



Demographic Characteristics of Autistic Children with and without Intellectual Disability

Aubrianna Wilson^{1,2}, Christine Wu Nordahl, Ph.D.³ Joshua Lee, Ph.D.³

¹ Maternal Child Health Careers / Research Initiatives for Student Enhancement-Undergraduate Program at Kennedy Krieger Institute, Advocacy, ²Middlebury College, ³University of California, Davis MIND Institute

INTRODUCTION

- An estimated 31.4% of autistic individuals have IQs in the range of intellectual disability (Full Scale IQ score ≤ 70).¹
- The relationship between intellectual disability (ID) and autism is unclear.² A few small-sized studies have begun to analyze the neurobiology of these children via magnetic resonance imaging (MRI).³
- Most MRI studies lack representation from both autistic children with ID and female autistic children, which means these children are not being seen in our current literature.⁴
- There are concerns that standard IQ assessments are biased towards a privileged non-autistic norm.⁵ Thus it is important to consider demographic variables as potential confounds when evaluating IQ scores in autistic children.

OBJECTIVE

- Analyze the demographic characteristics of autistic children with ID (FSIQ <70) and without ID (FSIQ >70) in terms of race/ethnicity, parental education, parental socioeconomic status, and the researchers' ability to obtain an MRI scan.
- Explore if FSIQ scores differ across these demographics, which may represent IQ assessment bias.
- Assess the common perception that autistic children with ID are too challenging to undergo MRI scanning.
- Gain a better understanding of Autism Phenome Project (APP) cohort demographics to influence further research.

METHODS

Participants

- The UC Davis Autism Phenome Project is a longitudinal MRI study evaluating brain developmental trajectories throughout childhood.

Time Point	Total Autistic Children	Autistic Children w ID	Autistic Children w/o ID	Age Range (years)
1	383	269	114	1.5 - 4.5
3	177	114	63	4.5 - 9.5
4	122	73	49	9 - 14

Racial Identity/Ethnicity	Asian	Black or African American	Hispanic/Latino	Other	Two or more races	White/European Caucasian
Time 1	32	11	64	8	80	188

Information Collection

- Demographic characteristics: survey completed by the child's caregiver
- Intellectual ability: FSIQ assessments conducted by psychologists at the MIND, depending on the child's age: Time 1 (MSEL), Time 3 (DAS Early Years, DAS School Age), and Time 4 (DAS School Age).
- MRI Scan Procedure: researchers and a caregiver devise a plan to best obtain a successful scan for each child. The MRI scans were taken during natural sleep at Time 1 and 3 and while awake at Time 4.

Analyses

- Group differences between autistic children with and without ID FSIQs were assessed for: race/ethnicity, SES, maternal and paternal education, and MRI scan ability.
- All statistical tests and visual creation utilized R Studio programming.

RESULTS

Intellectual Ability Does Not Differ Among Racial Identity/Ethnicity Groups at T1

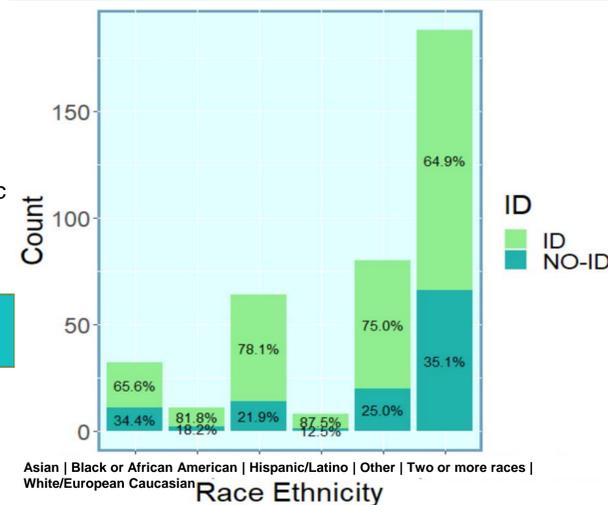


Figure 1. Autistic children with and without FSIQs in the range of ID within racial identity/ethnicity groups in the participants at Time 1, n=383. [T₁: X² (1, 383) = 7.5, p = 0.18; T₃: X² (1, 177) = 9.9, p = 0.071; T₄: X² (1, 122) = 7.5, p = 0.18].

Intellectual Ability Does Not Differ Regarding Awake MRI Scan Ability at T4

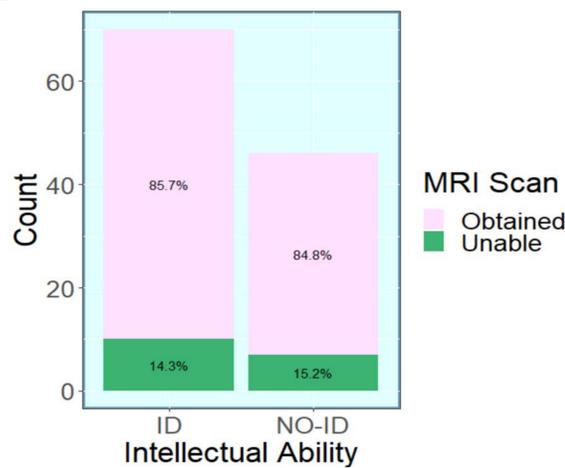


Figure 2. Autistic children who researchers were able and unable to obtain an MRI scan within intellectual ability groups at Time 4. ID (n = 73), NO-ID (n = 49). NA = did not attempt an MRI scan. [T₁: X² (1, 383) = 1.3, p = 0.54; T₃: X² (1, 177) = 2.2, p = 0.33; T₄: X² (1, 122) = 0.27, p = 0.93].

Intellectual Ability Does Not Differ Among Parental Education Level

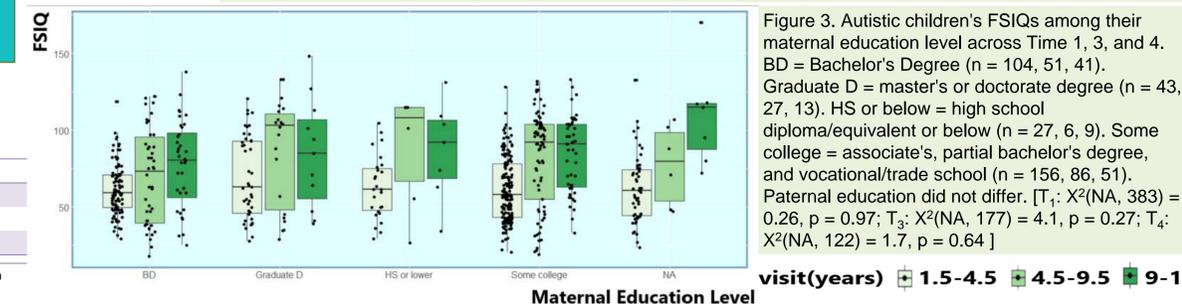


Figure 3. Autistic children's FSIQs among their maternal education level across Time 1, 3, and 4. BD = Bachelor's Degree (n = 104, 51, 41). Graduate D = master's or doctorate degree (n = 43, 27, 13). HS or below = high school diploma/equivalent or below (n = 27, 6, 9). Some college = associate's, partial bachelor's degree, and vocational/trade school (n = 156, 86, 51). Paternal education did not differ. [T₁: X²(NA, 383) = 0.26, p = 0.97; T₃: X²(NA, 177) = 4.1, p = 0.27; T₄: X²(NA, 122) = 1.7, p = 0.64].

Intellectual Ability Does Not Differ Among Parental Annual Income

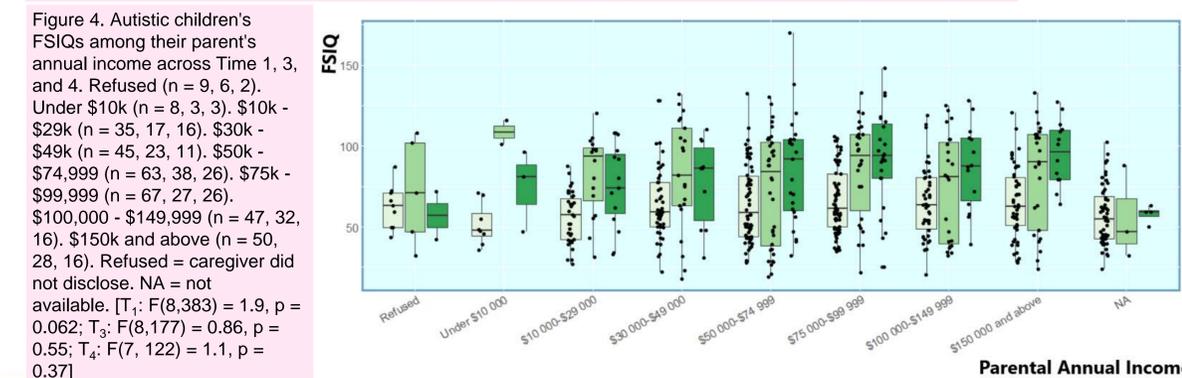


Figure 4. Autistic children's FSIQs among their parent's annual income across Time 1, 3, and 4. Refused (n = 9, 6, 2). Under \$10k (n = 8, 3, 3). \$10k - \$29k (n = 35, 17, 16). \$30k - \$49k (n = 45, 23, 11). \$50k - \$74,999 (n = 63, 38, 26). \$75k - \$99,999 (n = 67, 27, 26). \$100,000 - \$149,999 (n = 47, 32, 16). \$150k and above (n = 50, 28, 16). Refused = caregiver did not disclose. NA = not available. [T₁: F(8,383) = 1.9, p = 0.062; T₃: F(8,177) = 0.86, p = 0.55; T₄: F(7, 122) = 1.1, p = 0.37].

SUMMARY

- Within these participants, there were no significant associations between racial identity/ethnicity groups, SES, both maternal and paternal education levels, and the researcher's ability to obtain an MRI scan and whether an autistic child has an FSIQ score in or out of the range of ID.

CONCLUSIONS

- This cohort does not appear to be impacted by IQ assessment biasing towards a privileged norm. However, these findings are not generalizable to the broader population regarding the impact of inequity and systems of oppression such as racism and ableism. The MRI scan-ability findings suggest that autistic children with ID are able to complete MRI scanning at the same rate as autistic children without ID.
- These findings will shape future analysis of the neurobiological phenotype comparisons among these APP participants.
- Future research should explore: 1. the normative prejudice of IQ assessments, specifically in their ability to assess autistic children's intellectual ability as well as other marginalized communities in hopes of developing more equitable and representative IQ assessments 2. the impact of intersectional marginalization, stress, and reduced resources on autistic children's intellectual development and their well-being

STRENGTHS & LIMITATIONS

- More representation of female autistic children (1/3 female) and autistic children with ID compared to most autism studies. Also, the longitudinal nature is rare and allows for deeper analyses to be explored.
- Determining whether an autistic child has ID based on their FSIQ is unreliable because of:
 - The probable privilege bias of standard IQ tests lead many to question their ability to accurately represent a child's intellectual ability.
 - Before 5 years, IQ assessments are considered unstable measurements.
 - The determination of intellectual disability was based on FSIQ rather than a clinical diagnosis.
- Not a representative sample: heavily white, middle to upper class, etc.
- As a non-autistic individual without an ID, I do not share this lived experience and thus, lack the full extent to grasp the complexity of these inquiries.

REFERENCES

- Surveillance Summaries, 2018 ; 2. Skuse, 2007 ; 3. Lenroot and Yeung, 2013 ; 4. Hull et al, 2017 ; 5. Dawson et al., 2007

ACKNOWLEDGEMENTS

I would like to thank the Kennedy Krieger Institute, the UC Davis: MIND Institute, and the Maternal Child Health-Leadership Education program for supporting me throughout this research process. I would also like to thank Dr. Nordahl, Dr. Lee, Dr. Belcher, Dr. Van Eck, Dr. Linder, Dr. Heath, Ms. Acosta, Ms. Heckers, Ms. Hechtman, Mr. Clement, and the APP/GAIN research team for their constant guidance and care in my research. Lastly, I am truly grateful for the children and families who participated in the APP study.



INTRODUCTION

- **Intellectual disability (ID) is prevalent among the autistic community¹**
- **Most magnetic resonance imaging (MRI) studies lack representation, which means these individuals are excluded in current literature⁴**

Standard IQ assessment bias:

- **created to fit a privileged non-autistic norm. ⁵**
- **UC Davis Autism Phenome Project (APP)**



Image found on [UC Davis Health - MIND Institute: Autism Phenome Project website]

OBJECTIVE

- **Analyze the demographic characteristics of autistic children with ID (FSIQ \leq 70) and without ID (FSIQ $>$ 70):**
 - **race/ethnicity**
 - **parental education**
 - **parental socioeconomic status**
 - **MRI scan-ability**
- **Explore if FSIQ scores differ across these demographics**
- **Assess if autistic children with ID are too challenging to obtain an MRI scan**



Image found on [UC Davis Health - MIND Institute: Autism Phenome Project website]

METHODS

Participants

Time Point	Total Autistic Children	Autistic Children w ID	Autistic Children w/o ID	Age Range (years)
1	383	269	114	1.5 - 4.5
3	177	114	63	4.5 - 9.5
4	122	73	49	9 - 14

Racial Identity/Ethnicity	Asian	Black or African American	Hispanic/Latino	Other	Two or more races	White/European Caucasian
Time 1	32	11	64	8	80	188

Information Collection

- Demographic characteristics
- Intellectual ability
- MRI Scan Procedure

Analyses

- Group differences between autistic children with and without ID FSIQs were assessed for: race/ethnicity, SES, maternal and paternal education, and MRI scan ability.

RESULTS

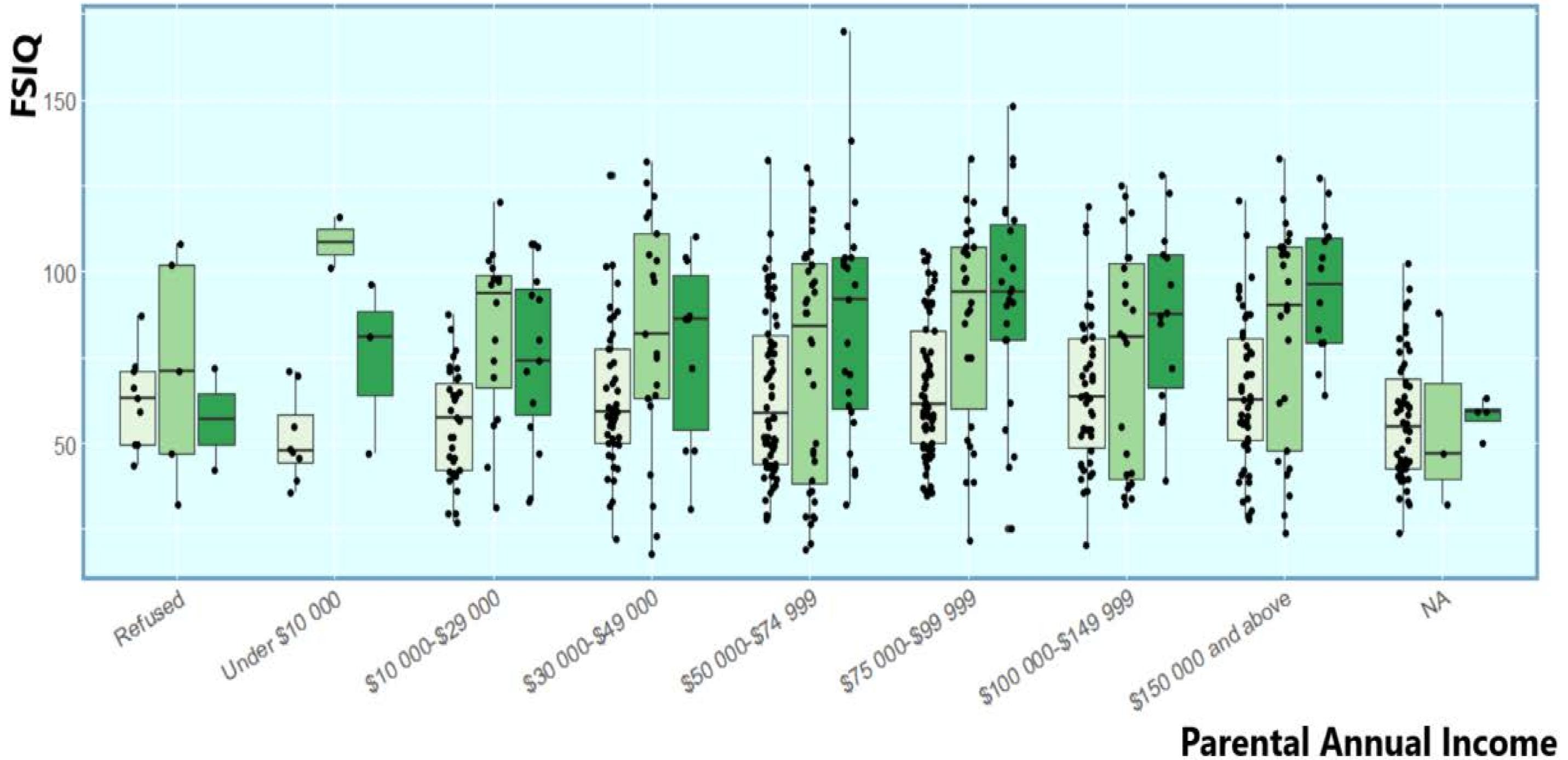


Ethnicity Groups at T1



RESULTS

Intellectual Ability Does Not Differ Among Parental Education Level



CONCLUSION

Ultimately, MRI autism research should include children with ID.

Future research to explore:

- the normative prejudice of IQ assessments
- the impact of intersectional marginalization, stress, and reduced resources on autistic children's intellectual development as well as their well-being

Thank you for your time.

This research would not have been possible without the support of Dr. Nordahl, Dr. Lee, Dr. Belcher, Dr. Van Eck, Dr. Linder, Dr. Heath, Ms. Acosta, Ms. Heckers, Ms. Hechtman, Mr. Clement, and the APP/GAIN research team for their constant guidance and care in my research.

Lastly, I am truly grateful for the children and families who participated in the APP study.