Understanding the Increased Prevalence of Autism in the United States

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Senior Project

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Table of Contents

Project Proposal

The Center for Disease Control and Prevention (CDC) states that the identified prevalence of autism spectrum disorders is increasing in the United States. In 2000, 1 in 150 U.S. children were diagnosed with autism spectrum disorders. Four years later, the CDC reported that 1 in 125 children were autistic. And today, 1 in 50 children are diagnosed with autism. For my senior project, I would like to research this phenomenon and learn why autism is becoming more prevalent in the United States. I would like to research three theories that support the dramatic increase of autistic children: genetics, environmental factors, and the cultural definition of this disorder.

To expand, most research agrees that there is a genetic disposition to autism. Researchers have found autism clusters, regions with an incredibly high rate of diagnosis, to show how genetics influence the prevalence of this disorder. Also, research shows a correlation between exposure during pregnancy to chemicals found in household products, pesticides, fertilizers, and other substances and autism. Lastly, the actual definition of autism has changed throughout history. First identified in the 1940s, symptoms of this disorder have changed considerably. I plan to research how the United States currently defines this disorder and how it impacts diagnosis. This will require an understanding of how autism has been defined in years past and how is it defined in other cultures.

I would also like to research how autism is treated in the United States. Alternative therapies (music therapies and oxygen therapies for example), applied behavior therapies, and speech and language therapies are common forms of treatment in the United States. I want to understand why these are successful and common forms of treatment. There are many treatment centers in San Luis Obispo, and I plan to interview some of these treatment centers to support my

research. Furthermore, a comparison is needed between treatment in the United States and treatment in other cultures. How do other cultures treat autism? How do their treatment practices differ from the United States?

This project is exploratory rather than argumentative. In sum, the purpose of my project is to learn about the existing knowledge of the prevalence and treatment of autism in the United States.

Annotated Bibliography

Ametepee, L., & Chitiyo, M. (2009). What we know about autism in Africa: A brief research synthesis. *The Journal of the International Association of Special Education*, *10*(1), 11-13.

Contrastingly, this article explains that little is known about the prevalence of autism in Africa. Researchers have concluded that there is autism in Africa, but the rate of diagnosis is unknown. From this data, I infer that Africa does not have the same definition of autism as Western nations. Researchers have found that some children studied have similar symptoms to autistic children in the West, but are not labeled as autistic or treated for autism in the same way as Western nations. This leads me to my next area of interest. How do we treat autism in the US? How do other cultures treat autism or autistic-like symptoms? How are these treatments effective?

Bailey, A., Le Couteur, A., Gottesman, I., Bolton, P., Simmonoff, E., Yuzda, E., & Rutter, M. (1995). Autism as a strongly genetic disorder: evidence from a British twin study. *Psychological Medicine*, 25, 63–77.

This study suggests autism is a genetic disorder. This study examined a large population of monozygotic and dizygotic British twin pairs. There results showed 60% of monozygotic twin pairs were concordant for autism; whereas, no dizygotic twin pairs were concordant. Furthermore, 92% of monozygotic twin pairs were concordant for a broader definition of autism and other cognitive, social disorders. 10% of dizygotic twin pairs were concordant with this broader definition. Researchers concluded that these results showed a strong genetic influence on autism. I will use this article in my paper for this purpose. This research will show how genes

play a role in autism. This will provide a foundation or back round knowledge to support claims that autism is increasing because of a genetic influence.

Baron-Cohen, S., & Hammer, J. (1997). Parents of children with Asperger Syndrome: what is the cognitive phenotype? *Journal of Cognitive Neuroscience*, 9, 548–54.

Children with autism tend to have difficulty interpreting the way others think and feel, termed in this article as a difficulty to mindread. However, children with autism tend to have a keen attention to detail. For example, they can usually pick out a unique shape in a complicated picture rather quickly. This task is called the Embedded Figures Task in this article. In this study, researchers found that parents of autistic children perform similarly when tested for mindreading and the Embedded Figures Task. Results showed that parents performed well on the Embedded Figures Task and were impaired on mindreading. Researchers concluded that first-degree relatives of children with autism have a milder cognitive profile of autism or think similarly. This research supports the theory that genetic inheritance is an important role of autism. More specifically, it argues what type of genes can be passed for autism to occur.

Baron-Cohen, S., Wheelwright, S., Stott, C., Bolton, P., & Goodyer, I. (1997). Is there a link between engineering and autism? *Autism,* 1, 153–63.

This study examined the occupations of parents with autistic and non-autistic children. Results showed that fathers with autistic children were twice as likely to be engineers than fathers with non-autistic children. These results show that autistic children and fathers who are engineers share a cognitive phenotype. To explain, children with autism generally have a superior understanding of physicality. Meaning, they understand how objects behave in a predictable and mechanical way. Engineers also have and need a grasp on these theories and topics to excel in their field. This research reinforces that there is a genetic component to autism.

This research shows that certain people or certain types of thinkers have a higher chance of having an autistic child than others. It is important to note that in this study, the majority of engineers did not have an autistic child, and most of the parents of autistic children were not engineers. However, there was a connection that is intriguing and significant.

Baron-Cohen, S., Bolton, P., Wheelwright, S., Scahill, V., Short, L., Mead, G., Smith, A., (1988). Autism occurs more often in families of physicist, engineers, and mathematicians. *Autism*, 2, 296-301.

This study was conducted in a similar manner and found similar results to Simon Baron-Cohen's 1997 study of parental occupation. This study explains that children with autism have a heightened understanding of the mechanics of objects. Researchers found that participants who work in mathematics, engineering, and physics (which all utilize the understanding of mechanics in some fashion) are more likely to have a biological relative with autism than participants that work in other fields. Research argues again that results show a cognitive phenotype for autism. This supports the idea that certain people or certain types of thinker have a relation to autism.

Baron-Cohen, S. (2006). The hyper-systemizing, assortative mating theory of autism. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 30, 865–872.

This study argues that autistic children are systemizers. Generally, it is easy for a child with autism to understand patterns and rules, and systemizers prefer structure. Baron-Cohen argues that autistic children are categorized as systemizers as well as engineers, physicists, and mathematicians. From previous studies cited above, he argues that children with autism could be a result of having two sytemizers as parents. He uses his other studies of Embedded Figues Tak and occupation analysis to support his claim. This supports the genetic inheritance of autism and

provides a possible foundation of why autism is increasing in technology hubs, cities were the majority of occupations require a systemized way of thinking.

Bishop, D. V., Whitehouse, A. J., Watt, H. J., & Line, E. A. (2008). Autism and diagnostic substitution: evidence from a study of adults with a history of developmental language disorder. *Developmental Medicine & Child Neurology*,*50*(5), 341-345.

This study reexamines adults with language development disorders to see if they would be diagnosed with autism according to today's criteria. In the sample of 38 adults, 8 adults who had been previously diagnosed with language development disorders were now diagnosed with autism under today's criteria. This article argues that a change in the definition of autism can account for the increase of this disorder.

Buchen, L. (2011). When geeks meet. *Nature*, *479*(7371), 25-27.

This article explains the theory of how genetics influence the increase of autism. It is also important to my paper because it criticizes and questions this theory. The criticism argues that other factors such as the environment and changes in the definition of autism account for this definition which is a nice transition for the rest of my paper.

Cone, M. (2010). Autism Clusters Found in California's Major Cities. *Scientific American*, *6*.

This news article reports autism clusters in California, such as the Silicon Valley and Los Angeles. This article explains how these clusters are categorized as technological hubs. It also addresses other clusters in the United States. I will use this article in to show how autism clusters are found in other regions, not just Eidhoven, Netherlands. Also, Baron-Cohen is currently studying the Silicon Valley in support of his hypothesis.

Dufour-Rainfray, D., Vourc'h, P., Tourlet, S., Guilloteau, D., Chalon, S., & Andres, C. R. (2011). Fetal exposure to teratogens: evidence of genes involved in autism. *Neuroscience & Biobehavioral Reviews*, *35*(5), 1254-1265.

This study summarizes how exposure to valproic acid, ethanol, thalidomide, and misoprostol increases the prevalence of autism when exposed prenatally. Autistic patients brains and austic-like behaviors in animals that were exposed to teratogenic drugs are described in this article. Findings suggest that exposure to teratogens are associated with autistic behavior. However, the article also notes that more research needs to be done on this theory.

Feinstein, A. (2010). *A history of autism: Conversations with the pioneers*. Wiley-Blackwell.

This book provides an overview of how the definition of autism in the West has changed since it was first labeled in the 1940s. It explains the definition of autism in the 1940s and each DSM (I-V) of autism since. It shows how the subtle change in wording and the addition and subtraction of symptoms can account for the increase in diagnosis. This book also has a clear list of symptoms that currently define autism which will be helpful for my introduction.

Folstein, S. E., & Rutter, M. L. (1988). Autism: familial aggregation and genetic implications. *Journal of autism and developmental disorders*, *18*(1), 3-30.

This study argued that autism is inherited. Folstein and Rutter examined 21 monozygotic and dizygotic twin pairs. They found that 36% of monozygotic twin pairs were concordant for autism and none of the dizygotic twin pairs were concordant for autism. They also examined disorders of reading, language, or intelligence in families of autistic children. They found that there was a high rate of reading, language, or intelligence disorders in families of autistic children. This shows that there is a genetic predisposition to autism. This research helps support the argument that autism has a genetic basis.

Landrigan, P. J. (2010). What causes autism? Exploring the environmental contribution. *Current Opinion in Pediatrics*, *22*(2), 219-225.

This article gives a great overview of the existing argument of autism and environmental factors. It outlines what chemicals and toxins have been found to increase autism. Also it explains the amount of chemicals that are in our environment, and the amount of chemicals children are exposed to in the United States. These numbers are important to support this theory.

Roberts, E. M., English, P. B., Grether, J. K., Windham, G. C., Somberg, L., & Wolff, C. (2007). Maternal residence near agricultural pesticide applications and autism spectrum disorders among children in the California Central Valley.*Environmental Health Perspectives*, *115*(10), 1482.

This study examines the proximity of agricultural fields to the mother during pregnancy and autism. It found a mild association between proximity to agricultural fields during pregnancy and autism spectrum disorders. The association between these factors was minimal and researchers feel more studies need to be done in respect to autism and pesticides.

Rodier, P. M. (1995). Developing brain as a target of toxicity. Environmental Health Perspectives, 103(Suppl 6), 73–76.

This article explains how the developing brain is susceptible to exposure of harmful toxins. The brain is not fully developed at birth. Postnatal growth and mylenation occurs in the brain and is very important to development. This article explains how toxins interfere with the development and mylenation of the brain. This article supports the argument that environmental factors, such as chemicals and toxins found in our surroundings, can effect brain growth and development. This article provides the necessary information to how environmental factors increase autism.

Roelfsema, M. T., Hoekstra, R. A., Allison, C., Wheelwright, S., Brayne, C., Matthews, F. E., & Baron-Cohen, S. (2012). Are autism spectrum conditions more prevalent in an informationtechnology region? A school-based study of three regions in the Netherlands. *Journal of Autism and Developmental Disorders*, 42(5), 734–739.

This study examines the IT center of the Netherlands, the city of Eindhoven. Researchers found that children living in Eindhoven were 2-4 times more likely to be diagnosed with autism spectrum disorders than children living in Haarlem and Utrecht, two other cities studied. This research supports Baron-Cohen hyper-systemizers assortative mating theory. Eidhoven is a technological hub where occupations in engineering, mathematics, and physics dominate. The prevalence of parents and families with systemizing occupation and the prevalence of autism in Eindhoven show how autism is increasing. Many other hubs also exist in the United States and across the world which could be a reason for the increase of diagnosis.

Strömland, K., Nordin, V., Miller, M., Akerström, B., & Gillberg, C. (1994). Autism in thalidomide embryopathy: a population study. *Developmental Medicine & Child Neurology*, *36*(4), 351-356.

This study examined a sample of 100 people with thalidomide embryopathy. Thalidomide was a sedative drug administered regularly until the late 1960s. This drug stopped being administered because it caused birth defects when mothers took it during pregnancy. The studied showed that 4 out of the 100 people studied had autism along with other aliments because of this drug. They argued that thalidomide increases that rate of autism when compared to the general population.

Volk, H. E., Hertz-Picciotto, I., Delwiche, L., Lurmann, F., & McConnell, R. (2011). Residential proximity to freeways and autism in the CHARGE study.*Environmental health perspectives*, *119*(6), 873.

This study argues that living near a freeway or major roadways during pregnancy and after delivery is associated with autism. Researchers theorized that the proximity of the freeway or roadway exposed the child to air pollution. Association with air pollution and autism is needed. Also, autism was associated to living near a freeway during pregnancy rather than living near a freeway during the child's first year of life.

Windham, G. C., Zhang, L., Gunier, R., Croen, L. A., & Grether, J. K. (2006). Autism spectrum disorders in relation to distribution of hazardous air pollutants in the San Francisco Bay area. *Environmental Health Perspectives*, *114*(9), 1438.

This study examined children with autism and children without autism born in 1994 in the San Francisco Bay Area. The child's exposure to hazardous air pollutants were studied by examining where the child lived and the concentration of air pollutant in each area. They found higher concentration of air pollutants were associated with autism. However, researchers felt more studies on this topic needed to be conducted.

Wiley, A. S., & Allen, J. S. (2009). *Medical anthropology: a biocultural approach*. Oxford University Press.

This book explains how the treatment of autism can only be viewed in a cultural context. Understanding how we treat autism is a reflection of our cultural concept of health. This book explains the concept of biomedicine, which will be useful when researching and interviewing our formal ways of treating autism in the United States.

Wong, V. C., & Hui, S. L. (2008). Epidemiological study of autism spectrum disorder in China. *Journal of Child Neurology*, *23*(1), 67-72.

This study reports the prevalence of autism in China from 1986 – 2005. This study found that autism rates in China match autism rates in the Western world. China adopted the same

definition of autism as the Western world in the 1980s. I found this article interesting to support the idea that a definition can give rise and prevalence to this disorder. China's study goes from 1986 onward because records of autism arguably do not exist or are much lower before this.

Outline

Introduction

I. Definition
   a. To understand the prevalence and treatment of autism a definition of autism is needed. What is it? What is an autism spectrum?
   b. Autism is developmental disability with social, cognitive, and communicative deficits.
      i. Social
         1. Theory of Mind
            a. Children with autism have a difficult time understanding that other think differently from them.
         2. Joint Attention
            a. Children with autism have a difficult time coordinating attention with a social partner in relation to an object or an event.
            b. Social imitation and referencing is also a difficulty among autistic children.
      ii. Cognitive
         1. Weak central coherence
            a. Children with autism have a heightened attention to detail and often have difficulty seeing the bigger picture.
         2. Executive Dysfunction
            a. Children with autism have a difficult time planning and performing goal oriented activities
      iii. Communicative
         1. Language
            a. Deficits in language skills are found in the majority of autistic children
               i. Speech delay
   c. Autism Spectrum Disorders
      i. Autism is a complex disorder that is highly variable.
         1. High Functioning Autism
         2. Low Functioning Autism
II. Prevalence
   a. CDC Reports
      i. The Center for Disease Control and Prevention (CDC) states that the identified prevalence of autism spectrum disorders is increasing in the United States. In 2000, 1 in 150 U.S. children were diagnosed with autism spectrum disorders. Four years later, the CDC reported that 1 in 125

children were autistic. And today, 1 in 88 children are diagnosed with autism.

b. Research helps support and helped shape the CDC's findings.
    i. Schieve, Rice, and collegues conducted a study that compared the National Survey of Children's Health from 2003 to 2007. Results showed that the prevalence of autism in 2007 was twice the number recorded in 2003.
    ii. The Autism and Developmental Disabilities Monitoring Network conducted a study of 14 different areas in 2008. They surveyed medical records of 8 year-old children in the area. Results showed that on average 11.3 per 1,000 children were diagnosed in 2008. This was a 23% increase from 2006.
c. Purpose
    i. The purpose of this paper is to understand this phenomenon. Why is autism increasing in the United States?
    ii. Three theories support this increase
        1. Genetics
            a. Researchers have found autism clusters, regions with an incredibly high rate of diagnosis, to show how genetics influence the prevalence of this disorder.
        2. Environmental Factors
            a. Research shows a correlation between exposure during pregnancy to chemicals found in household products, pesticides, fertilizers, and other substances and autism.
        3. The Definition of autism
            a. Understanding how autism has been defined in history and its definition and prevalence in other cultures
    iii. Also, how do we care for children with this disorder? Autism is treated with many different types of therapies in the United States
        1. The United States has formally defined autism, therefore it is formally treated.
        2. Alternative therapies, Behavioral therapies, and Speech therapies are common forms of treatment.

Increased Prevalence of Autism: Genetics

The prevalence of autism is increasing because of the assortative mating of individuals with cognitive systemizing genes. This increase is seen and demonstrated in technology hubs.

I. Autism as a genetic predisposition

a. Research shows 92% of monozygotic twin pairs were concordant for autism.
b. Other studies show a significant concordance for autism, 36% of monozygotic twin studied.

II. What genes are more susceptible to autism?
a. Research shows a parents perform similarly to their autistic child on cognitive tasks
b. Research found that fathers of children with autism are twice as likely to be engineers as fathers of children without autism.
c. Research found that participants of study who work in mathematics, engineering, and physics are more likely to have a biological relative with autism

III. How do genes count for increase?
a. From the research above, autism result of two systemizers as parents. Argues assortative mating, like pairs with like
b. Technological hubs support this theory. Children living in Eindhoven, technological hub in the Netherlands, were 2-4 more likely to be diagnosed with autism.
c. Other clusters have been identified in technology hubs

IV. Criticisms
a. Theoretical research needs to be retested and replicated
b. Many of his studies used high-functioning autistic children
c. Other environmental factors

Increased Prevalence of Autism: Environment

The increased prevalence of autism is due to environmental factors such as teratogens, air pollution, and pesticides.

I. Effects of toxins on developing brain
a. Risks in our society
i. Children are exposed to 3000 synthetic chemicals produced in quantities of more that 1 million pounds per year. These chemicals are found in consumer products as well as air food and water. Studies have found that 200 industrial chemicals are harmful to the developing brain. (Landrigan, 2010).
b. Reasons
i. A infant's brain is susceptible to exposure of harmful toxins because it is not fully developed at birth. Postnatal growth and mylenation occurs in the brain and is essential to development. Exposure to toxins in the environment can negatively affect development and myleniation. (Rodier, 1995).

II. Toxins and autism

a. Teratogens
    i. This study examined a sample of 100 people with thalidomide embryopathy. Thalidomide was a sedative drug administered regularly until the late 1960s. This drug stopped being administered because it caused birth defects when mothers took it during pregnancy. The studied showed that 4 out of the 100 people studied had autism along with other aliments due to this drug. Researchers argued that thalidomide increased the rate of autism when compared to the general population. (Stromland, 1994).
    ii. Exposure to valproic acid, ethanol, thalidomide, and misoprostol increase the prevalence of autism when exposed prenatally. Studies researched autistic patients' brains and autistic-like behaviors in animals that were exposed to teratogenic drugs. Findings suggest that exposure to teratogens are associate with autistic behaviror. (Dufour-Rainfray, 2011).
b. Air pollution
    i. Researchers found a correlation between living near a freeway or major roadway while pregnant and having an autistic child. The study argues that the proximity of the freeway or roadway exposed the child pollution. (Volk, 2011).
    ii. Study examined children with autism and children without autism born in 1994 in the San Francisco Bay Area. The child's exposure to hazardous air pollutants were studied by examining where the child live and the concentration of air pollutants in each area. Findings suggest concentration of air pollutants were associated with autism. (Windham, 2006).
    iii. Study examined 279 children with autism and 245 control children. Researchers analyzed traffic-related air pollution at the mother's residency during pregnancy and the child's first year of life. Results showed that exposure to air pollution, specifically nitrogen dioxide, during pregnancy and the first year of life ways associated with autism. (Volk, 2013).
c. Pesticides
    i. Research examined the proximity of agricultural fields to the mother during pregnancy and autism. Results indicated a mild association between proximity to agricultural fields and autism spectrum disorders. (Robets, 2007).
    ii. A study by Shelton and Hertz-Picciotto outline and summarize the research to date of autism and pesticides. This study reviews and discusses certain aspects of pesticide exposure and how that is correlated to autism. (Shelton, 2012)

Increased Prevalence of Autism: Definition

Lastly, the prevalence of autism is increasing because the definition has broadened in recent years.

I. History: Process of Autism diagnosis and definition (Feinstein, 2010).
   a. Kranner
      i. Defined in 1943
      ii. Outlined five features: lack of affective contact with other people, desire for sameness, fascination with objects, language that does not intend for interpersonal communication, good cognitive potential in memory
   b. DSM
      i. DSM-I and DSM-II
         1. Recognized autism only with childhood schizophrenia and Kranner topics
      ii. DSM-III - 1980
         1. Autism as a separate entity with specific criteria
         2. DSM-III-R 1987
            a. Recognized a broader category for autism, included sub-groups pervasive developmental disorder and infantile autism
      iii. DSM-IV - 1994
         1. Empirical research created a longer list of symptoms
            a. Creation of Autism spectrum, broadening disorder once more
         2. Revision in 1994 to 2000. Only wording changed in symptom diagnose was “and” to “or”. This broadened the definition

II. Evidence for how changing definition can change diagnosis
   a. Diagnostic substitution
      i. Study reexamines adults with language development disorders to see if they would be diagnosed with autism according to today’s criteria, diagnostic standers. In the sample of 38 adults, 8 adults who had been previously diagnosed with language development disorders were now diagnosed with autism under today’s criteria. This article argues that a change in the definition of autism can account for the increase of this disorder. (Bishop, 2008).
      ii. Similarly, King and Bearman examined 7003 patinents that were born before 1987 (DSM-III-R published) with autism. 631 patients in the study were first diagnosed with mental retardation and then acquired a diagnosis of autism. They calculated the probability of acquiring a diagnosis as a result of the change in definition. They found that 26.4% of the increase in autism is accounted for this change in definition, these individuals had previously been diagnosed with mental retardation.
      iii. Croen and Grether conducted a study of birth cohorts in California for 1987-1994 to understand how a change in diagnosis contributed to the

increase of autism prevalence. Results showed an increase of autism through these years, from 5.8 to 14.9 per 10,000. They found that other factors like race, education, and maternal age did not influence this increase. However, they evaluated the prevalence of mental retardation throughout these years and found a decrease in its prevalence. This suggest that some cases of mental retardation were being diagnosed as autism in later years.

III. China
   a. This study reports the prevalence of autism in China from 1986 – 2005. This study found that autism rates in China match autism rates in the Western world. China adopted the same definition of autism as the Western world in the 1980s. Rates match increasing rates in the United States because China adheres to the same definition. (Wong, 2008).

IV. Africa
   a. Contrastingly, little is known about the prevalence of autism in Africa. Researchers have concluded that there is autism in Africa, but the rate of diagnosis is unknown. (Ametepee, 2009).
   b. Africa does not have the same definition of autism as Western nations. Researchers have found that some children studied have similar symptoms to autistic children in the West, but are not labeled as autistic or treated for autism in the same way as Western nations.
   c. Transition to next topic
      i. How do we treat autism in the US?
      ii. How do other cultures treat autism or autistic-like symptoms?
      iii. How are these treatments effective?

Treatment

I. Culturally relevant treatment
II. Therapies
   a. Behavioral
   b. Speech
   c. Alternative

Understanding the Increased Prevalence of Autism in the United States

Autism is a complex developmental disability with social, cognitive, and communicative deficits. Signs of these deficits usually appear before the age of three, and this disorder lasts throughout life (Center for Disease Control and Prevention, 2012). Socially, children with autism have a difficult time understanding that others think differently from them, and coordinating attention with a social partner. Being able to understand that others think differently is referred to as theory of mind or mentalizing. Children that lack these capabilities struggle with social situations, especially social learning and cooperating with others (Feinstein, 2010). Moreover, coordinating attention with a social partner is called joint attention. Deficits of joint attention can limit a child's ability to social reference as well as other aspects of social learning (Feinstein, 2010). Cognitively, children with autism have weak central coherence and executive dysfunction. Meaning, autistic children have a heightened attention to detail and often have difficulty seeing the larger picture, and they have a difficult time planning and performing goal oriented activities (Feinstein, 2010). Autistic children also have communicative deficits. Language abnormalities range from speech delay to being completely non-verbal (Feinstein, 2010). Moreover, others symptoms may include flapping hands, rocking their body, or spinning in circles. Autistic children hold to routine get upset with small life changes (Center for Disease Control and Prevention, 2012).

Though social, cognitive, and communicative deficits are common and defining of autism, each deficit is highly variable. Some autistic children may display all developmental abnormalities, while others may display a few. Previously, autism was divided into four different types of disorders: Autism, Asperger Syndrome, Childhood Disintegrative Disorder and Pervasive Developmental Disoder (PDD). Asperger Syndrome, Childhood Disintegrative

Disorder, and PDD are categorized as milder forms of autism (Center for Disease Control and Prevention, 2012). However, Autism's definition has changed recently. Each disorder is now under and referred to as Autism Spectrum Disorders, ranging from high functioning autism to low functioning autism (American Psychiatric Association, 2013). To clarify, in this paper, I will use the term autism. This is because the research referenced in this paper studies autism and Autism Spectrum Disorders is a relatively new term.

The Center for Disease Control and Prevention (2013) states that the identified prevalence of autism is increasing in the United States. In 2000, 1 in 150 U.S. children were diagnosed with autism. Four years later, the CDC reported that 1 in 125 children were autistic. In 2008, 1 in 88 children were diagnosed with autism. And today, the CDC reports that 1 in 50 children are autistic (Blumberg et al., 2013). The prevalence of autism is widely debated. However, all of the CDC's proclamations are grounded in research. Schieve and colleagues (2012) conducted a study that compared the National Survey of Children's Health from 2003 to 2007. Results showed that the prevalence of autism in 2007 was twice the number recorded in 2003 (Schieve et al., 2012). And, The Autism and Developmental Disabilities Monitoring Network (2012) conducted a study of 14 different areas in 2008. They surveyed medical records of 8 year-old children in the area. Results showed that on average 11.3 per 1,000 children were diagnosed in 2008. This was a 23% increase from 2006 (Baio, 2012). Lastly, the most current study conducted by Stephen J. Blumberg and colleagues (2013) compared the National Survey of Children Health from 2007 to 2011-2012. They found an approximate two percent prevalence of parent-reported autism in 2011-2012, creating a significant increase in the prevalence of this disorder from 2007 (Blumberg et al., 2013). The table shown below shows the significant

increase of parent-reported autism from 2007 to 2011-2012 found by Blumberg and colleagues (Blumberg et al., 2013).

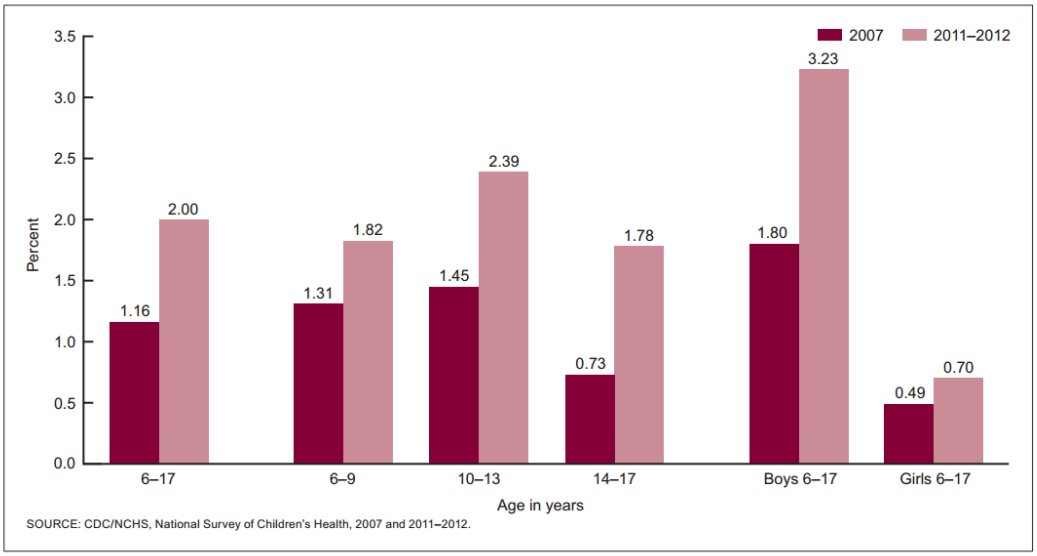

Figure 1. Percentage of children aged 6–17 years with parent-reported autism spectrum disorder, by age group and sex: United States, 2007 and 2011–2012

Reproduced from Blumberg et al., 2013

The increased prevalence of autism spectrum disorders is drastic and intriguing. The purpose of this paper is to understand this phenomenon. Why is autism increasing in the United States?

Four theories support the increased prevalence of autism in the United States: genetics, environmental factors, a changing diagnosis criteria, and cultural definitions of disorders. To expand, the first section of this paper will explain the increase in reference to genetics. Most researchers agree that there is a genetic disposition to autism (Bailey, 1995; Folstein, 1988). Researchers argue that some genes are more susceptible to autism (Baron-Cohen, 2006). And, researchers have found autism clusters, regions with an incredibly high rate of diagnosis, in technological hubs to demonstrate how genetics influence the prevalence of this disorder (Baron-Cohen, 2012). The next section of this paper will explain how the increased prevalence of autism may be associated with environmental factors. Research shows a correlation between autism and

exposure during pregnancy to teratogens, air pollution, pesticides, and phthalates. Furthermore, the last two sections will describe how a changing definition and cultural construction of autism may account for this increase. First identified in the 1940s, symptoms of this disorder have changed considerably. Its definition has expanded and with expanded criteria an increase in prevalence has been observed. Moreover, it is necessary to understand the increase of autism in a cultural context. We identified this group of symptoms, gave it a label, established it as a disorder, and now actively recognize it. Other cultures have also identified and accepted this naming of symptoms; however, some cultures do not define these developmental deficits in the same way. Many cultures might not even label these abnormalities as a disability or disorder. To explain this point, medical anthropological theory and cross-cultural research about other disorders and autism will be used.

Increased Prevalence of Autism: Genetics

Research suggests that autism is a genetic disorder (Bailey, 1995; Folstein, 1988). This knowledge is developed from twin studies. Bailey and colleagues (1995) conducted a study examining a large population of monozygotic and dizygotic British twin pairs. Their results showed 60% of monozygotic twin pairs were concordant for autism; whereas, no dizygotic twin pairs were concordant. Furthermore, 92% of the monozygotic twin pairs were concordant for autism spectrum disorders (Bailey, 1995). Moreover, other studies have found a significant concordance for autism. Folstein and Rutter (1988) examined 21 monozygotic and dizygotic twin pairs. They found that 36% of monozygotic twin pairs were concordant for autism, and none of the dizygotic twin pairs were concordant for autism. This knowledge shows that autism

has a genetic basis and leads to two research questions: What genes are associated with autism? And how do these genes account for the increased prevalence of autism?

Children with autism have cognitive deficits or a unique cognitive phenotype (Feinstein, 2010; Baron-Cohen, 2006). Specifically, Simon Baron-Cohen (2006) argues that autistic children have a systemizing cognitive phenotype. Children with autism tend to have a keen attention to detail, are able to understand patterns and rules, and prefer structure (Baron-Cohen, 2006). Interestingly, multiple studies by Simon Baron-Cohen have found that first-degree relatives of children with autism have a milder cognitive profile of autism or a milder systemizing cognitive phenotype (Baron-Cohen, 2006).

For example, research shows parents perform similarly to their autistic child on cognitive tasks (Baron-Cohen & Hammer, 1997). Baron-Cohen and Hammer (1997) tested autistic children and their parents on their ability to mentalize (interpret the way others think or feel) and their attention to detail. Attention to detail was measured using the Embedded Figures Task or picking out a unique shape in a complicated picture. Results showed that the autistic children performed well on the Embedded Figures Task and were impaired on mentalizing, agreeing with the systemizing cognitive phenotype. Likewise, parents performed well on the Embedded Figures Tasked and were impaired on mentalizing, showing a similar systemizing cognitive phenotype (Baron-Cohen & Hammer, 1997).

Moreover, Simon Baron-Cohen and colleagues (1997) conducted another study that examined the occupations of parents with autistic and non-autistic children. Results showed that fathers with autistic children were twice as likely to be engineers than fathers with non-autistic children (Baron-Cohen et al., 1997). Baron-Cohen and colleagues argue that there is a connection between engineer fathers and autistic children because of a similar cognitive

phenotype. This is because, as mentioned, children with autism have a keen attention to detail (Feinstein, 2010), which allows them to understand how objects behave in predictable and meaningful ways (Baron-Cohen et al., 1997). Engineers also utilize these skills in their field. Furthermore, Baron-Cohen and colleagues (1998) conducted another study examining parental occupation and autism. Researchers found that participants who work in mathematics, engineering, and physics (which all utilize the understanding of objects or mechanics in some fashion) are more likely to have a biological relative with autism than participants that work in other fields (Baron-Cohen et al., 1998). People with these occupations share a cognitive phenotype with autistic children, highlighting which genes are influential.

How, then, does a cognitive systemizing phenotype account for the increase of autism? From his previous research, Simon Baron-Cohen (2006) concludes this increase is the result of the hyper-systemizing, assortative mating theory of autism. He theorizes that autism could occur more frequently as a result of having two parents with cognitive systemizing phenotypes (Baron-Cohen, 2006). He then hypothesizes "that an area that [includes] a high proportion of systemizers might lead to a higher prevalence of autism in offspring" (Baron-Cohen, 2006). Technological hubs, major cities or regions with the majority of occupations in IT and technology, support his hypothesis. Those employed in occupations in technology hubs are generally engineers, mathematicians, and physicists or people with cognitive systemizing phenotypes. To test his hypothesis, Roelfsema and colleagues (2012) examined a technological hub in the Netherlands, the city of Eindhoven. Researchers found that children living in Eindhoven were two to four times more likely to be diagnosed with autism spectrum disorders than children living in Haarlem and Utrecht, two other cities included in the study which are not considered technological hubs (Roelfsema et al., 2012). Therefore, Eindhoven is an example of a technology

hub as well as an autism cluster, a city or region with high rate of diagnosis. Other technological hubs are also labeled as autism clusters. For example, the Silicon Valley in Northern California is a technological hub with a very high rate of autism (Buchen, 2011). Specifically, in California alone, ten different regions are considered to be autism clusters: Torrance, Beverly Hills, Van Nuys, Calabasas, Laguna Beach/Mission Viejo, La Jolla/Del Mar, San Francisco, Sunnyvale/Santa Clara, Redwood City, and Fresno (Cone, 2010). Simon Baron-Cohen argues that this is because like-minded people are living in the same region, meeting, and having children.

Simon Baron-Cohen's theory about genetics linked to the increase of autism diagnosis is noteworthy, but it does not go without critique. Many academics are intrigued by Baron-Cohen's theory, but think his studies need to be replicated and need more data (Buchen, 2011). Moreover, others academics disagree with his theory entirely. For example, Irva Hertz-Picciotto, an epidemiologist at the University of California, Davis, found autism clusters that were not in a technology hub (Buchen, 2011). Critiques argue that there is more to this puzzle than genetics and turn to environmental factors and the changing definition of autism for answers.

Increased Prevalence of Autism: Environmental Factors

Synthetic chemicals are found in everyday consumer products and are emitted into air, food, and water (Landrigan, 2010). These products often make life easier, so production of synthetic chemicals is increasing (de Cock, Maas, & van de Bor, 2012). Today, infants are exposed to 3,000 synthetic chemicals produced in quantities of more than 1 million pounds per year (Landrigan, 2010). The increase of synthetic chemical production and use could be associated with increased prevalence of autism (de Cock, Maas, & van de Bor, 2012). This is

because synthetic chemicals can be harmful to an infant's brain. An infant's brain is not fully developed at birth. After birth, the brain grows rapidly and myelination, the coating of nerves in myelin for faster synapses, occurs (Rodier, 1995). However, exposure to toxins in the womb and after birth can negatively affect brain development and decrease myelination (Rodier, 1995). This can have significant impacts on development, and autism is one developmental disorder that may be associated with environmental toxin exposure (Landrigan, 2010). Specifically, the increased prevalence of autism may be associated with environmental factors such as teratogens, air pollution, pesticides, and phthalates.

To begin, teratogens are drugs or other substances that cause developmental abnormalities of a fetus (Dufour-Rainfray et al., 2011). Two studies show a correlation between teratogens and autism. Firstly, K. Stromland and colleagues (1994) examined a sample of 100 people with thalidomide embryopathy, birth defects because of the drug thalidomide. The results showed that four out of the 100 people had autism along with other ailments. Stromland argues that this rate of diagnosis was high compared to the general population (Stromland et al., 1994). Secondly, Diane Dufour-Rainfray and colleagues (2011) explain in their study that exposure to valporic acid, ethanol, thalidomide, or misoprosol increased the prevalence of autism when exposed prenatally. This knowledge was gathered from multiple case studies and research conducted on mice (Dufour-Rainfray et al., 2011). Research shows that teratogens may be associated with autism. It is important to note that teratogens are usually associated with other symptoms also.

Air pollution may be associated with the increased prevalence of autism as well. Heather E. Volk and colleagues (2011) found a correlation between living near a freeway or major roadway while pregnant and having an autistic child. They argue that proximity of the freeway to

the mother's house exposed her child to air pollutants (Volk et al., 2011). Furthermore, Heather E. Volk and colleagues (2013) conducted a follow-up study. Researchers analyzed traffic-related air pollution at the mother's residency during pregnancy and the child's first year of life. Results showed that exposure to air pollution, specifically nitrogen dioxide, during pregnancy and the first year of life were associated with autism (Volk et al., 2013). Moreover, Gayle C. Windham and colleagues (2006) conducted a study examining children with autism and children without autism born in 1994 in the San Francisco Bay Area. Each child's exposure to hazardous air pollutants was studied by examining where the child lived and the concentration of pollutants in each area. They found that areas with higher concentrations of air pollutants had higher rates of children with autism (Windham et al., 2006).

Furthermore, autism may be associated with pesticide exposure and phthalates. Firstly, Eric Roberts and colleagues (2007) examined the residences of mothers near agricultural pesticide applications and autism. Results showed mothers living near pesticide application during gestation were six times more likely to have an autistic child (Roberts et al., 2007). Furthermore, researchers saw an association between higher rates of autism and increased amount of pesticides applied to the field and an increased proximity between the mother's home and field (Roberts et al., 2007). Secondly, phthalates are associated with autism. Phthalates are commonly found in food packaging, children's toys, personal care products, and fragrances (Miodovonik et al., 2011). Also, PVC flooring is a source for airborne phthalates (Larsson et al., 2007). Malin Larsson and colleagues (2009) researched the connection between children living in homes with PVC flooring and autism. From their research, they found that children living in homes with PVC flooring had higher rates of autism diagnosis (Larsson et al., 2009). Moreover, Amir Miodovnik et al. (2010) found an association between phthalates and autism-like

symptoms. Miodovink et al. analyzed the phthalate concentration in the urine of women in their third trimester, and then the women were asked a follow-up survey of their child's behavior years later. They found that women with higher concentrations of phthalates in their urine, which exposed their children to phthalates prenatally, were more likely to have children with social deficits (Miodovink et al., 2010).

From this research, many environmental factors, such as teratogens, air pollution, pesticides, and phthalates, are linked to autism. And, the widespread production and use of these chemicals could be associated with the increased prevalence of autism (de Cock, Maas, & van de Bor, 2012). However, it is important to note that the findings in these studies only show a correlation between autism and a specific environmental factor. There could be many other factors contributing to autism, and it is difficult to determine a specific cause. Researchers were aware of this in their studies. Many advocated that more research needs to be done to understand how environmental factors contribute to the increased prevalence.

Increased Prevalence of Autism: Changing Diagnosis Criteria

In 1943, American psychiatrist Leo Kranner first defined autism in his paper "Autistic disturbances of affective contact" (Feinstein, 2010). His paper described five features of this disorder: lack of affection with other people, a need for sameness and routine, a heightened interest in objects, good memory skills, and language abnormalities (Feinstein, 2010). Kranner also explained that that autism occurs at birth or very early in life and is a unique syndrome (Feinstein, 2010). The definition of autism has changed considerably since 1943, and redefining this definition influences the prevalence of autism.

For example, the definition and understanding of autism that Kranner established in 1943 changed by 1947. Many began to recognize autism as childhood schizophrenia (Feinstein, 2010). In 1952, the first edition of the Diagnostic and Statistical Manual (DSM) explained that schizophrenic reactions in children were autism; there was no difference between the two disorders (Feinstein, 2010). This idea was also present in the DSM-II (Feinstein, 2010). Then autism was redefined in 1980 with the DSM-III. The DSM-III separated autism and childhood schizophrenia and recognized autism as its own entity with specific criteria (Feinstein, 2010). The general category of autism was listed as 'pervasive developmental disorder' with a subcategory named 'infantile autism', and infantile autism was defined by Kranner's original features (Feinstein, 2010, pg. 178). Ph. Cialdella and N. Mamelle (1989) found that the different DSM-III criteria influenced the prevalence of autism in the Rhone region of France. Researchers observed the prevalence of autism was 10.8 per 10,000 children before using the DSM-III. And when the DSM-III was used, the prevalence of autism significantly decreased to 5.1 per 10,000 children (Cialdella & Mamelle, 1989). They argued that the DSM-III omitted many schizophrenic symptoms, which dropped the diagnosis rate in Rhone by half (Cialdella & Mamelle, 1989). This research exemplifies how a definition can impact the rate of diagnosis.

The rate of diagnosis was influenced by the change of criteria from the DSM-III to the DSM-IV as well. In 1994, the DSM-IV was published and changed the definition once more. This edition grounded autism in empirical evidence and stated that social deficits and attention to detail were the core features of autism (Feinstein, 2010). The DSM-IV explained and outlined four autism-related disorders: autistic disorder, Asperger's disorder, childhood disintegrative disorder, and pervasive developmental disorder (American Psychiatric Association, 2013). With

this change, research suggests that the new expanded criteria of the DSM-IV influenced the increased prevalence of autism.

For example, Dorothy Bishop and colleagues (2008) reexamined adults with language development disorders to see if they would be diagnosed with autism according to the DSM-IV standards. In the sample of 38 adults, 8 adults who had been previously diagnosed with language development disorders were now diagnosed with autism under the DSM-IV criteria (Bishop, 2008). The definition of symptoms changed the disorder these adults had. Similarly, Marissa King and Peter Bearman (2008) researched the increased prevalence of autism from 1992 to 2005. They gathered 7003 autistic patients from the California Department of Developmental Services that were born before 1987. 631 patients in the study were particularly interesting. These patients were first diagnosed with mental retardation and then were diagnosed with autism years later. King and Bearnman attributed this to the change in autism diagnosis. They then calculated that 26.4% of the increase of autism diagnoses from 1992 to 2005 could be associated with the patients previously diagnosed with mental retardation (King and Bearman, 2008).

Furthermore, Lisa A. Croen and colleagues (2002) researched the prevalence of autism by analyzing birth cohorts in California from 1987 to 1994. Results showed that the prevalence of autism increased from 5.8 to 14.9 per 10,000 children during this time. Race, education, and maternal age did not account for this increase. However, Croen and colleagues found that the change in diagnosis criteria between these years may have influenced the increase. They explain that children born from 1987 to 1990 were diagnosed with the DSM-III criteria; whereas, children born from 1990 to 1994 were diagnosed using criteria outlined in the DSM-IV (Croen et al., 2002). Also, Croen and colleagues found an increased prevalence of autism during the years studied and a decreased prevalence of mental retardation. This may be associated with the

broadening of the definition of autism in the DSM-IV, which allowed the reclassification of mental retardation as autism (Croen et al., 2002).

All three studies suggest that the change in diagnosis criteria or the expanding definition accounts for the increased prevalence of autism. Each study stressed a correlation between the change in definition and the increased prevalence, not a cause. They argue that many other factors could account for the increased prevalence of autism as well. As mentioned in the introduction, the DSM-V, coming out this year, will change the criteria for autism again. With this new edition, autism is defined and diagnosed as Autism Spectrum Disorders (America Psychiatric Association, 2013). Meaning, there are not four separate disorders related to autism. It will be defined as one disorder with a range of severity. Research needs to be conducted to see if this change in criteria is associated with the prevalence of autism.

Increased Prevalence of Autism: Cultural Definition

To continue, understanding the prevalence of autism in other cultures explains how a definition alone can account for the increased prevalence in the United States. In their study, Virginia C. N. Wong and Stella L. H. Hui (2008) observed a steady increase in the prevalence of autism in Hong Kong from 1986 to 2005. They argue that China's autism rates match the autism rates in the Western world. This makes sense because China adopted the Western definition of autism in the 1980s (Wong & Hui, 2008). Wong and Hui point out that China uses the same criteria, the most recent edition of the DSM, for diagnosis. As mentioned in previous research, Wong and Hui speculate that the changing criteria from the DSM-III to the DSM-IV could influence the increased rate of diagnosis (Wong & Hui, 2008). In contrast, little is known about the prevalence of autism in Africa. Researchers acknowledge that there is autism in Africa, but

the rate of diagnosis is unknown (Ametepee & Chitiyo, 2009). Why is this? Autism may exist in Africa, but perhaps it is defined and recognized in a different way. Maybe in Africa the social, cognitive, and communicative deficits of autism are not considered to be deficits at all. To explain this point, I would like to use anthropological theory and cross-cultural examples.

To show how autism could be defined differently cross-culturally, I will begin with an explanation of normality and abnormality. Ruth Benedict (1934) explains in her article "Anthropology and the Abnormal" that normality is culturally constructed. Benedict argues that customs and human experience are highly variable. What is considered to be abnormal in one culture could be completely acceptable, even revered, in others and vise versa. To support her claim, Benedict explains how shamans in the Shasta tribe of California, Siberia, and Zulu of South Africa all have trances or seizures. In these particular cultures, seizures do not need some sort of medical treatment, but rather it allows these individuals to hold the high status of shamans and generally give medical support (Benedict, 1934). Andrea S. Wiley and John S. Allen (2009) expand on Benedict's argument in their book *Medical Anthropology: A Biocultural Approach.* They explain that medical anthropology recognizes that standards of health and disease have fluidity between cultures and over time (Wiley & Allen, 2009). Like Benedict, they argue that what is seen as healthy or normal in one culture might not be consistent across others, and what is seen as unhealthy or abnormal in one culture might not be of concern across others. Benedict explains this thought with cross-cultural understandings of seizures. I would like to expand on this idea using cross-cultural understandings of attention deficit hyperactivity disorder (ADHD) and Down syndrome as well as autism. These examples will then provide parallels to help make the claim that simply defining autism accounts for its increased prevalence.

First, The Center for Disease Control and Prevention (2010) explains that ADHD is a neurobehavioral disorder that causes impulsive behavior, difficulty in paying attention, and an overactive disposition. In the United States, ADHD is commonly treated with medication (CDC, 2010). Contrastingly, Japan treats overly active, distracted children differently. Lois Peak (1989) explained in her article "Learning to become part of the group: The Japanese child's transition to preschool life" that symptoms of ADHD are not considered to be behavior problems in Japanese preschools. A child's energy is simply accepted and tolerated. Peak notes that Japanese preschool teachers were confused and appalled when they learned American children are often diagnosed and medicated for hyperactivity (Peak, 1989). This contrast shows how disorders can be culturally constructed. The Japanese believe that a child who struggles with paying attention and is loud is simply energetic; whereas, Americans often believe a child with this same personality should take medication.

This concept is seen with the cross-cultural understanding of Down syndrome as well. First, Down syndrome is defined as a genetic disorder where an individual has an extra copy of chromosome 21 (National Down syndrome society, 2012). This genetic difference causes developmental delays and unique physical characteristics (National Down syndrome society, 2012). The United States accepts and uses this definition of Down syndrome and treats accordingly. However, Katherine A. Dettwyler (1994) explains in her ethnography *Dancing Skeletons: Life and Death in West Africa* that Africa defines Down syndrome very differently. Dettwyler explains that while conducting fieldwork on malnourished children in Mali, she encountered a child, Abi, with Down syndrome. She was particularly excited because she too has a child, Peter, with Down syndrome. Dettwyler began to talk to Abi's parents about Abi's condition. She recalls their conversation:

> I looked up at her mother. 'Do you know that there's something 'different' about this child?' I asked, choosing my words carefully.
>
> 'Well, she doesn't talk,' said her mother, hesitantly, looking at her husband for confirmation. 'That's right,' he said. 'She's never said a word'.
>
> 'But she's healthy?' I asked.
>
> 'Yes,' the father replied. 'She's like the other kids, except she doesn't talk. She's always happy. She never cries. We know she can hear, because she does what we tell her to. Why are you so interested in her?' (Dettwyler, 1994, pgs. 97-98)

To Abi's parents Abi did not even have a disorder. She was generally healthy child, she did not need treatment, and she did not have a label. From this experience Dettwyler is overcome with emotion and explains the impact of culturally defining or not defining disorders. She eloquently states:

> I cried for Abi—what a courageous heart she must have; just think what she might have achieved given all the modern infant stimulation programs available in the West. I cried for Peter—another courageous heart; just think of what he might achieve given the chance to live in a culture that simply accepted him, rather than stereotyping and pigeonholing him, constraining him because people didn't think he was capable of more…Children in the United States had the freedom to attend special programs to help them overcome their handicaps, but children in Mali had freedom from the biggest handicap of all—other people's prejudice. (Dettwyler, 1994, pg. 99)

Abi and Peter show how disorders can be culturally constructed. They might have the same symptoms or look similar, but they are treated in different ways.

Like ADHD and Down's syndrome, autism is culturally constructed. To begin, Elinor Ochs, Tamar Kremer-Sadlik, Karen Gainer Sirota, and Olga Solomon (2004) explain in their article "Autism and the social world: an anthropological perspective" that "the DSM-IV-TR lists as a diagnostic criterion for autism the 'failure to develop peer relationships appropriate to developmental level' yet does not distinguish between interpersonal and socio-cultural acumen needed to establish and maintain a developmentally appropriate peer relationship" (pg. 155). They explain that peer relationships and social norms are culturally variable. This shows that our definition of autism may not be translate to other cultures and continues to beg the question of what is 'developmentally appropriate', what is 'normal'? Other cultures that do not use our outlined definition of autism still have children with social, communicative, and cognitive deficits. However, they have different cultural standards about what is 'developmentally appropriate'. This theory is reiterated with the Navajo concept of autism.

Jeanne L. Connors and Anne M. Donnelan (1993) observed, interviewed, and surveyed 34 Navajo families with children that had autism according to Western definition. However, these children with autism-like symptoms were not diagnosed with autism in their community. Their research shows that the Navajo have a different view of childhood, adulthood, and disability from the West. They believe that children are allowed to do whatever they want. Children are encouraged to explore and are not corrected for wrongdoings (Connors & Donnelan, 1993). When children turn six years old, they take on more responsibilities, learn appropriate behavior, and begin the transition into adulthood (Connors & Donnelan, 1993). However, children with autistic-like behaviors do not make this transition. The Navajo believe that children with what the West would categorize as disabilities take on responsibilities that they feel fit while still having the freedom they had in childhood. The Navajo adjust and accept

variance in children's behavior and developmental trajectory. Connors and Donnelan explain that the Navajo have no words for disabilities, disorders, or mental impairments, and the Navajo simply allow differences in development (Connors & Donnelan, 1993).

Like Benedict argues, we have culturally defined autistic attributes as abnormal under an official diagnosis. Leo Kranner identified this group of symptoms and gave it title. From the 1940s on, this title has evolved and has become custom in our culture. Today, many individuals identify with having this disorder, and research on autism, guidelines on how to diagnose autism, fundraisers for autism, and autism treatment centers exist.

Perhaps it is for this reason that autism is increasing in the United Sates. Because we have culturally defined this disorder, we are actively looking for it and diagnosing it. Ka-Yuet Liu, Marissa King, and Peter S. Bearman (2010) explain that the increased prevalence of autism is associated with the spread of the cultural definition of autism. They found that children in California living near other autistic children are more likely to be diagnosed with autism than children that lack exposure (Liu, King, & Bearman, 2010). Researchers thought the observed increase could be from similar people living in the same neighborhoods, environmental toxins, or viruses. Their study does not dismiss these theories. However, their study included a variety of communities in California, where viruses and toxins may not translate. The strongest correlation they found for the increased prevalence of autism was the social influence and social diffusion of autism. Results showed that children interacting with autistic children and parents conversing with parents of autistic children created awareness of symptoms and a sensitivity to this disorder (Liu, King, & Bearman, 2010). This shows that our cultural understanding and awareness of autism may influence the increased prevalence of autism.

In conclusion, this section suggests that cultures construct their views of disorders and development. Cross-cultural research on ADHD, Down Syndrome, and autism show that cultural constructions of disorders are highly variable. Furthermore, research suggests that social diffusion can influence the prevalence and people's perception of disorders. This theory has limitations, and I propose it with sensitivity. I believe it is beneficial to diagnose and help children with autism in our culture. We have the resources to make strides with developmental deficits. However, I think it is also very necessary to understand the cross-cultural variability of autism. From researching how other cultures define autism, we might learn or take on a new perspective that can help our own children.

Concluding Thoughts

In this paper, four different theories are outlined to help explain why autism is increasing in the United States. Each theory proposes a unique argument for this phenomenon. While I was researching these theories, I had the opportunity to shadow an independent contractor specializing in early intervention for autistic children. She worked with children to improve their speech and behavior and worked with parents so they could help their child too. Throughout the day, I would try to figure out why these children had autism. Did they have an engineer for a father? Did they live near a freeway? Were they diagnosed with the DSM-IV criteria? Or are their symptoms only culturally relevant? At the end of the day, I did not come up with an answer. Each theory described is equally valid. It is difficult to pick out the root cause for the increased prevalence of autism because our environment is so complex. I think it is important to understand and appreciate each theory. To understand this phenomenon, it is important to recognize each aspect of our environment. Our environment includes genetic dispositions,

environmental factors, and cultural influences. The increased prevalence of autism is not a simple occurrence, and our environment is not simple either.

Furthermore, it is difficult to say one of four theories is superior than the other because they all occur under the same time frame. Meaning, the creation of technological hubs occurred along with the increased production and use of chemicals. And, the change of definition and increased awareness of the cultural definition also happened simultaneously. I think it is important to understand the increased prevalence of autism in a holistic context. That is why I researched each theory. To understand the increased prevalence of autism, it is necessary to understand its entirety. Moreover, to fully understand autism, I believe we should appreciate the cross-cultural variation in autism's meaning, diagnosis, and prevalence. Also, the theories describe might not be the only answers. The are other possible theories, like maternal age associated with autism, or other theories that haven't even been developed that could provide answers to this phenomenon.

Future Research

The last theory explained in this paper argued that autism is a culturally defined disorder. And if autism is culturally defined, that also means it is culturally treated. In the future, I would like to research how autism is treated in the United States.

While shadowing the independent contractor, I observed many treatments to help autistic children. In one day, I watched specialists use five treatments: Hanen Method, DIR/Floortime, Evidence Based Practices training modules, operational therapy, and applied behavior analysis. Each practice takes a slightly different approach and targets a different developmental deficit to help autistic children. For example, the Hanen method helps treat communicative deficits of

autistic children. This strategy believes the most effective ways to help speech delay and speech problems are early intervention and the involvement of the child's parents. Professionals focus on providing the parents with strategies and knowledge to help their child early in life (Hanen Centre, 2011).

The DIR/Floortime Method has a different treatment philosophy. Developed by Dr. Stanley Greespan, DIR stands for development, individual differences, and relationship-based methods. Meaning, this framework argues that the most effective way to help a child with autism is to create a treatment plan that considers the developmental stage of the child as well as the child's preferences and strengths (DIR Floortime, 2007). This framework is carried out using Floortime, which follows a child's interest (usually while playing) and creates a learning situation off of this interest (DIR Floortime, 2007).

In contrast, Evidence Based Practices training modules are specific, fixed treatments that are backed behind scientific, peer-reviewed research. The National Professional Development Center on Autism Spectrum Disorders outlines 24 Evidence Based Practices. These practices help modify behavior and improve social skills (National Professional Development Center on Autism Spectrum Disorders). Moreover, occupational therapy focuses treatment on bettering fine and gross motor skills to help autistic children in their day to day routines. Occupational therapy treats children with autism through evaluation and intervention (American Occupational Therapy Association, 2011). Lastly, applied behavior analysis uses specific planned techniques to guide and change behavior for everyday situations (Autism Speaks, 2013). The five observed treatment methods have some overlap, but are distinct from one another. The methods have different treatment styles and target different developmental deficits.

Even further, these described treatments are only some of the treatments available to children with autism. The Central Coast Autism Spectrum Center outlines multiple treatments available to autistic children in San Luis Obispo County. They outline the treatments described as well as alternative treatments like oxygen therapy, music therapy, and counseling services (Central Coast Autism Spectrum Center, 2013). Every treatment method argues that it is effective and backed by research. But, what research exists to support the success of these treatments? Which treatments target the different developmental deficit of autism? And are some treatments more beneficial to others?

The purpose of my research would be to understand treatments for autism in the United States. And, to fully understand how we treat autism, it would be necessary to research how other cultures treat autism as well. First, do they use our same definition of autism? If yes, do they use our same treatment methods? If no, how do they interact, socialize, or help a child with social, cognitive, and communicative deficits? I believe that understanding autism in other cultures could help children with this disorder in our own.

Lastly, this current paper and ideas for future research barely scratch the surface of autism. Autism is so complex, and there are many other topics to explore besides increased prevalence and treatment. Research has been done and can be further explored about diagnostic criteria, diagnostic tests, parent-child relations, and education. I would propose that we could look at each topic of autism with an anthropological lens and holistic view point. Elinor Ochs, Tamar Kremer-Sadlik, Karen Gainer Sirota, and Olga Solomon (2004) argue in their article "Autism and the social world: an anthropological perspective" that "Autism is the last frontier of anthropology" (pg. 172). Cross-cultural research and anthropological perspectives of this disorder would be beneficial.

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