Dimensions of Autism: Unravelling the Relation between Autism Spectrum Disorder (ASD) Incidence and Socioeconomic Background

Introduction & Problem

Individuals with Autism Spectrum Disorder (ASD), diagnosed or undiagnosed, struggle with a range of challenges, from difficulty communicating opinions, connecting with others, or managing mental health conditions. Each case may look different, and the specific roots of ASD are still unknown, often making treatments hard to target. This research study aims to identify the patterns between social determinants of health (SDOHs) and autism, increasing awareness, effectiveness of treatments, and equity within the health community.

ASD is a very misunderstood disease by many in the scientific community, despite the fact that tens of millions of people worldwide are affected. In the past few decades in the US alone, the rate at which people have been diagnosed with ASD has tripled. Discussing the possible connection between healthcare determinants and Autism gives us further insight into the causes of ASD and, more importantly, helps us to develop improved treatment options for individuals suffering from ASD. Despite this, this research also provides reasoning for the continued use of healthcare's most effective tool: prevention. Although some determinants can't be changed, like race and sex, things like access to readily available healthcare are determinants that can be changed on a societal level, allowing both individuals with ASD and those without to live healthier lives.

Is there a direct relationship between Autism Spectrum Disorder (ASD) occurrence in early development and the social determinants of health? How can this information be utilized to aid individuals affected by autism?

Hypothesis

If there is variance in social determinants of health between individuals, then we expect to see a direct negative correlation to the incidence of autism, because the social determinants of health are linked with adverse health outcomes.

Method

For this research project, the following factors will be studied:

- Socioeconomic status and household income
- Ethnic background
- Quality and access to services
- Gender in adolescents

This will be investigated through:

- Online medical article databases, including PubMed and the National Institutes of Health
- Graphing software (Google Sheets) to organize data effectively

Background Information

Autism spectrum disorder (ASD), or commonly known as autism, is a neurodevelopmental disorder characterized by learning and behavioural patterns (National Institute of Mental Health, 2024). The Canadian National ASD Surveillance System in 2018 reported that 1 in 54 children between the ages of 5 and 17 were diagnosed with autism; patterns show that prevalence has increased over the years (Autism Canada, 2018). It can be diagnosed at any age, though symptoms typically arise during the first two years of development (National Institute of Mental Health, 2024). Common symptoms of ASD include repetitive behaviours, narrow and deep interests, and a multitude of difficulties with communication and social interactions (Autism Canada, 2018).

There is a range of severities to this condition, hence the name autism spectrum disorder, and it can look different from person to person (Autism Canada, 2018). Many individuals with autism have problems with mental health, intellectual or sensory differences, while others may struggle physically (Public Health Agency of Canada, 2025). Furthermore, autism often comes with a multitude of co-occurring conditions: to name a few, epilepsy, anxiety, depression, obsessive compulsive disorder (OCD), attention deficit hyperactivity disorder (ADHD), immune/sleep dysregulation, and gastrointestinal abnormalities (Public Health Agency of Canada, 2025). Because of this wide continuum, treatments and diagnoses are case-specific and varied (Autism Canada, 2018). Although many are diagnosed at a young age, symptoms may not be recognized until adulthood, often meaning feelings of isolation in childhood and the inability to articulate one's thoughts. In addition, ASD is a lifelong condition, requiring continued support for both children and adults, such as specialized medical care, social support, education, employment, and housing (Autism Canada, 2018).

Nevertheless, the diagnostic criteria, demographics, and treatments of autism are constantly evolving; for instance, the subsumption of Asperger's syndrome (Autism Canada, 2018). Still, the exact origins of autism are unknown, making it difficult to treat—likely factors include genetics, exposure, and environmental effects (Public Health Agency of Canada, 2020). Certain studies have revealed that components such as gene mutilation can increase the risk of autism, but do not necessarily cause or guarantee its occurrence (Public Health Agency of Canada, 2020). It has also been confirmed that it is not contagious, nor a result of vaccination or parenting (Public Health Agency of Canada, 2020). Despite this ambiguity, increased research and studies have been conducted to further support communities affected by ASD (National Institute of Mental Health, 2024). This project focuses on the environmental causes of autism spectrum disorder, more specifically, the social determinants of health.

The World Health Organization (WHO) defines the social determinants of health (SDOH) as the conditions in which individuals grow and live. These determinants can often affect healthcare outcomes, such as life expectancy and quality of care. This varying impact, if left unaddressed, can lead to lasting adverse health outcomes and perpetuate disparity among different populations. Although the Canadian Public Health Association lists fourteen determinants as factors affecting healthcare quality in Canada, this project focuses on 4: Socioeconomic status and household income, ethnic background, quality and access to services, and gender in adolescents.

Research & Data

Gender

Data from Brain Facts, 2018, were taken and studied (Society for Neuroscience, 2018, 71), revealing that 1 in 68 Americans at 8 years of age meet the criteria for an autism diagnosis. By comparing patterns to those of the 1970s, there is a positive trend of ASD prevalence, meaning there has been an increase in autism incidence over time. Although this suggests an increase in autism spectrum disorder demographics, it could be a result of a broader criteria of diagnoses. In addition, results show that boys are five times more likely to be diagnosed. Again, this doesn't necessarily mean that males have a higher risk factor of ASD, just that the symptoms exhibited may be presented outwardly, and therefore more commonly recognized/diagnosed.

The Finnish Prenatal Nationwide Register Study of Autism investigated time trends in ASD (socio-demographic) risk factors and co-occurring conditions (59% of cases studied had at least 1), particularly intellectual disability, or ID (Khorasani et al., 2025). Individuals with an ASD diagnosis (with and without ID) born in Finland from 1998-2015 were divided into birth cohorts, birthplace, parent immigration status, and gender. At age 6, the boy to girl ratio for autism diagnoses was 4.18:1, then 4.50:1 (without ID) at age 10, and finally 1.52:1 by 15; the prevalence of girls change much more rapidly than boys, and we see that girls typically first get diagnosed at 9 years of age (1 year later than most boys; median age). Still, 77.1% of autism cases were boys. It was also observed that ASD rates for biological

sex tended to differ by region (e.g. girls' rates increased in the South; boys' rates increased in the East). This evidence supports research that girls tend to be diagnosed with autism later on due to more internalized feelings/symptoms.

The Public Health Agency of Canada compiled data relating to Autism Spectrum Disorder (ASD) using data from the 2019 Canadian Health Survey on Children. It compiled data from all 10 provinces and 3 territories. In terms of ASD rates relating to sex, diagnosis rates were significantly higher for males than for females. The male-to-female diagnosis ratio for children aged 1 to 4 was 2.7; however, it seems to rise significantly for children 5 and up, resulting in a ratio of 3.9 (Public Health Agency of Canada). This difference in ratio may be attributed to the difference in sample size for the different age groups. The overall male-to-female ratio for all children aged 1 to 17 was 3.9.

Using the 95% confidence specified in this source and the 69 000+ children in the population pool, we determined that the chi-squared value was greater than the critical value, meaning that we reject the null hypothesis and accept our alternative hypothesis.

Ethnicity

A study from the journal Children, taking place in the United States of America tried to pick out racial inequities within health diagnostic services; this was done by stratifying ethnic backgrounds with rates of autism spectrum disorder, and comorbid ASD and ADHD, or attention deficit hyperactivity disorder from a pool of 205,480 children aged 3-17 (with a mean age of 10.6 years), representing 73.1 million American children (Izuchi et al., 2025). Data shows that Hispanic and non-Hispanic Black children had lower odds (or were diagnosed later on) of ASD than non-Hispanic White children. The patterns discovered through these statistics were very consistent, and it was determined, after thorough analysis, that this was an issue with diagnostic services, rather than biological risks of neurological disorders.

In the Finnish Prenatal Nationwide Register Study of Autism, ASD incidence was studied in comparison to immigration status and birth region in Finland (Khorasani et al., 2025). After analysis of the results, there was higher prevalence among immigrant parents. This could be due to a higher percentage of consanguineous marriage (leading to an increased risk of genetic mutations of intellectual disability), immunological factors (pathogen exposure in mothers), stressful life events (also related to genetic mutation), and reduced stigma in seeking healthcare or diagnostic services.

In a 2014 study published in PubMed, researchers investigated Autism Spectrum Disorder (ASD) in relation to race, ethnicity, and nativity. The study was focused on the Los Angeles Area and found that 7540 out of 1,626,324 children born in the time period were diagnosed with ASD (Becerra et al., 2014). Researchers also investigated potential comorbidity with intellectual disability. The study concluded that there seemed to be an association between maternal race or ethnicity and ASD diagnosis and severity. Increased risks of being diagnosed with ASD with intellectual disability were found in the children of foreign-born mothers, especially those who were black, Central/South American, Filipino, and Vietnamese. Children of foreign-born black mothers and Vietnamese mothers were also more likely to express the "violent outbursts" phenotype.

In a 2022 study published to the Autism and Developmental Disease Monitoring (ADDM) network, 16 sites analyzed healthcare data of 16 sites across the United States. Using health insurance information and passports, researchers were able to identify important determinants like race, household income, and sex. The article notes that before 2016, the highest ASD prevalence was observed in white children and women from neighbourhoods with higher socioeconomic status. That data seems to changed, however, as rates of autism diagnoses have increased in non-white populations. This data contradicts that of some of our other studies.

The Public Health Agency of Canada states that they did not find a statistical significance between ASD diagnosis and visible minority status (presumably including things like ethnicity), household education level, and location of residence (Public Health Agency of Canada)

Due to the outdated nature of some of the sources and the lack of certainty with our current sources, we can neither reject nor fail to reject our null hypothesis. This leaves us with a rather ambiguous conclusion to this question.

Quality of/Access to Services

In the North-West provinces of Iran (including Ardabil, East-Azerbaijan, etc.), a cross-sectional study was conducted by Azeri Blue Buddies: Interdisciplinary Longitudinal Autism Researchers (Jafarabadi et al., 2021). This project ran from July 1st to November 30th in 2019, which included 202 participants with ASD aged 2-16 (mean age of 2.5 years), observing 10 variables on demographics, socioeconomic status, and the quality/accessibility of services. Although there is no direct evidence here connecting ASD occurance to SDH markers, there is an association between these indicators and diagnostic services (access/quality). In Iran, many health or medical centers conduct SDH screening, providing for low socioeconomic status and accomodating autism diagnoses; however, health insurance generally does not account for ASD rehabilitation, and most diagnoses are issued from private organization (welfare organizations) rather than public centers or clinics, raising concerns about equity. Furthermore, there is a lack of data on accessibility in low/middle-income countries (LMICs), where over 61% of children reside. An assessment with Structural Equation Modelling (SEM) of the data uncovered the relationship and inequalities in this public health issue. The mean quality of services was 61.23/100 (significantly affected by access), and the mean access to services was 65.91/100. The mean SDH status was 29.50/100, showing a positive correlation between SDH and quality/access: individuals with lower determinant levels recorded lower quality. These gaps stem from referral issues, lack of insurance coverage, cultural norms, long waiting times, and more.

The Finnish Prenatal Nationwide Register Study of Autism, ASD incidence was studied and evaluated, taking note of where these screenings occurred (Khorasani et al., 2025). In contrast to Iranian ASD services, diagnoses in Finland are conducted and treated in public healthcare systems, registered by CRHC physicians. These typically are at clinics of child neurology/psychiatry.

The same study from Children in the USA studied socioeconomic conditions within larger structural contexts in terms of access to services for autism support (Izuchi et al., 2025). It was discovered that constrained healthcare access to is associated with attention regulation, emotional control, and adaptive functioning difficulties. Higher rates of ASD in advantaged families is most likely from increased accessibility to these screening services. There appears to be a need to address these barriers in healthcare practices of marginalized communities in autism diagnosis.

Income

The same study from Children in the USA identified common SDOH markers and compared them to incidence of autism spectrum disorder, and comorbid ASD and ADHD (Izuchi et al., 2025). These social determinants of health include those relating to financial security, such as household income (relative to poverty level), parental education, health insurance, food insecurity, and neighbourhood safety. Rates of ASD decreased steadily from 3.8% in households below 100% FPL (federal poverty level, relative to household income), to 2.0% at households above 400% FPL; after analyzing the data, lower levels of socioeconomic status showed a strong correlation with higher odds of ASD (and as a result, co-occurring conditions like ADHD). This suggests that higher stress levels in caregivers likely correlates to autism prevalence; from financial burdens of poverty, to nutritional risks, and dangerous neighbourhood environments, these challenges are all associated with poorer developmental or behavioural outcomes in children. Despite this, statistics often show high rates of diagnosed autism in financially stable

families—it is most probable that this is primarily due to better access to diagnostic services. This data supports our hypothesis of higher ASD incidence among lower SDOH levels, as prevalence is not equally distributed.

In the Finnish Prenatal Nationwide Register Study of Autism, household income was categorized by maternal socioeconomic status, and compared to ASD incidence (Khorasani et al., 2025). Groups include upper white-collar workers, lower white-collar workers, blue-collar workers, others, and unknown/missing. The majority of ASD cases from families of lower white-collar workers (31.9%), signifying elevated risk. Furthermore, the majority of ASD cases come from lower socioeconomic status, alluding to the suggestion that lower income levels and support associate with higher levels of stress (neuroinflammatory abnormalities, potentially changing brain development in offspring). This evidence supports our hypothesis that higher socioeconomic status indicates a lower risk of ASD.

The Canadian Public Health Agency compared rates of ASD diagnosis by household income. Data was divided into 5 different quintiles, with quintile 1 being households with a household income in the 20th percentile ($0-44,878) and people in quintile 5, including people in the 80th percentile of income (over $149,924). ASD prevalence was highest in households in the first quintile, with a prevalence rate if 2.6. The rate was lowest for members in the last quintile, with a prevalence rate of 1.1.

Results & Conclusion

After thorough investigation, it was determined that there is a significant correlation between the social determinants of health (SDOHs) and occurence of autism spectrum disorder (ASD). Through statistical analysis, we deduced that ASD prevalence is highest among individuals in low-income households, and those of the male sex; however, rates for factors such as ethnic background or race are rather ambiguous, and it is difficult to deduce whether patterns are coincidental. Even across the various examined studies taking place in different countries, there is a notable difference in research topic, and data is focused in varied areas (e.g. private institutions in Iran vs. public healthcare system in Finland). To conclude, individuals with autism reported adverse health outcomes, and often access or quality of services were insufficient in providing appropriate support.

Further Applications and Questions

As stated earlier, there is no single medication for treating autism spectrum disorder, and many individuals tend to turn to behavioural therapies. With the information researched in this project, risk factors and symptoms can be identified and diagnosed earlier on, making interventions more effective. It can also provide as evidence to influence change in areas like access to healthcare services and appropriate ASD support. Some limitations include the credibility of the data investigated in this study. In the future, improvements can be made by accessing a plethora of databases, and comparing statistics accordingly, to optimize the accuracy of our results.

Why are some of these disparities present?
What are some common biomarkers correlated with an autism diagnosis (e.g. genetic mutations)?

Citations & Acknowledgements

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