with left wing political ideology and who were familiar with at least one person with DYX were less likely to endorse biological beliefs about DYX. Additionally, individuals with higher education, females, and younger people tend to have more positive attitudes towards individuals with ID, though gender is not a consistent effect across studies (Scior, 2011).

### **Current Study**

Although studies have explored attitudes and beliefs towards ID and DYX, there is no research to date on the perceptions of the general US population toward children with DYX and ID. It is imperative to be aware of the beliefs and potential misconceptions that the general public may have towards these developmental disabilities because they may form the basis for discrimination (Klein & Hood, 2004), influence the success of inclusion policies (Scior, 2011), and result in stigmas that tend to lead to social rejection (Gilmore, 2010; Boyle, 2016). Additionally, this information may aid in our understanding of how society views developmental disabilities in general, which in turn, can help guide interventions, treatment decisions, and the appraisal of the challenges a child may face (Hebert & Koulouglioti, 2010).

Thus, the current study aims to provide a more comprehensive review of the general public's perceptions of DYX and ID. Specifically, this study explores common beliefs about symptoms, causes, and general views of DYX and ID, in comparison to a non-cognitive condition (i.e., Obesity). We also conduct a finer-grained analysis of beliefs by examining how gender, parental status, and ethnicity effect perceptions toward DYX and ID as prior research suggests that gender, parental status, and ethnic differences may play a role in how these conditions are perceived (see Furnham, 2013; Scior, 2011; Yeh et al., 2004).

## Method

### Participants

Participants were recruited through Amazon's Mechanical Turk (MTurk, <http://www.mturk.com>). The questionnaire was made available to U.S residents only, resulting in 1,258 participants completing the questionnaire on perceptions about developmental disabilities and obesity. The majority of participants were between 21 and 40 years old (77%), and self identified as white (66%). Thirty-eight percent of participants obtained a bachelor's degree and 21% reported having 'some college credit.' Participants belonged to a wide range of household income categories (less than 25,000 to 149,999). Forty-five percent of participants reported having a child, and of those, 12% indicated having a child with a learning disability (see Table 1).

### Materials

The design and themes of the questionnaire were in part based on The Revised Illness-Perception Questionnaire (IPQ-R; Moss-Morris et al., 2002), containing five distinct categories: (1) 10 items on basic demographics (age, marital status, income, etc.) that were rated either by multiple or binary choice, (2) 3 items used to assess familiarity and awareness of the condition (e.g., have you heard of this condition before, etc.) that were binary: yes or no, (3) 16 items about symptoms associated with the condition (e.g., deficits in reading, attention, etc.) that were rated on a three point scale: often, sometimes, rarely, (4) 15 items concerning possible etiologies of the condition (vaccines, will of god, heritability, etc.) that were rated on a three point scale: often, sometimes, rarely, and (5) 17 items regarding general views (risk factors, general controllability, life course, etc.) about the condition that were rated on a three point scale: true, sometimes true, not true.

Participants were asked to complete these items regarding DYX and ID. In addition, Obesity (OB) was included as a comparison condition because it has received a great deal of press and has been associated with health and developmental challenges. Further, OB was selected as a well-known non-cognitive condition for comparison within the context of health implications. We also assessed perception of four other disabilities including attention hyperactivity deficit disorder, speech disorder, spoken language disorder, and autism as part of a larger ongoing study. However, the data reported here will focus only on DYX, ID and OB because of the limited amount of studies that have examined perceptions towards these conditions with an American sample.

### Procedure

Issues regarding confidentiality and study procedures were explained, and informed consent was obtained by all participants online. Through a function on MTurk, restrictions for individuals outside of the U.S. The survey was administered by Qualtrics survey software through Mturk. On Mturk, "requesters" (researchers) can create and post "HITS" (surveys, experiments) for "workers" (participants) that get paid upon successful completion of HITS (see Mason & Suri, 2012 for details). Participants for this study received \$1.50 after successfully completing of the questionnaire. The procedures of the study were approved by the University of California, Merced Institutional Review Board. After obtaining informed consent, participants were asked to answer basic demographic questions (education level, age, gender, etc.). Next, participants were randomly assigned to answer questions about three of the six developmental disabilities addressed in the full research program, and all participants concluded the survey by answering questions about the control condition (OB). Randomization of which

disability a participant responded to was administered through a built-in setting on Qualtrics. Participants were asked questions about half of the disorders (3 out of 6; with all answering questions about OB) in order to minimize fatigue. The questions were identical for each condition.

On average, participants took 20 minutes to complete the questionnaire. A total of 646 responses were received for DYX and 636 for ID. All 1,258 responders answered questions about OB. The Qualtrics survey software randomization setting aims to evenly present all conditions across all participants. Had more participants had been recruited, we would have eventually reached an equal distribution of responders across conditions, but discontinuing data collection at 1,258 participants, caused a slightly uneven distribution of the samples.

### **Data analyses**

SPSS (IBM, Version 22.0) was used for all analyses. There were a large number of items in the survey, and to reduce this number and help improve the stability of scores for respondents, we ran exploratory factor analysis (EFA) with an extraction method of generalized least squares and a rotation of Promax. EFAs were run on items within the categories of etiologies (15 items) and general views (17 items). The categories of demographics and symptoms do not lend themselves to EFA but their results are described in the sections below.

Categorical EFAs were conducted for each of the three conditions separately. The final item pool for each category was narrowed down from the initial item pool based on factor loadings: if the first EFA iteration indicated that an item had a nonsignificant loading or significantly cross-loaded on a factor, that item was removed, and another EFA iteration was run. The final factor solutions common across conditions were then identified, and named, based on a theoretical interpretation items within each of the five factors yielded: consequence, controllability, psychosocial causes, external causes, and biological causes (see Table 2 for specified items that made up our factors). Due to coding, lower scores indicate more agreement with the question/statement about the condition, and higher scores indicate greater disagreement: 'True' and 'often' were always coded as 1, whereas 'not true' and 'rarely' were always coded as 3. For example, a lower mean controllability score would indicate that the respondent (s) considered a condition to be more controllable. Additionally, a high mean psychosocial causes score would indicate that the respondent (s) rarely considered a condition to be caused by psychosocial factors.

Cronbach alpha values were calculated for each factor, and ranged from .41 to .80. Unstandardized composite scores were then created through SPSS using factor weights. Individual scores were multiplied with the respective factor loading scores and all products were summed to obtain a weighted average score.

Analysis of variance (ANOVA) was used to determine the relationship between composite scores and ethnic groups, parental status, and parent gender for each of the three conditions. Two self-identified ethnic groups did not have a sufficient number to be included in the analyses and were excluded (Native Americans = 16, participants who identified as Other = 15). Thus, the analytical design became a 4 ('White,' 'Hispanic/Latino,' 'Black/African American,' or 'Asian/Pacific Islander') by 2 (male or female) by 2 (respondent is a 'parent' or 'not a parent'). Statistical significance was accepted at the  $p < .05$  level for three-way interactions, simple two-way interactions and main effects. To further examine the main effect of ethnicity, pairwise comparisons were run with a Bonferroni adjustment.

## Results

### Demographics

As shown in Table 1, most participants self-identified as White, were fairly educated, obtaining either a Bachelors' degree or indicated some college level education. The average age range was between 21 and 40 years of age. About half of our participants were parents, and 12% of those parents had a child with a learning disability.

### Symptoms

We asked participants to select the symptoms most often associated with the conditions. It is evident that individuals were distinguishing among these conditions. For instance, participants were aware that children with DYX often have trouble reading and that children with ID often have low intelligence. Although our participants acknowledged correctly the hallmark symptoms of developmental disabilities, they still had some misconceptions. For example, 42% of participants indicated that "trouble with vision" is sometimes a symptom of DYX. The majority of participants indicated that children with OB rarely experience symptoms associated with ID and DYX, although half of participants indicated that children with OB sometimes have "trouble with social relationships".

### Familiarity

At the start of each section for each condition, participants were asked three questions to assess awareness and familiarity of the condition. They were asked whether they have heard of the condition, believe they know what the condition is, and if they themselves or anyone in their family has/had the condition. Nearly 100% were familiar with all three conditions. When asked if they themselves or anyone in their family has/had the condition, responses ranged from 51% for OB, 9% for ID, and 15% for DYX.

### Perceptions by Ethnicity, Gender, and Parental Status

Three-way ANOVAs were conducted to determine the effects of ethnicity ('White', 'Hispanic/Latino', 'Black/African American', 'Asian/Pacific Islander') gender ('Female' and 'Male'), and parental status ('Parent' and 'Nonparent') on perceptions of DYX, ID, and OB on the factor composites as dependent variables.

### Intellectual Disability Perceptions

**ID Psychosocial Causes.** The ANOVA yielded statistically significant main effects for ethnicity,  $F(3,571) = 7.801, p < .001$  and gender  $F(1, 571) = 4.339, p < .05$ . There were no statistically significant two-way or three-way interactions between ethnicity, gender and parental status.

As shown in Table 3 males ( $M = 8.2794, SD = 1.39$ ) considered the cause of ID to be more psychosocial than females ( $M = 8.4359, SD = 1.11$ ). Mean psychosocial causes in the White group were 8.5003 ( $SD = 1.13$ ), 8.4273 ( $SD = 1.26$ ) in the Hispanic group, 7.9010 ( $SD = 1.46$ ) in the Black group, and 7.9335 ( $SD = 1.52$ ) in the Asian group. There was a significant mean difference between Whites and Blacks of .720 95% CI [.139, 1.301],  $p = .007$ , and between Whites and Asians of .696, 95% CI [.216, 1.177],  $p = .001$ . However, the difference between Whites and Hispanics, .055, 95% CI [-.501, .611], was not significant,  $p = 1.000$ . Thus, Blacks and Asians considered psychosocial factors as more important for ID than Whites.

**ID External Causes.** There was a statistically significant simple main effect of ethnicity,  $F(3,571) = 2.895, p < .05$ . Neither parental status nor gender effects were significant. There were no statistically significant two-way or three-way interactions.

No pairwise comparisons achieved conventional levels of significance with Bonferroni correction ( $p < .05$ ), perhaps due to low power. However, the mean trends yielding the overall significant main effect suggests that Blacks are the most likely group to see external factors as important.

**ID Biological Causes.** A three-way ANOVA examining ID biological causes and ethnicity, gender, and parental status revealed no statistically significant main effects or interactions.

**ID Consequences.** A three-way ANOVA examining ID consequences and ethnicity, gender, and parental status revealed no statistically significant main effects or interactions.

**ID Controllability.** There was a statistically significant simple main effect of ethnicity,  $F(3, 571) = 5.821, p < .01$ . There was not a statistically significant gender effect ( $p = .066$ ) nor were there significant two-way or three-way interactions.

Mean controllability scores among White, Hispanic, Black, and Asian groups were 9.5201 ( $SD = 1.69$ ), 9.3203 ( $SD = 1.77$ ), 9.0183 ( $SD = 1.67$ ), and 8.6068 ( $SD = 2.07$ ), respectively. There was a statistically significant mean difference between Whites and Asians of .961 95% CI [.279, 1.642],  $p = .001$ . However, the pairwise differences between the remaining groups were not statistically significant. This suggests that Asians consider ID as more controllable in comparison to Whites.

### Dyslexia Perceptions

**DYX Psychosocial Causes.** As indicated in Table 4, there were statistically significant simple main effects for ethnicity,  $F(3, 606) = 3.734, p < .05$  and gender  $F(1, 606) = 11.065, p < .01$ .

The difference between females and males was .819, 95% CI [.335, 1.302],  $p = .001$ , indicating that males more often saw psychosocial causes as important for DYX. Mean psychosocial causes in the White group were 8.865 ( $SD = .093$ ), 8.886 ( $SD = .301$ ) in the Hispanic group, 8.347 ( $SD = .268$ ) in the Black group, and 8.035 ( $SD = .266$ ) in the Asian group. There was a statistically significant mean difference between Whites and Asians of .830 95% CI [.083, 1.577],  $p = .020$ . There were no statistically significant differences among the remaining groups. Therefore, relative to Whites, Asians appear to attribute more of the DYX cause to psychosocial issues.

There was a significant two-way interaction between gender and parental status,  $F(1, 606) = 5.875, p < .05$ . No other two- or three-way interactions were significant. Bonferroni tests indicated a statistically significant mean difference between females who were parents (mothers) versus males who were parents (fathers): mean difference of 1.415, 96% CI [.630, 2.200],  $p = .000$ . The difference between nonparent females and males, .222, 95% CI [-.342, .787], was not statistically significant  $p = .440$ . The gender effect thus seems to lie only within the parent group (see Table 4, Figure 1) and it suggests that fathers attribute more psychosocial causes to DYX.

**DYX External Causes.** There was a significant main effect of gender,  $F(1, 606) = 5.040, p < .05$ . Males ( $M = 8.4655, SD = 1.13$ ) considered the cause of DYX to be more external than females did ( $M = 8.6258, SD = 1.06$ ). There were no other significant effects or interactions.

**DYX Biological Causes.** A three-way ANOVA examining DYX biological causes and ethnicity, gender, and parental status revealed no statistically significant simple main effects or interactions.

**DYX Consequences.** The ANOVA examining DYX consequences and ethnicity, gender, and parental status revealed significant main effects for ethnicity,  $F(3, 606) = 4.586, p < .01$ .

Mean consequences score in the self identified White group were 4.9112 ( $SD = 1.31$ ), 5.3909 ( $SD = 1.35$ ) in the Hispanic group, 4.9378 ( $SD = 1.52$ ) in the Black group, and 5.4048 ( $SD = 1.42$ ) in the Asian group. After Bonferroni correction, there was a statistically significant mean difference between Whites and Asians of  $-.627$  95% CI  $[-1.163, -.092]$ ,  $p = .012$ . These findings suggest that Asians view the consequences of DYX as less severe than Whites. There were no other statistically significant pairwise differences among the other ethnic group means. There were also no significant interactions in this ANOVA.

**DYX Controllability.** There was a statistically significant three-way interaction between ethnicity, gender and parental status on ID controllability,  $F(3, 606) = 4.729$ ,  $p < .01$ . There was also a statistically significant simple main effect of ethnicity,  $F(3, 606) = 3.342$ ,  $p < .05$ . Pairwise post hoc tests indicated a significant mean difference between Whites ( $M = 6.8565$ ,  $SD = 1.58$ ) and Asians ( $M = 6.5790$ ,  $SD = 1.78$ ) of  $-.661$  95% CI  $[-1.023, -.299]$ ,  $p = .038$ . Thus, Asians view DYX as highly controllable in comparison to Whites. However, there were no other significant pairwise differences among the ethnic groups.

The three-way interaction, though statistically significant, did not lend itself to a multitude of post hoc tests given the small sample size of the cell means. Nonetheless, we graphically present the three-way trend in Figure 2 below that shows a unique interaction which exists between parental status, gender, and ethnicity. An examination of estimated marginal means and Figure 2, suggests that Hispanic mothers and Asian fathers show a different trend than the rest of the groups: Hispanic mothers and Asian fathers more often believe that a child with DYX can control his/her condition.

### **Obesity Perceptions**

**OB Psychosocial Causes.** A three-way ANOVA examining OB psychosocial causes and ethnicity, gender, and parental status revealed no statistically significant interactions or simple main effects.

**OB External Causes.** There was a statistically significant simple main effect of gender,  $F(1, 1179) = 9.100$ ,  $p < .01$ , with females ( $M = 6.0862$ ,  $SD = .73$ ) indicating that external causes are less important than males ( $M = 5.9921$ ,  $SD = .93$ ). No other significant main effects or interactions were found.

**OB Biological Causes.** While there were no significant main effects, there was a significant two-way interaction between ethnicity and parental status concerning OB biological causes,  $F(3, 1179) = 3.280$ ,  $p < .05$ . There was a significant mean difference of  $.850$  95% CI  $[-.124, .1576]$   $p = .022$ , between Asian parents and Asian nonparents, with Asian parents being more likely to believe that biology underlies OB compared to Asian nonparents.

**OB Consequences.** A three-way ANOVA examining OB consequences and ethnicity, gender, and parental status revealed no statistically significant simple main effects or interactions.

**OB Controllability.** A three-way ANOVA examining OB consequences and ethnicity, gender, and parental status revealed no statistically significant simple main effects or interactions.



## Discussion

The present study aimed to add to our understanding of how the general public perceives ID and DYX, and to consider how ethnicity, gender and parental status might modify these perceptions.

It has been hypothesized that a possible reason for the underutilization of mental health services among minorities is mental health etiological beliefs (Yeh et al., 2004). This may manifest in different ways, although contradictory etiological beliefs between provider and patient may impede treatment progress. Also, since minorities are less likely to view behavioral problems as a mental health issue, they may be less likely to seek services (Yeh et al., 2004).

Similarly, Scior (2011) found that gender may also influence an individual's attitudes towards disabilities. Relatedly, Yeh and colleagues (2004) described how ethnic differences influence the way that parents perceive childhood mental health problems. Thus, it is important to identify what etiological beliefs are held among the general public, as well as what factors may influence these perceptions.

The majority of participants in this study indicated that they knew what ID and DYX were (and OB). Additionally, when asked if they themselves or anyone in their family has/had the condition, responses were not too deviant from child and adult population rate estimates for these conditions (U.S. Department of Education, 2015). Therefore, we are adequately confident that our data have some degree of validity.

Results from the present study indicated that Asian males in general were more likely to endorse psychosocial causes towards ID, and Asian fathers specifically were more likely to endorse psychosocial causes towards DYX. While males were more likely to endorse external causes towards DYX in comparison to females, Blacks appeared to be more likely to endorse external causes towards ID in comparison to Whites and Hispanics. With regard to controllability, Asians perceived ID and DYX as highly controllable in comparison to Whites, yet it seemed that Hispanic mothers and Asian fathers perceived DYX in children as highly controllable.

In contrast to other studies (Kisanji, 1995; Mulatu, 1999; Scior, 2011), it is evident that the majority of participants in our sample do not believe that environmental or psychosocial factors are the major causes of developmental disabilities. Work conducted in India found that two common causal beliefs about ID were related to external and psychosocial causes (Madhavan, Menon, Kumari, & Kalyan, 1990). The means across Tables 3-4, which indicate how participants viewed external and psychosocial causes, suggests that the participants did not strongly endorse external or psychosocial causes. Conversely, they were more likely to endorse biological causes for ID. This difference in views may be explained by culture or the attitude changes that have occurred in the nearly 30 years that have passed since Madhavan et al (1990) and may be unique to the U.S.

While psychosocial causes were not a highly accepted causal belief for ID or DYX, we did find gender and ethnic differences in the way in which psychosocial causes were perceived. Males were more likely to endorse psychosocial causes in comparison to females. Decades of research that have explored the relationship between gender and locus control measures suggests that while males and females are both becoming more external in relation to locus control, females tend to be more external than males (Sherman, Higgs & Williams, 1997). While this literature suggests that females blame outside forces more often than males, our study is more consistent with the former finding in the literature, which states that males have a more external

locus of control orientation. For instance, within our study males consistently favor psychosocial and external causes towards ID and DYX in comparison to females

Yet the relationship of assigning cause and gender is even more complicated. With regard to DYX, a two-way interaction between gender and parental status revealed that fathers were more likely to endorse psychosocial causes in comparison to mothers. This finding may suggest that while gender differences exist among how individuals perceive causal beliefs, parental status may have a unique effect in how males perceive causal beliefs. This notion may be supported by the literature on how the experience of becoming a father often changes male perspectives (Chin, Hall & Daiches, 2009).

While most evidence supports genetic and neurological factors as one of the key causal factors of developmental disabilities, minority groups within our sample do not seem to endorse biological causes as often as Whites do. For example, in comparison to Whites, Asians were more likely to endorse psychosocial causes for ID and DYX. Similarly, with regard to ID, Blacks were more likely to endorse psychosocial causes. These findings are consistent with other studies which have found that minorities are more likely to attribute the cause of developmental disabilities to psychosocial factors (Yeh et al., 2004; Stief, 2004; Lawton, Gerdes, Haack, & Schneider, 2014). Therefore, findings from our study and other studies suggest that cultural/ethnic factors may influence the way in which individuals perceive the cause of developmental disabilities.

Apart from perceived causal beliefs, we also found an ethnic difference between the way in which the consequences of having a developmental disability are perceived. Whites were more likely to believe that DYX has more serious consequences (e.g., poverty, criminality) in comparison to Asians. This is in line with previous research on Asian Americans and their perceptions of developmental disabilities in general (Ryan & Smith, 1989), in that Asian Americans recognize a child's disability later compared to non-Asians, and many do not recognize a child's disability at all. Therefore, it is possible that Asians in our sample may not be aware of the consequences of DYX or prefer not to consider them.

The perceived controllability a child has over his/her condition is important to consider, as a child who is seen as having less controllability over his/her condition can likely be expected to receive more assistance than a child who is perceived as having more control. Perceived controllability can also influence how positively/negatively others interact with the afflicted person, including general warmth, providing social-career opportunities, and more (Boyle, 2016; Hughes, Gabel, Irani, & Schlagheck, 2010; Puhl, & Heuer, 2009; Sikorski et al., 2011). With regard to controllability, Asians in our sample were more likely to believe that both ID and DYX were more controllable in comparison to Whites. Additionally, a three-way interaction between ethnicity, parental status, and gender on DYX controllability (see Figure 2) suggested an intricate relationship between ethnicity, parental status and gender in determining perceptions. Future studies should parse out the three-way interaction on DYX perceptions and further explore controllability among an Asian sample. Because perceptions of controllability may be especially relevant to help seeking behaviors, this information may be particularly useful to professionals working with Asian American families that have a child with a developmental disability (Ryan & Smith, 1989).

Moreover, looking at the means of responses of controllability, it is evident that children with ID are viewed to have little controllability over their condition. This mirrors previous research which has found that individuals with ID are perceived as severely less capable in comparison to those without such disabilities (Siperstien et al., 2003).

### **OB as Comparison**

OB was used as a control condition for this study and allowed for a comparison to developmental disabilities because of its widely known nature as a primarily physical and non-cognitive condition. For example, participants' perceptions of OB were uniformly in line with previous research (Tiggemann & Anesbury, 2000). Thus, the comparison with developmental disabilities allowed us to explore variable perceptions across serious childhood maladies that have some clear and different etiological, educational, and career antecedents and consequences.

Our analysis revealed statistically significant differences in the way that participants view ID and DYX compared to the more general consensus for OB. Further, comparing DYX and ID to OB allowed us to check whether participants were paying attention and understanding the questions asked. The similarities and differences between how OB and developmental disabilities were perceived allowed us to better understand perceptions held towards developmental disabilities. Interestingly, a study focusing on a sample from Israel found more negative stereotypes and a lower support of rights towards individuals with ID compared to individuals with a physical disability (Werner, 2014). While our study was looking at general views and perceived causal beliefs, we similarly found discrepancies with how OB was viewed in comparison to developmental disabilities. For instance, our data shows that OB is viewed as highly controllable in comparison to DYX and ID, whereas ID is viewed as least controllable and DYX is viewed as sometimes controllable.

### **Limitations**

Because we used a three-choice response scale, it was difficult to disentangle what participants meant by 'sometimes.' On the one hand, this option could be interpreted as an indication by a subject that he/she was "undecided." On the other hand, this choice may reflect an accurate and balanced view that the conditions are rarely purely true or not true.

We also used a convenience sample that included only those in the U.S. with computers and access to Amazon Mturk. While this was a limitation, it should be noted that Mturk is becoming an increasingly popular Web-based data-collection site used by researchers (Buhrmester, Kwang & Gosling, 2011). Mturk samples are often more demographically diverse than typical American college samples (Buhrmester et al., 2011), have shown strong test-retest reliability (Holden, Dennie, & Hicks, 2013), and the data obtained seem to be as reliable as those obtained via laboratory settings (Johnson, & Borden, 2012). It is noteworthy that based on key demographics (ethnicity, age, education, etc.), our sample was in fact nationally representative of the current US population (US Census Bureau, 2017).

It is also important to recognize that for some analyses our sample size was quite large. This gave us adequate statistical power for main effect comparisons, and while statistical significance was often achieved, the effect sizes were not large (see Tables 3-4). Thus, the practical implications of our data await further testing. This is in contrast to the other situation in our data where power was limited. Specifically, some of the tests for two- and three-way interactions were based on small cell sizes, and a resultant limited degree of statistical power. Again, future work of a different design may help clarify the complex opinion/perceptual mechanisms that operate in our culture.

### **Implications**

Whereas most studies focus solely on one condition, this study took a more comprehensive survey across two under-researched developmental disabilities within a nationally representative sample of US citizens. While there are studies examining the general public's perceptions toward ID (Sigelman, 1991; Sinson & Stainton, 1990), to our knowledge

this is the first study focusing on perceptions of possible causes and general views towards DYX. As the number of laws and public policy initiatives on awareness of developmental disabilities increase (Youman & Mather, 2015), it is imperative to gather a more thorough understanding of the public's perceptions toward DYX. Additionally, understanding public perceptions of developmental disabilities is important because such health-related beliefs can predict medical adherence (Holmes, Hughes, & Morrison, 2014), are associated with coping strategies and psychological well-being (Knibb & Horton, 2008; Hebert & Koulouglioti, 2010), and can help determine how affected children are responded to in schools and neighborhoods (Mukolo, Heflinger, & Wallston, 2010;). Knowing what perceptions exist and how they compare to empirical research can be useful in creating future interventions to change public perception (e.g., Griffiths, Carron-Arthur, Parsons, & Reid, 2014) and ultimately change behaviors toward, treatment of, and public policy for individuals with developmental disabilities.

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Table 1

*Participant Demographics*

<b>Characteristics (n=1,258)</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Gender</b>		
Female	643	51.1
Male	614	48.8
<b>Age</b>		
Under 21	25	2
21-30	572	45.5
31-40	411	32.7
41-50	139	11
51-64	103	8.2
65 or older	8	0.6
<b>Ethnicity</b>		
White	832	66.1
Hispanic/Latino	113	9
Black/African	124	9.8
<b>American</b>		
Native/Indian	16	1.3
<b>American</b>		
Asian/Pacific	158	12.6
<b>Islander</b>		
Other	15	1.2
<b>Education</b>		
8 <sup>th</sup> grade	1	.1
Some high school	17	5.6
High school	124	9.9
Some college	284	21.6
Trade/vocational	49	2
<b>training</b>		
Associate degree	136	10.1
Bachelor's degree	488	38.3
Master's degree	114	9
Professional degree	24	1.7
Doctorate degree	21	1.7
<b>Household income</b>		
Less than \$25,000	262	20.8
\$25,000-\$34,999	222	17.6
\$35,000-\$49,999	229	18.2
\$50,000-\$74,999	254	20.2
\$75,000-\$99,999	171	13.6
\$100,000-\$149,999	98	7.8

<b>Characteristics (n=1,258)</b>	<b>Frequency</b>	<b>Percentage (%)</b>
\$150,000 or more	22	1.7
Do you have children?		
Yes	566	45
No	692	55
Has your child ever been diagnosed with a LD?		
Yes	161	12.8
No	405	32.2

*Note:* Due to table length not all survey options are shown, for instance under Education ‘no schooling’ was an option although 0 participants selected that option.

Table 2

*Composite Scores: Consequence, Controllability, Psychosocial Causes, External Causes, and Biological Causes*

Composite Score Name	Factor Loadings			Items	Scale
	ID	DYX	OB		
Consequence	.80	.87	.85	Can increase odds of living poverty	True, Sometimes true, Not true
	.68	.84	.74	Can increase odds of engaging in criminal behavior	
	.55	.70	.44	Serious condition	
Controllability	.77	.74	.79	A lot a child can do to control his/her symptoms	True, Sometimes true, Not true
	.77	.81	.83	What he/she does can determine whether his/her X gets better or worse	
	.74	.71	.77	A positive attitude and good hard work can alleviate X	
	.79	.74	.77	X can be cured or treated	
	.68	.30	.23	Certain drugs can be used to cure X	
Psychosocial Possible Causes	.70	.70	.72	Stress or worry	Often, Sometimes, Rarely
	.81	.81	.71	Parental behavior or parenting	
	.81	.81	.82	Family problems or problems in the homes like abuse, divorce	
	.12	.10	.25	Chance or bad luck	
	.72	.65	.23	Spiritual forces or related phenomenon	
External Possible Causes	.70	.79	.77	A germ or virus	Often, Sometimes, Rarely
	.70	.77	-.34	Diet or eating habits	

<b>Composite Score Name</b>	<b>Factor Loadings</b>			<b>Items</b>	<b>Scale</b>
Biological Possible Causes	.62	.73	.77	Pollution or toxins in the environment	Often, Sometimes, Rarely
	.66	.77	.78	Vaccines	
	.23	.34	.49	Hereditary	
	.60	.49	.72	Medical neurological factors	
	.76	.80	.69	Poor medical care or prenatal care	
	.80	.84	.77	Alcohol, smoking, drugs taken by mother	

*Note.* True/Often was coded as 1, Sometimes/Sometimes true was coded as 2, Not true/Rarely was coded as 3.

Table 3

*Three-Way Analysis of Variance of ID Perceptions by Ethnicity, Gender, and Parental Status*

	Mean (SD)	Df	F	Sig.	Partial Eta Squared	Observed Power <sup>b</sup>
Psychosocial causes						
Main effects						
Ethnicity		3	7.801	<b>.000</b>	.039	.989
White (n=406)	8.5003(1.13)					
Hispanic (n=46)	8.4273(1.26)					
Black (n=53)	7.9010(1.46)					
Asian (n=82)	7.9335(1.52)					
Gender		1	4.339	<b>.038</b>	.008	.548
Female (n=307)	8.4359(1.11)					
Male (n=280)	8.2794(1.39)					
Ethnicity		3	2.895	<b>.035</b>	.015	.691
White (n=406)	6.8054(1.07)					
Hispanic (n=46)	6.9693(1.07)					
Black (n=53)	6.4049(1.27)					
Asian (n=82)	6.5131(1.18)					
Controllability						
Main effects						
Ethnicity		3	5.821	<b>.001</b>	.030	.952
White (n=406)	9.5208(1.69)					
Hispanic (n=46)	9.3203(1.77)					
Black (n=53)	9.0183(1.67)					
Asian (n=82)	8.6068(2.07)					

*Note.* Significant effects in bold,  $p < .05$ . <sup>b</sup> = computed using alpha at .05. Lower mean indicates higher perception score (True/Often coded as 1, Not true/Rarely coded as 3).

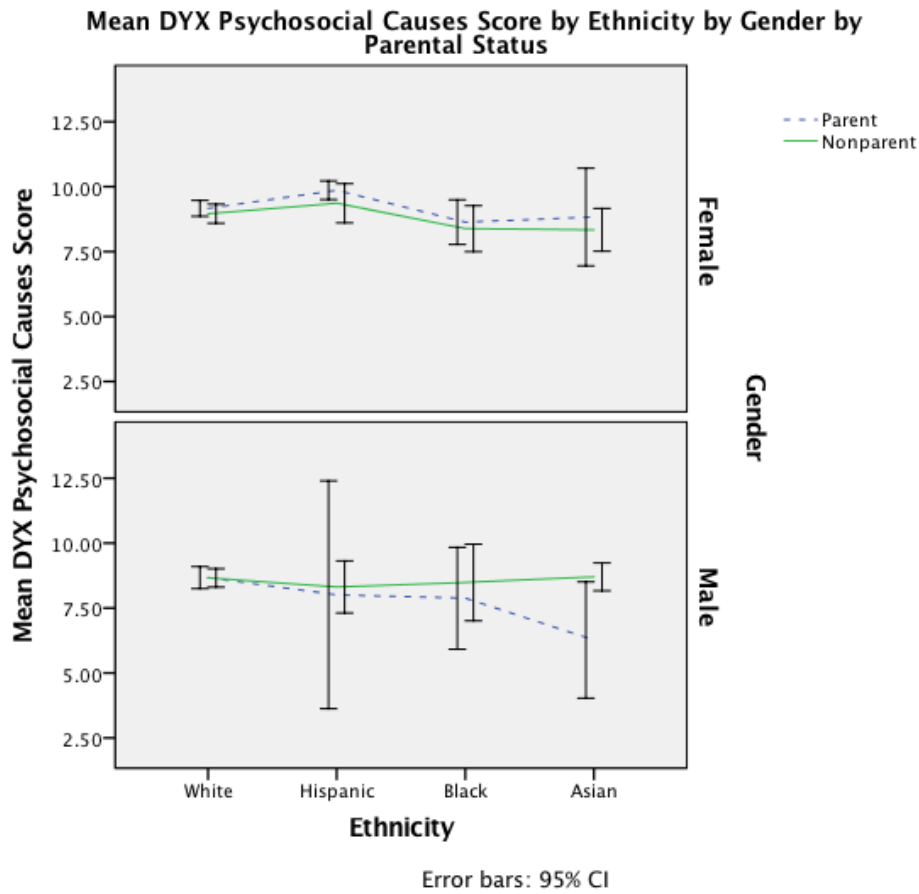
Table 4

*Three-Way Analysis of Variance of DYX Perceptions by Ethnicity, Gender, and Parental Status*

Source	Mean (SD)	Df	F	Sig.	Partial Eta Squared	Observed Power <sup>b</sup>
Psychosocial causes						
Main effects						
Ethnicity		3	3.734	<b>.011</b>	.018	.809
White (n=424)	8.8792(1.86)					
Hispanic(n=49)	9.0139(1.81)					
Black (n=61)	8.4420(2.00)					
Asian (n=88)	8.3669(2.10)					
Gender		1	11.065	<b>.001</b>	.018	.913
Female(n=325)	8.9868(1.96)					
Male (n=297)	8.5420(2.03)					
Interaction effects						
Gender X Parental status		1	5.857	<b>.016</b>	.010	.677
External causes						
Main effects						
Gender		1	5.040	<b>.025</b>	.008	.611
Female(n=325)	8.6258(1.06)					
Male (n=297)	8.4655(1.13)					
Consequences						
Main effects						
Ethnicity		3	4.586	<b>.003</b>	.022	.888
White (n=424)	4.9122(1.31)					
Hispanic (n=49)	5.3909(1.35)					
Black (n=61)	4.9378(1.52)					
Asian (n=88)	5.4048(1.42)					
Controllability						
Main effects						
Ethnicity		3	3.342	<b>.019</b>	.016	.759
White (n=424)	6.8565(1.58)					
Hispanic (n=49)	6.1846(1.76)					
Black (n=61)	6.5065(1.60)					
Asian (n=88)	6.5790(1.78)					
Interaction effects						
Ethnicity X Gender X Parental status		3	4.729	<b>.003</b>	<b>.023</b>	.898

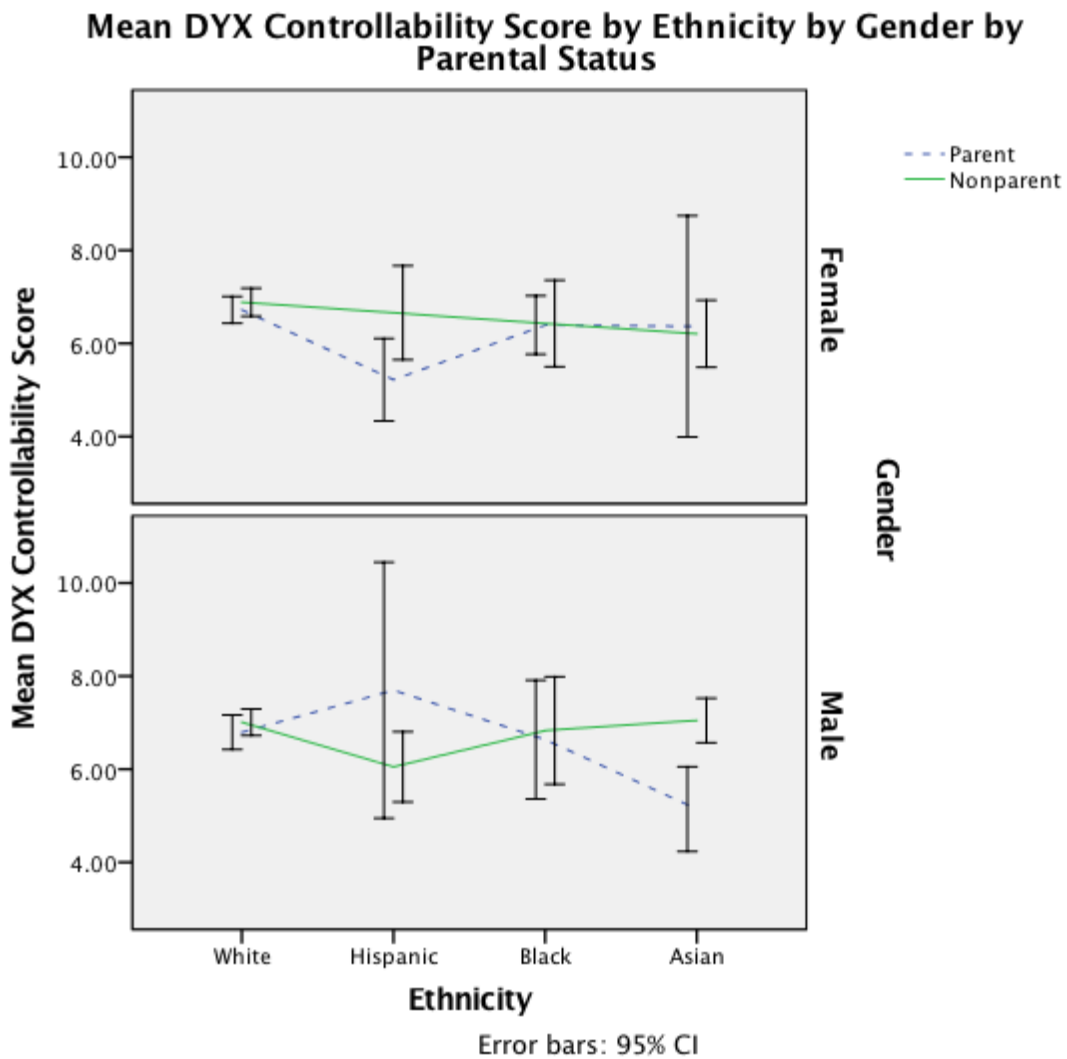
*Note.* Significant effects in bold,  $p < .05$ . <sup>b</sup> = computed using alpha at .05. Lower mean indicates higher perception score (True/Often coded as 1, Not true/Rarely coded as 3).

Figure 1.



*Note.* Mean DYX (Dyslexia) psychosocial causes composite score by ethnicity, gender, parental status. Standard errors are represented in the figure by the error bars attached to each column mean. Lower mean indicates higher perception score (True/Often coded as 1, Not true/Rarely coded as 3). Mean score is derived from composite score.

Figure 2.



*Note.* Mean DYX (Dyslexia) controllability composite score by ethnicity, gender, and parental status. Standard errors are represented in the figure by the error bars attached to each column mean. Lower mean indicates higher perception score (True/Often coded as 1, Not true/Rarely coded as 3). Mean score is derived from composite score.