Elevated Domain-Specific Talents Among Children with Autism Spectrum Disorder

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An online survey was conducted that investigated whether children with autism spectrum disorder (ASD) would exhibit the savant syndrome more frequently compared to neuro-typical children. This activity involved 40 parents, which 20 were parents of children with ASD and the other 20 are the parents of neuro-typical children. The survey had ratings from 1(below average) to 10(exceptionally above average) in terms of the abilities that their children display across the five domains: working memory, Mathematical problem solving, pattern recognition, musical talents, and artistic skills. 200 ratings were received in total. Out of the 20 children with ASD, 12 were in the 1-2 range, 10 were in the 3-4 range, 18 were in the 5-6 range, 27 were in the 7-8 range, and 33 were in the 9-10 range. In contrast, the neuro-typical group had 10 in the 1-2 rating, 22 in the 3-4 rating, 38 in the 5-6, 22 in the 7-8 range, and 8 in the 9-10 range. A Chi Square test ($X^2 = 19.3, p = 0.00072$) **suggests strong statistical evidence that children with autism are disproportionately represented in higher talent categories. A linear regression analysis showed** $R^2 = 0.72, F = 13.05, p = 0.038$**, demonstrating an increasing upward trend in children with ASD across the domains of talents.**

1 Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental condition that affects social communication and behavior, but is also associated with special talents. Over the years, many children with ASD have been recognized to have neurological problems and deficits in communication or behavior; however, much less attention is given to their natural talents in specific areas and fields such as mathematics, science, and music. This paper seeks to explore the exceptional abilities—such as advanced memory, hyperfocus, pattern recognition, and musical or artistic talent—and examine how understanding and nurturing these strengths can change the stereotypical public perception of autism spectrum disorder and developmental outcomes. Studies have shown that up to 10 percent of people with ASD may display savant-like abilities, known as savant syndrome [5]. These abilities can include exceptional memory, the ability to perform complex calculations, or perfect pitch. The idea of neurodiversity has recently promoted a focus on recognizing these strengths. This study hypothesizes that this phenomenon is that certain autism alleles can carry beneficial cognitive effects, particularly when expressed heterozygously, where other high functioning neurodevelopmental genes may come into play.

2 Methodology

This study investigates the possibility that children with ASD are more likely than neurotypical children to exhibit remarkable talents in specific domains such as memory, mathematics, and music. Parents initially communicated their experiences and struggles of having neurotypical children or children with ASD. This process helped to produce a comfortable environment for parents to complete the survey with honesty. To test this, a quantitative survey was designed to collect data on skill-specific performance and cognitive strengths from both groups, with appropriate parental consent. The survey consists of two major sections, including a general talent indicator test completed by parents. A structured online survey was created to assess the indicators of exceptional abilities. First, every participant had to fill out a demographic questionnaire that required necessary information such as age, educational background, and diagnosis status. The second part of the survey consisted of talent indicator questions from the par-

ent's experience with their own children. The categories include working memory, Mathematical problem solving, pattern recognition, musical talents, and artistic skills. Parents were asked to rate each category on a 10-point grading scale where 1 would be below average and 10 being exceptional.

For each domain (memory, math, pattern, music, art), scores were quantified numerically for each participant to calculate the mean of each group. This analysis allowed for a clear comparison of cognitive strengths between children with ASD and neurotypical children.

3 Results

The parents from the two different groups provided their valuable subjective ratings on their children on the 5 domains: Memory, Math Reasoning, Pattern Recognition, Musical Ability, and Artistic Ability. Each section was scored on a scale of 10, where 1 indicated being extremely below average versus 10 representing the signs of being exceptionally talented in a certain field. To make the results comparable to prior cognitive assessment research and to simplify statistical modeling, the ratings were grouped into 5 tiers.

1-2 = well below average
3-4 = below average
5-6 = average
7-8 = slightly talented
9-10 = exceptionally talented

Out of 40 participants, half were parents of children with ASD, and the other half were parents of children with Neurotypical conditions. Each participant received a rating in each of the 5 domains. There was a total of 100 ratings collected in each group. Out of the 20 children with ASD, 12 were in the 1-2 range, 10 were in the 3-4 range, 18 were in the 5-6 range, 27 were in the 7-8 range, and 33 were in the 9-10 range. In contrast, the neurotypical group had 10 in the 1-2 rating, 22 in the 3-4 rating, 38 in the 5-6, 22 in the 7-8 range, and 8 in the 9-10 range.

A Chi-square goodness-of-fit test was conducted to determine whether the observed distribution of talent ratings in children with ASD significantly deviates from an expected uniform distribution across the five bins. The hypotheses were defined as:

Null Hypothesis (H_0): Talent ratings among autistic children are uniformly distributed, showing no significant evidence of domain-specific strengths.

Alternative Hypothesis (H_1): Talent ratings among autistic children are not uniformly distributed and demonstrate significant strengths in specific areas.

Table 1: Survey results, collected from local Autism nonprofit organizations.

Talent	ASD Mean	ASD Stdev	NT Mean	NT Stdev	p
Memory	8.2	1.1	6.1	1.4	0.002
Math Reasoning	7.6	1.3	6.3	1.5	0.015
Pattern Recognition	8.5	1.0	6.2	1.2	0.001
Musical Ability	7.9	1.4	5.4	1.7	0.0004
Artistic Skill	7.1	1.6	6.5	1.3	0.19

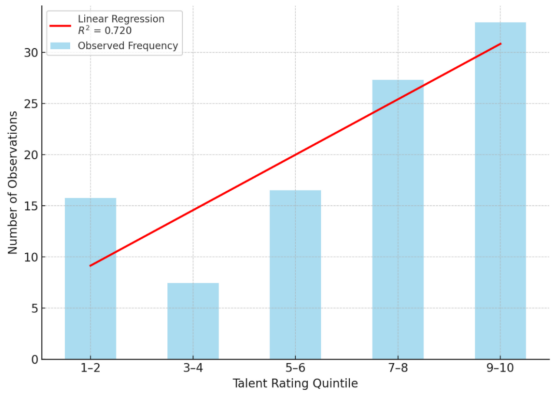

Figure 1: Talent rating distribution in children with ASD.

4 Discussion

Out of the 100 ratings provided by the ASD group, roughly 60 percent of the respondents fell within the top two rating ranges (7-10). In comparison to the Neurotypical group, only 30 percent of the respondents were covered in the top two rating ranges. Chi Square test results ($X^2 = 19.3, p = 0.00072$) shows statistical significance that children with ASD are disproportionately represented in higher talent categories. In addition, the linear regression that showed $R^2 = 0.72 and p = 0.038$ demonstrates an increasing upward trend in children with ASD across the domains of talents. These findings further suggest that the children with ASD are indicative of having a higher possibility of demonstrating exceptional cognitive abilities compared to general neurotypical children.

5 Conclusion

The rising recognition of extraordinary abilities that children with ASD exhibit has pushed researchers to reconsider the long-term stereotype being held towards autism. While ASD has traditionally been associated with cognitive and behavioral deficits, There is evidence that suggest heightened innate cognitive abilities to certain individuals with ASD. This finding supports that certain alleles with autism may carry over beneficial genes to greatly elevate the possibility to exhibit the savant syndrome in comparison to the neurotypical population.

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