Autism as a Global Challenge: Examining the Increased Childhood Prevalence of Autism

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ABSTRACT

Autism Spectrum Disorders (ASD) are a spectrum of conditions that are generally characterized by language deficits, restricted interests, social communication impairments, motor deficits, and repetitive behaviours. This paper examined the increased childhood prevalence of autism globally by analyzing studies conducted in specific countries through three underlying research aims. The aims are to determine the prevalence and diagnostic criteria of ASD within countries, to find out the international explanations for the increased prevalence of ASD, and to establish the extent of epidemiological consistencies between countries. Although the findings generally paint a picture of an increased ASD prevalence, researchers fail to agree on the reasons for this. Several countries that do not report this increase attribute the inconsistency to a lack of reliable studies. Further research is necessary to establish the link between cultural behaviours and beliefs to the prevalence rates, and also to provide a substantiated and definitive etiology of ASD.

Introduction

General Description

Researchers have defined autism as a neurodevelopmental disorder that affects an individual's ability to interact and communicate with other people (Boutot, 2017). It is regarded as one among the most pervasive developmental abnormalities, generally observed through difficulties in social interactions and communication, extremely narrowed interests, motor deficits, and highly repetitive behaviour (Boutot, 2017). Researchers posit that autism manifests itself within the first three years of a person's life, although it remains characterized as a life-long condition that continues to affect an individual from infancy to adulthood. It is also worth noting that several pervasive developmental disorders, such as Asperger's syndrome, now fall under the DSM-IV definition of Autism Spectrum Disorder (Boutot, 2017). It should also be acknowledged that many individuals with autism continue to lead independent and satisfying lives. On the other hand, other individuals with autism find that it impacts their quality of life significantly (Elsabbagh et al., 2015). This leads to the ratiocination that cases of autism cannot be perceived as having identical impacts on the diagnosed individuals, thereby underlining the imperative to refrain from the adoption of a one-size-fits-all conceptualization of autism.

Since autism's pioneering studies in the 1960s, sources of data on the disorder has become prolific, extensive, and comprehensive. The main areas of academic focus in the extant literature have been predicated on both a global and domestic scope of analysis that seeks to examine the rise in prevalence of ASD cases, establish the etiology of the disorder, and identify treatment plans for individuals living with ASD. There is a general consensus in the literature that attests to the global increase in the prevalence of ASD. However, there is some lack of consistency in relation to the attribution of the trend to the concurrent increase of risk factors in the respective populations. The more recurrent finding in the literature is that the increase in prevalence can be ascribed to factors including the changes and implementation of a broader scope of the diagnostic criteria, younger age at diagnosis, readily available and accessible

services, and the increasing global awareness (Kogan et al., 2018). In the context of the etiology of ASD, the causes and their possible effects on the global prevalence have been analyzed extensively. Boutot (2017) admits that there does not appear to be a single cause of ASD but rather a combination of genetic and environmental factors that have a significant impact on increasing the risk of having the disorder.

Vatanoglu-Lutz et al. (2014) point out that the treatment plans for ASD are predicated on the imperative to diminish the consociated deficits and distress on the family. The additional mandate of the treatment plans is to boost functional independence, thus increasing the standard of life for the person with ASD (Vatanoglu-Lutz et al., 2014). However, there is no universally applicable treatment protocol, with the commonplace reality being the use of a customized treatment plan for individuals with ASD (Vatanoglu-Lutz et al., 2014). This also complements the earlier noted perspective to refrain from a one-size-fits-all approach to ASD. Finally, the primary resources for the treatment of ASD extend beyond the traditional healthcare facilities, to encompass the family unit as well as educational institutions (Vatanoglu-Lutz et al., 2014).

Identification of Specific Research Aims

The pertinent backdrop of the research is the aforementioned trend capturing the increase in the prevalence of autism on a global scale, which has been ascribed to a range of factors that are either global or national context specific. The commonly cited factors include the availability of services, diagnostic criteria, and the intersection of socio-economic factors, among others. These hypotheses prompted the objective of this paper in critically analyzing the global explanations for the rise in prevalence rates of Autism Spectrum Disorder diagnoses in children. The secondary objective of this paper is premised on the establishment of consistency in relation to the reasons for this increased prevalence, with further probing analysis warranted in instances where consistency cannot be established.

The research goals are organized to examine three critical sections, namely the prevalence and diagnostic criteria of Autism Spectrum Disorders within countries, the international explanations for the increased prevalence of Autism, and the extent of epidemiological consistencies between countries. The methodological approach of each of the research objectives is further expanded subsequently.

Prevalence and Diagnostic Criteria of Autism Spectrum Disorders within countries

The methodological approach for this research objective adopts a country-by-country strategy, focusing on the specific countries that are the subjects of recent primary research. The definition and categorization of Autism Spectrum Disorders from those countries are also investigated under this research aim. Lastly, an overview of the diagnostic processes used to identify children with autism is outlined. This then provides the contextual backdrop to the discussion on the prevalence rates of Autism Spectrum Disorder reported in each country.

International Explanations for the Increased Prevalence of Autism

This objective seeks to ascertain the degree of increased prevalence of Autism Spectrum Disorder cases among children as well as the underlying attribution factors applicable to specific countries in the global framework. Research from the various countries is critically appraised, and the discussion that ensues provides some insight into how researchers from multiple countries perceive autism and the explanation for its prevalence. Moreover, this research aim can be framed as the launch pad for the subsequent investigation on the consistency of available research on the epidemiology of Autism Spectrum Disorder between the different countries.

The Extent of Epidemiological Consistencies between Countries

This section entails a synthesis of the prior research objectives, with the aim of investigating the degree of consistency in the global epidemiology of Autism Spectrum Disorder. The analysis is therefore predicated on evaluating the

contemporary dynamics of the disorder from a cross-country narrative approach, with emphasis on prevalence rates among children.

Although the global prevalence rates of autism are observed to be on an upward trend globally, the trend is not universally applicable. A comparison of the research from several countries around the world is conducted to identify the variation between countries that reflect the global trend in terms of higher prevalence, against their counterparts. Ultimately, an analysis of the research is carried out to establish the reasons for this inconsistency between countries with regard to the rise in prevalence of Autism Spectrum Disorder cases in children. Lastly, this research objective seeks to establish if a gap exists concerning the research that is conducted globally about the epidemiology and prevalence of Autism Spectrum Disorder.

Significance

The global research on autism significantly falls behind that conducted on other psychiatric disorders and medical conditions. This retardation is attributable to the flawed concepts pertaining to autism that emerged in the aftermath of its clinical identification in 1943 (Thurm & Swedo, 2012). The most notable of these misconceptions was the supposition that autism was a result of parenting failures and 'refrigerator mothers', insinuating the absence of maternal warmth and neglect.

In the 1950s and 1960s, mother struggling to raise their autistic children bore an additional burden that is difficult to imagine. Instead of receiving help from child psychologists and other professionals, these mothers were told they had not connected or bonded with their child because of their inability to properly relate to the autistic child (Boutot, 2017). This theory also postulated that because of maternal coldness and inadequate parenting, these children felt hopeless and were unable to fight what was considered a psychiatric disorder (Boutot, 2017). It seems that the general notion during this time in society was that the mother was responsible for causing autism in their children. This 'refrigerator mother' theory was widely accepted in the medical community at the time (Boutot, 2017).

In retrospect, it appears that these researchers and child experts were perplexed between cause and effect. It is plausible that the absence of bonding between parents and their children was due to a lack of social skills in their autistic children, as suggested by Thurm and Swedo (2012). After all, it should be considered that these autistic children had normal siblings who were raised by the same parents. Thus, despite the general belief that autism was caused by emotionally cold parenting, many psychological experts believed that this theory did not explain the true causes of autism (Thurm & Swedo, 2012).

Arguably, the efforts of Dr. Bernard Rimland and his colleagues in the 1970s constitute the greatest success story as far as research on autism is concerned. Rimland's work established that autism was, in fact, a failure of neurodevelopment, with possible treatments available through behavioural intervention techniques (Thurm & Swedo, 2012).

Rimland's son suffered from autism and his personal experiences refuted the cold parenting theories that were predominant at the time (Thurm & Swedo, 2012). This motivated Rimland to look for other causes of autism. His research focused on disproving the belief that autism was a psychogenic illness and advocated the theory that autism has a genetic or neurological origin (Thurm & Swedo, 2012). Rimland was also quite vocal about other possible causes of autism, such as environmental pollutants (Thurm & Swedo, 2012). This inevitably led to disagreements within the medical community and other researchers at that time.

Rimland's work set a precedent for emerging research on autism leading to the contemporary discernment of autism as a brain-based disorder with certain abnormalities in brain function and structure. Additionally, this paradigm shift created new avenues for research, which are yielding a significant understanding of the pathogenesis, etiology, and treatment of autism (Thurm & Swedo, 2012). Therefore, the imperative for developing more comprehensive research is predicated on the mandate to redress the existing gaps in traditional literature on the prevalence factors and other issues pertaining to Autism Spectrum Disorders.

Understanding Autism Spectrum Disorders

The reasons for the global rise in the prevalence of ASD have been debated widely in scientific circles by researchers, often with conflicting findings being brought forward. Some researchers are of the opinion that the criteria used in diagnosing ASD greatly impacts the rates of prevalence registered in the different countries (Onaolapo & Onaolapo, 2017; Lundstrom et al., 2015). For instance, Lundstrom et al. (2015) noted that nations in North America prefer the criteria outlined in the DSM-IV tool. Other countries use alternative tools, such as a combination of CCMD and ADOS in China (Wang et al., 2018), INDST-ASD in India (Chauhan et al., 2019), and a combination of SCQ and ADI-R in Iran (Samadi, Mahmoodizadeh, & McConkey, 2012). This lack of consistency in the diagnostic criteria poses essential clinical and research implications warranting further research.

There is a stark difference between autism and the myriad of other common childhood disorders, in that the former exists in a spectrum or range of conditions (Onaolapo & Onaolapo, 2017). This presents a key challenge to researchers as well as clinicians since no two cases are identical (Boutot, 2017). It has led to contention concerning plausible etiology, prevalence, and significance. This points out to the absence of universal consensus pertaining to the epidemiology of autism, and further validates the need for continued research.

Defining Autism

As iterated earlier, autism has been defined by scientists as a complex neurodevelopmental disorder that presents through persistent deficits in social communication and interactions, together with restricted and repetitive interests as well as motor deficits (Boutot, 2017). Autism also exists as a spectrum or range of various severities (Boutot, 2017). Therefore, there is no case of autism that is precisely identical to another.

The fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) is regarded as a universal diagnostic tool that was developed and published by the American Psychiatric Association for purposes of classifying mental disorders through a common language and standardized diagnostic criteria. Under the DSM-IV, the diagnosing criteria for autism in children focuses on establishing whether the child being screened exhibits specific phenotypes from a list (Onaolapo & Onaolapo, 2017).

Causes of Autism

Onaolapo and Onaolapo (2017) stated that the etiology of autism is still under scientific study, and despite extensive research over the years, complete knowledge of the causes remains unclear. Although there is no known single cause of autism, it is generally accepted within the scientific community that it is caused by a combination of genetic and environmental factors (Quesnel-Vallieres et al., 2019; Onaolapo & Onaolapo, 2017). In support of this, Elsabbagh et al. (2012) clarified that despite the poor understanding of many aspects of autism, major strides had been taken concerning the genetic, biological, environmental, and developmental origins of autism. Elsabbagh et al. (2012) further argued that extensive and well-controlled cohort studies following through with expectant women were most probably able to lay bare the impact of certain pre-natal and perinatal risk factors implicated in ASD.

Vatanoglu-Lutz et al. (2014) also describe the occurrence of autism as a result of a neurological condition that impacts normal functions of the brain, hence interfering with the development of an individual's communication and social interaction skills. Onaolapo and Onaolapo (2017) corroborated this by establishing that, usually, abnormalities within the neural connectivity involving synapses, tracts, and neuronal communication through neurotransmitters are essential pathological characteristics of the brain in ASD.

Environmental factors were demonstrated to have an impact on the etiology of autism in a study conducted by Ritz et al. (2018) in Denmark. In this nation-wide study of Danish children, Ritz et al. (2018) reported having found that air pollution exposures during formative infancy – but not in pregnancy – resulted in a rise for susceptibility of

ASD. This was particularly true for autism and Asperger diagnoses in children (Ritz et al., 2018). This study is especially meritorious as it was the most comprehensive that addressed the impact of air pollution on the susceptibility of ASD. Also, it was one of the few which incorporated control for smoking behaviour in mothers during the expectancy period. Moreover, it examined the co-morbidities of ASD and co-adapted for several exposure durations ranging between pre-conception to infancy. Air pollutants exposure within the prenatal stage has been linked to various negative birth conditions, and also structural and neuropsychological abnormalities of the brain during childhood (Ritz et al., 2018).

Characteristics of Autism

Vatanoglu-Lutz et al. (2014) identified the characteristics of autism to consist of language shortfalls, social deficits, repetitive patterns of behaviour, narrow interests, and motor deficits. Boutot (2017) also corroborated these characteristics of autism, but also added that these traits appear to vary in severity from person to person. Additionally, some individuals with autism might exhibit varying abilities and behaviours (Boutot, 2017). It is, therefore, safe to point out that no two cases of autism are identical. It is also worth noting that autism is usually found in co-morbidity with multiple pervasive developmental disorders, such as Asperger Disorder, and hence a person may present varying characteristics (Boutot, 2017).
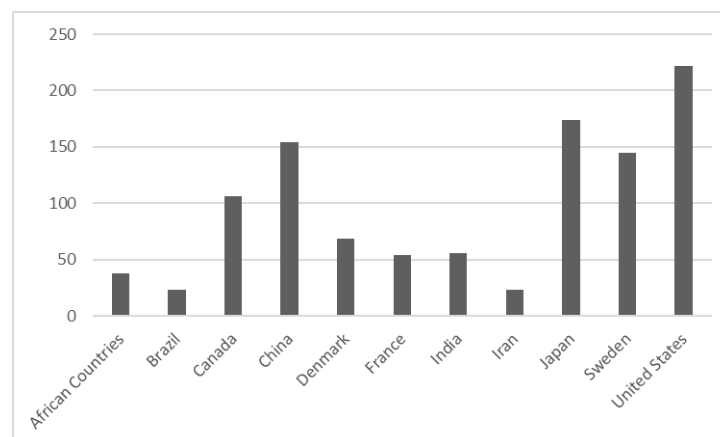
Autism Around the World

Figure 1. Autism diagnosis rates per country, per 10,000 children

African Countries

According to Bakare & Munir (2011), the situation of various aspects of ASD in Africa is largely unclear. This is because the majority of serious cases seek help from orthodox medical practitioners, while the comparably less severe cases often consult traditional healers and spiritualists for remedies (Bakare & Munir, 2011). Information on the prevalence and diagnostic criteria was only accessible from four African countries, namely Nigeria, Egypt, Tunisia, and Tanzania.

Bakare & Munir (2011) documented a study focused on Arab counties but with the inclusion of Egypt and Tunisia, which are located in the northern part of Africa. The study found the prevalence of ASD in Tunisia and Egypt at 11.5% and 33.6%, respectively, among children expressing developmental disorders. The Modified Checklist for Autism in Toddlers (M-CHAT) was utilized as a screening tool. A separate but pertinent aspect of the study also focused on the epidemiology of Autism, but the subjects were children of African heritage who were not currently

located in the continent (Bakare & Munir, 2011). That is, the study assessed the prevalence of ASD among children with Somali ancestry living in Sweden. A significantly higher prevalence of ASD among children with Somali parents was documented at 0.7% as compared to 0.2% in the non-Somali category (Bakare & Munir, 2011).

Three studies availed information on the diagnosis of ASD among African children concerning symptom presentation and co-morbid disorders. Apart from the main symptoms of ASD, as stipulated in the DSM-IV definition of autism above, a lack of expressive language (non-verbal cases) presented itself commonly in over 50% of the cases reported in the literature (Bakare & Munir, 2011). One of the studies reported 51.2% of non-verbal cases of ASD in their study, whereas another observed about 71% of non-verbal cases of ASD in their study (Bakare & Munir, 2011). However, the commonly cited reason for the discrepancy was attributed to variation in local diagnostic practices.

Another important finding was that intellectual disability appeared to be the most common co-morbid disorder diagnosed in association with ASD among African children. In particular, it was documented in over 60% of the cases studied (Bakare & Munir, 2011). Other co-morbid disorders in association with ASD among African children that were documented included epilepsy and, in one case, oculo-cutaneous albinism (Bakare & Munir, 2011).

Brazil

The case of Brazil and almost all South American countries is almost wanting, due to the striking absence of a reliable population-based prevalence estimate published in the region, despite preliminary efforts (Paula et al., 2012). In fact, in the last 20 years of epidemiological research on ASD, the best estimates of prevalence fall anywhere between 4 per 10,000 to 6 per 10,000 children in Brazil (Paula et al., 2012). However, based on the recent ASD prevalence rates in the USA and other Western countries, which indicate that 1% of children are affected, it is conceivable that approximately 1.5 Brazilian children have ASD (Paula et al., 2012).

Canada

A critical consensus among autism researchers highlights that the DSM-IV is widely accepted as the diagnostic tool for ASD in Canada (Oullette-Kuntz et al., 2014; Lundstrom et al., 2015). According to Ouellette-Kuntz et al. (2014), the Autism Spectrum Disorders – Canadian American Research Consortium (ASD-CARC) launched a multidisciplinary program of autism research in 2001. That undertaking resulted in the establishment of a national epidemiological database as a multi-site surveillance program that examines and studies autism in Canada (Ouellette-Kuntz et al., 2014). The findings from multiple years of surveillance among children aged 2 – 14 years in three Canadian regions are elaborated herein concerning ASD prevalence.

Ouellette-Kuntz et al. (2014) focused on the data throughout a three-year surveillance period that involved Newfoundland and Labrador, Prince Edward Island, and Southeastern Ontario. The prevalence among children was 94.2 per 10,000 in Newfoundland and Labrador, 58.7 per 10,000 in Prince Edward Island, and 114.9 per 10,000 in Southeastern Ontario (Ouellette-Kuntz et al., 2014). The prevalence ratio based on gender delineation was 4:1 male to female, respectively, across all three regions (Ouellette-Kuntz et al., 2014). Hence, there appears to be a relatively consistent gender ratio across Canada, albeit in the context of different prevalence rates.

China

In general, the prevalence rates in China seem to be comparable to those in the Western world. Wang et al. (2018) documented the pooled prevalence of ASDs from 16 studies with available data to be ranging from 39.23 per 10,000 (95% CI: 28.44 to 50.03 per 10,000, I2=89.2%). Wang et al. (2018) also reported that the prevalence was higher in males (72.77 per 10,000) than in females (16.45 per 10,000). Regarding urbanization, the prevalence was recorded to

be high in rural areas of China (62.26 per 10,000) as compared to the urban centers (32.73 per 10,000). It is also worth noting that the pooled prevalence of ASDs from studies conducted in or before 2012 (38.72 per 10,000) was slightly higher than those carried out after 2012 (36.36 per 10,000) (Wang et al., 2018). This observation was arrived at after study years were dichotomized using the median splitting method (Wang et al., 2018). Lastly, eastern China recorded the prevalence of ASD at 45.81 per 10,000 while that of central China was at 50.85 per 10,000 (Wang et al., 2018).

The diagnosis tools and criteria utilized in the China studies included CCMD, DSM-IV, DSM-V, and ADOS. There was no significant difference between the prevalence of ASDs established by the first three criteria (63.75 per 10,000, 41.87 per 10,000, and 48.96 per 10,000), respectively. However, the last diagnosis criteria produced significantly higher figures than the others (85.59 per 10,000) (Wang et al., 2018).

Denmark

In a study of 15,837 children in Denmark, Ritz et al. (2018) established that the prevalence of autism has been rising. The researchers focused specifically on children's exposure to air pollutants during the early stages of development and found that the number of cases of autism increased with age (Ritz et al., 2018). Regarding gender differences, the prevalence rate of ASD was observed in 76% of males (Ritz et al., 2018). Additionally, the children born to parents who had been living in larger Danish cities during pregnancy seemed to be more susceptible to ASD (Ritz et al., 2018).

The diagnostic criteria for ASD in Denmark has broadened, such that the national data tracking included diagnoses that were made from outpatients rather than only children who were admitted to health facilities (Ritz et al., 2018). This national health registry, which is controlled by the Danish government, regards the DSM-IV as the official diagnostic criteria for autism cases in the country (Ritz et al., 2018).

France

Van Bakel et al. (2015) investigated the prevalence of autism in four regions of France. The prevalence rates of childhood autism (CA) 8.8 per 10,000, Asperger's syndrome (AS) 1.7 per 10,000, and other ASD 25.9 per 10,000 were reported by Van Bakel et al. (2015). The overall prevalence rate was 36.5 per 10,000, while the male to female ratio was 4:1, respectively. Also, 47.3% of children had an intellectual disability, whereas less than 5% of the cases involved all other co-morbidities (Van Bakel et al., 2015). While Van Bakel et al. (2015) suggested the prevalence for childhood ASD diagnoses is low compared to North American and European countries, this prevalence rate is increasing.

France's diagnostic criteria for ASD are completed using population-based registers, the RHE31 and RHEOP, which monitor the adverse effects of childhood neurodevelopmental disabilities (Van Bakel et al., 2015). These registers record every case of ASD diagnoses, as well as children with a range of other developmental disabilities and disorders (Van Bakel et al., 2015). Although the two registers have different databases, they work in collaboration and apply similar criteria used in describing and including children in the registers (Van Bakel et al., 2015).

India

Chauhan et al. (2019) documented four studies in which several diagnosis tools were used, including DSM-IV, SCDC, SCQ, questionnaire-based surveys, and a behavioural checklist. All of the applied tools encompass a similar diagnostic approach, including multiple and different diagnostic questions (Chauhan et al., 2019). Moreover, the choice of the appropriate diagnostic tool is essential as it enhances the chances of securing the specific diagnosis of ASD. All the studies employed a two-step procedure involving the screening and confirmation of the disorder to diagnose ASD (Chauhan et al., 2019). In total, the four studies included the diagnostic screening of 130,599 children spread across South India, Eastern India, and North India (Chauhan et al., 2019).

A related pertinent study on Autism amongst Indian children was conducted by Chauhan et al. (2019) in rural areas and observed a percentage prevalence of 0.11 (95% CI 0.01–0.20), ranging from 1 to 18 years of age. The pooled percentage prevalence of the studies conducted in the urban setting was 0.09 (95% CI 0.02–0.16) in the age range of 0–15 years (Chauhan et al., 2019).

Iran

Samadi, Mahmoodizadeh, and McConkey (2012) suggested that few countries, if any, screen for ASD in children to the same lengths as performed in Iran. This is because the screening is conducted as part of a national Iranian screening program synchronized with school entry. Therefore, this makes it obligatory for families to participate. The screening for autism is conducted using the Iranian translation of the SCQ, and then the Persian version of the ADI-R is used to confirm the diagnosis. To clarify, the ADI-R is normally used by special education experts in the Iranian Special Education Organization (ISEO) to assess children who had positive results on the SCQ (Samadi, Mahmoodizadeh, & McConkey, 2012).

The study by Samadi, Mahmoodizadeh, and McConkey (2012) documented the prevalence of autism among five-year-old Iranian children over three years. A total of 641, 633 girls and 678,701 boys were screened, out of which 24% and 76% were suspected as having autism based on the SCQ results, respectively. The resulting prevalence of those identified as meeting the characteristics for Autism based on the ADIR was reported at 6.26 per 10,000 (Samadi, Mahmoodizadeh, & McConkey, 2012). Finally, more boys than girls were ultimately diagnosed with autism in each of the three years of the study, at a ratio of approximately 4:1 (Samadi, Mahmoodizadeh, & McConkey, 2012).

Japan

Kurasawa et al. (2018) primarily sought to investigate the gender differences and annual trends in age of diagnosis of ASD. The prevalence of ASD in Japan is documented per the various disorders constituting ASD as follows: childhood autism (33.6%), atypical autism (2.9%), Asperger's syndrome (9.4%), other pervasive developmental disorder (0.7%), and unspecified pervasive developmental disorders (47.6%). It was noted that most children were diagnosed with ASD at three years, although there have been an increasing number of cases where children were diagnosed at seven and eight years of age (Kurasawa et al., 2018). Meanwhile, 76.1% of the cases were males whereas 23.9% of the reported cases were females (Kurasawa et al., 2018).

Kurasawa et al. (2018) conducted their study using the clinical data that was acquired from the Japan Medical Data Center (JMDC), which is considered Japan's largest provider of clinical data. Notably, the JMDC monitors all clinical information of all Japanese citizens who have health insurance (Kurasawa et al., 2018).

Sweden

In the study conducted by Lundstrom et al. (2015), the phenotypes of language or communication deficit, social interaction delay, and restricted and repetitive behaviours were analyzed. These constituted the autism score in the Child and Adolescent Twin Study in Sweden (CATSS), a national study that essentially examined Swedish twins during their childhood. This study involved a structured interview, created for use by non-specialists over the telephone. It contained 96 questions, of which 17 correspond to an ASD domain (Lundstrom et al., 2015). The prevalence of ASD symptom phenotype in the twin study was 0.95%, and the estimates for the 10-time points ranged from 0.52 – 1.59%, with overlapping confidence intervals at all time points (Lundstrom et al., 2015).

United States

The United States of America generally uses the DSM-IV as diagnostic criteria for ASD, which makes sense as the tools are developed and recommended by the American Psychiatric Association. Kogan et al. (2018) mentioned that the prevalence of children diagnosed with autism in the United States has significantly increased within the past 30 to 40 years. A nation-wide and state-representative survey of 50,000 children in 2016 was commissioned with the intent to have a chance to obtain a better understanding of the prevalence situation in America (Kogan et al., 2018).

From the nationally representative data, an estimation of 1.5 million children under the age of 17 corresponded with the point-prevalence of parent-reported autism diagnoses for 2016 (Kogan et al., 2018). Adjustment for selected demographic, birth, and socio-economic phenotype further revealed that ASD prevalence in boys was 3.46 times higher as compared to that in girls (Kogan et al., 2018). For children from single-parent households, the ASD prevalence was found to be 47% times higher than those from married households (Kogan et al., 2018). Additionally, children from households with less than 100% of the federal poverty level (FPL) had a prevalence rate that was 2.06% times higher than in households with an FPL equal to or greater than 400% (Kogan et al., 2018).

Examining the Rise in Autism

Over the last three to four decades, the prevalence of diagnosed Autism Spectrum Disorders has risen significantly globally (Kogan et al., 2018; Salhia et al., 2014). The study conducted from the vantage point of three Canadian regions, as well as one from the Japanese national context, corroborate this statement by noting that the prevalence has increased markedly within the past two decades (Ouellette-Kuntz et al., 2014; Kurasawa et al., 2018). Prevalence rates across select European countries also reiterate this trend. Meanwhile, the absence of similarity in the identified African countries and the South American counterparts can potentially be explained by the current diagnostic gaps that impede the accuracy of their respective testing protocols. Therefore, the majority of the researchers concur that the epidemiology of ASD has mirrored changing global dynamics, with prevalence rising from 2/10,000 children in studies from the 1940s to about 5/10,000 children in studies from the 1970s (Onaolapo & Onaolapo, 2017). However, it is worth noting that countries in Africa and South American regions do not have reliable studies and hence largely rely on the global trends for Autism epidemiology studies.

Although the rise in prevalence of ASD globally is not fully understood as mentioned by Kogan et al. (2018), many researchers are skeptical that this phenomenon could be due to an increase in risk factors (Kurasawa et al., 2018). Conversely, there are several other factors that researchers are keen to highlight as assuming a more central role in the increased prevalence of ASD globally. These factors are elaborated subsequently.

One of the major areas of consensus from extant literature is that the increased prevalence can be attributed to the switching and broadening of the diagnostic criteria (Onaolapo & Onaolapo, 2017; Salhia et al., 2014; Kurasawa et al., 2018; Kogan et al., 2018). This opinion was reiterated by Elsabbagh et al. (2012), who stated that prevalence rates were observed to rise significantly if the case definition as broadened to include atypical forms of ASD.

The second most common suggestion for the explanatory factors behind the increased prevalence of ASD were the readily available services and the increasing global autism awareness by both healthcare practitioners and the families of autistic children (Onaolapo & Onaolapo, 2017; Salhia et al., 2014; Kogan et al., 2018). In the United States, doctors conducting universal screening in toddlers and young children might have contributed to the increased diagnoses in the United States (Kogan et al., 2018). However, the problem of a lack of consistent specialty supports and services continues to persist (Kogan et al., 2018; Onaolapo & Onaolapo, 2017). Of course, this is also an issue that presents in other countries that have observed an increase in ASD diagnoses in children. In Canada, Ouellette-Kuntz et al. (2014) noted that screenings have increased nationwide, but the availability of proper supports and services has been largely inconsistent across the country. Kurasawa et al. (2018) also remarked on the lack of medical support for Japanese children with autism.

Lastly, Kurasawa et al. (2018) indicated that the increased global prevalence of ASD among children could result from a younger age at diagnosis which, on average, was three years old. However, the number of diagnoses declined as the child ages which suggests that healthcare practitioners are strictly focused on diagnosis at an early age (Kurasawa et al., 2018). Meanwhile, Kogan et al. (2018) suggested that this increase could be attributed to the increased provider ascertainment at earlier ages. Interestingly, in a Canadian epidemiological study, Ouellette-Kuntz et al. (2014) alluded that as the diagnosis age has continued to reduce significantly, it could be the main impetus for the increased prevalence rates of ASD globally.

Bringing It All Together

Kogan et al. (2018) indicated that the prevalence of ASD in children has been documented by epidemiology studies to be increasing significantly across Europe, North America, and some countries in Asia. The steady rise in the prevalence of ASD in these nations is largely attributed to certain factors that have been put in place by their respective governments. These include the availability of services, reduced age of diagnosis, autism awareness among families and healthcare workers, and the switching and broadening of generally accepted diagnostic criteria (Kurasawa et al., 2018). On the contrary, prevalence rates of autism in African and South American countries were not reported to be increasing in tandem with the global trend (Onaolapo & Onaolapo, 2017). This was a result of inadequate and unreliable studies conducted and published in these regions (Paula et al., 2012).

Researchers in the European and North American countries reported incident rates occurring within the same range between 36.8 to 50 per 10,000 children (Kogan et al., 2018; Elsabbagh et al., 2012). These reports are in sync with the global incidence rate of ASD. On the contrary, some Asian, South American, and sub-Saharan nations reported incidence rates as low as 8 per 10,000 children (Onaolapo & Onaolapo, 2017). Kogan et al. (2018) admit that the similarity of incidence rates among European and North American nations is a result of using homogenous criteria for diagnosis with almost all the nations using the DSM tool developed by the American Psychiatric Association. Conversely, Onaolapo & Onaolapo (2017) established that the use of different diagnostic tools and processes among some Asian nations, or a general lack of knowledge on ASD among some Latin America and Sub-Saharan nations, is the key reason for differing incidence rates among children.

However, it is worth noting that despite how small or large the sample size was, the incidence rates consistently affected more males than females, with a ratio of 4:1 across all nations that were studied. The implication is that ASD has a Male Sex Predilection (Onaolapo & Onaolapo, 2017). Gender predilections in the prevalence of diseases are well-studied with female predilections reported steadily in several disorders with autoimmune causes, whereas a male preponderance is established in certain neurodevelopmental disorders (Onaolapo & Onaolapo, 2017).

Lastly, there certainly exists an undeniable gap in the research on the epidemiology and prevalence of autism around the world. Elsabbagh et al. (2012) posited that the gap is applicable to the inconsistency in understanding the epidemiology of ASD, arising from the differences in perception and diagnosis of autism. Meanwhile, the recorded prevalence data in many devolving nations continue to be markedly lower than those in developed countries (Onaolapo & Onaolapo, 2017).

Onaolapo & Onaolapo (2017) reiterate that the seemingly low prevalence of ASD recorded across select developing nations does not suggest an absolute low prevalence of ASD in these nations. Rather, it seems to poignantly point to inadequate diagnostic services and the inappropriate adaptation of diagnostic criteria concerning cultural differences in behaviour. This low prevalence can also be attributed to under-sampling, as there are rarely nationally reliable data apart from the ones based on individual and predominantly private clinics (Onaolapo & Onaolapo, 2017).

Discussion

One major finding was that research on the epidemiology of ASD was unevenly distributed across geographical regions, which had negative connotations and implications for specialists as well as research results. Currently, uneven distribution has a negative impact on the process of research and findings since specialists cannot identify the actual number of people with this disorder. Consequently, this not only affects the overall statistics for the prevalence of ASD, but also impacts the ability to conduct further research into the disorder.

For these reasons, encouraging research is pivotal to promote improvements on findings about autism. However, many countries in regions such as South America, are affected by the problematic prevalence of a lack of knowledge. The European and Western countries generally have established healthcare systems that research and publish reliable epidemiological studies. Conversely, there is little to no substantiated information on ASD in a majority of the Sub-Saharan and South American nations. For instance, the preliminary studies in Brazil appeared in two regions only, which illustrates the lack of distribution of these studies. According to research carried out by Paula et al. (2012), approximately 90% of all studies published in Brazil between 2002 and 2009 came from the southeast and southern regions of Sao Paulo and Rio Grande do Sul. This shows that more research is needed in order to cover larger geographical areas.

The implication of this rather disappointing finding on the distribution of research is that the absolute prevalence of ASD in certain nations cannot be understood fully, thereby negatively affecting the protocols of identification, analysis, research, and proper treatment. Since the amount of information available on ASD in Sub-Saharan and South American countries is poorly distributed and developed, it is likely that the issue is not perceived as serious as it is in reality. This is an important fact for future research as more work needs to be done to establish the viability of epidemiological figures on ASD that stem out of these nations. Improvement in ASD research in these areas is contingent on providing society with actual numbers of people with ASD, iteration of symptoms that allow the identification of ASD, and increasing awareness of the steps and treatment required to enhance the life quality of individuals with ASD. More importantly, the focus will be on helping patients that have not been identified and treated yet.

Another finding suggested that, despite the extensive research on ASD globally, there was no definitive cause of the condition known to date. In their research, Bakare and Munir (2011) reported that a study seeking the views of healthcare practitioners about the etiology of ASD resulted in attributing the etiology of ASD to preternatural and supernatural factors. This finding cemented the belief of traditionalist Africans, by linking traditional spiritual forces to neuropsychiatric disorders (Bakare & Munir, 2011). However, this misconception leads to stigmatization and stereotyping of the disorder.

As stated herein, the causes of autism include genetic as well as environmental factors. Although there are no specific causes identified to date, it is essential to base research and studies on scientific and medical facts. Since poor information and misinformation are still pervasive in many parts of the world, stigmatization and stereotyping still occurs as a result of inadequate knowledge, non-scientific belief systems, and a lack of scientifically motivated results (Onaolapo & Onaolapo, 2017).

Elsabbagh et al. (2012) found that the incidence of autism is more common in children, despite being present in both children and adults. This is quite a concerning finding as it directly caters to the implication of governments predominantly focusing diagnosis and studies of ASD on children. However, further research is necessary on ASD in adults, as it has been documented to continue presenting symptoms throughout a person's life. Moreover, autism has been known to affect their social skills, academic achievements, and working performance even in adulthood. This demonstrates a pivotal imperative to cater to those adults who might not have been diagnosed as children but present the characteristics of ASD.

It is fair to conclude that further research on ASD must be conducted on a global scale. It is necessary not only to promote and encourage research, but also to insist on countries thoroughly researching the situation to learn about its' current prevalence. Another milestone would be the identification of adults who appear to have ASD, in the absence of prior diagnosis during childhood. Apart from diagnosing children and treating them at the early stages in

life, adults also require assistance to improve the development of skills and resources to deal with ASD. Since raising awareness is where it all begins, spreading awareness of the urgent need for further research ought to be the first step.

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