Connection Between Air Pollution And Autism Spectrum Disorder

In order to investigate the link between air pollution and Autism Spectrum Disorder (ASD), we must first understand what exactly air pollution and autism are. Air pollution is the term used to describe the mixture of particles and gases in our air that have poisonous or toxic effects on both animals and the environment, including humans. It is mostly caused by humans, by processes such as the burning of fossil fuels, or the chemical emissions from vehicle exhausts. Air pollution is known to have detrimental effects on humans, such as causing and aggravating respiratory and heart problems, mainly asthma, but there are many other problems thought to be caused by it which are constantly being researched. Autism Spectrum Disorder, commonly referred to as ASD, or autism is a neurodevelopmental disorder that affects social interaction, communication with others and traits and behaviours. It is classed as a learning disability as it limits one's capability to understand instructions and changes the way they experience the world surrounding them. Air pollution on our planet has been rising for decades and continues to increase today, and more and more people are being diagnosed with autism around the world too, so surely there is a link between these two growths?

The air we breathe consists of hundreds of chemicals and particles, of which most are harmless. A small amount, however, is known to be toxic to our planet, pollutants. Different pollutants are known to have different effects on humans: carbon monoxide, emitted from motor vehicles and the burning of fossil fuels reduces the blood's ability to carry oxygen around the body, which can be fatal. Sulphur dioxide and nitrogen oxides, released by the burning of coal and exhaust fumes respectively cause breathing difficulties and weakens the immune system, increasing susceptibility to infections, as well as forming acid rain, which contaminates rivers and destroys wildlife. Not all air pollution can be blamed on us humans though; there are also natural emissions of pollutants. Cows are known to release methane by burping or farting. Small amounts of methane in the atmosphere is not harmful to the planet, but too much of this gas enhances the greenhouse effect and warms up the planet. As there are lots of humans who consume milk and meat from cows, there are estimated to be over 1.3 billion cows in the world, which means that 28% of methane emissions come from these animals. That's 130 million tonnes of methane from cows! The emission of pollutants has increased since 1900 and 2000, hence air pollution in our atmosphere has also increased. Through the 20th century, the world population increased rapidly, more people owned cars, lots of fossil fuels were burnt for energy. Furthermore, exhausts from mining and factories released lots of pollutants in the aftermath of the industrial revolution. However, since the late 1900s, the amount of emissions of air pollution has gradually decreased, with the introduction of green renewable energy, electric cars, and a decrease in industry. Despite there being a decrease, it is still high, with 91% of the world's population living in areas where air quality exceeds limits set by the World Health Organisation (WHO). This is because it is very difficult to remove the pollutants already in our atmosphere. Unlike organic matter decomposing into compost, pollutants, as they are chemicals, don't just go away after some time; they linger in our air, trapped beneath the ozone layer, and with emissions constantly ongoing, the amount of pollutants in the air is not going to decrease overnight. Therefore, there has actually been an increase in the proportion of pollutants in the atmosphere, even though emissions have decreased. We can see that this has had a negative effect on our planet, with Figure 1 showing that the number of deaths from polluted air has

continuously increased since 1990 in all regions around the world, according to the Institute for Health Metrics and Evaluation. In Delhi alone, over 20 people a day die from respiratory diseases caused by air pollution. This is because air pollution is known to exacerbate respiratory problems such as asthma, leading to sufferers struggling to breathe as the trachea swells up, and sometimes dying. Asia has the highest number of deaths from air pollution which can be accounted for by there being lots of factories and relatively high emissions of pollutants, without strict regulations or caps like Europe and America, combined with the general poverty, poor housing and healthcare facilities, and also a lack of understanding the risks associated with air pollution.

There is no single definition of the term autism; it refers to a large group of neurodevelopmental (involving the development of the nervous system and brain) disorders. It affects the way people perceive the world and interact with others. People who have autism are autistic for life. It doesn't just happen at some point in their life, but they are born with it. Autism is a disorder, rather than a disease or illness; there is no treatment or cure. As it is a spectrum disorder, people can have different severity of the disorder, and everybody handles it in their own way. Some can manage it well, but others can have learning disabilities or mental health issues. Common signs of autism include but are not limited to finding it difficult to interact and communicate with others, struggling to understand other peoples' emotions and feelings, taking longer to understand a situation, having repeated behavioural habits. Very little is known about what actually causes autism, only that there is no single origin and that it can be a combination of genetic and environmental factors. Genetic factors such as passing down an autism gene from an immediate family member or having a random mutation during foetal development are known explanations as well as environmental ones such as exposure to certain medications or toxins, and perhaps air pollution as we may find out. The problem with getting diagnosed with autism is that there is no medical test that can be carried out with a positive or negative result such as testing for cystic fibrosis, so it is really quite difficult to give a certain diagnosis of autism. Due to the fact that symptoms can start displaying at any time, whether a toddler or an adult, it is almost impossible to determine whether someone is autistic at birth. Only when the symptoms start showing, initial suspicions about autism can be raised. The only thing a doctor can do is assess the current situation based on what the patient (if an adult) or patient's parents (if a child) discloses and have them complete a questionnaire, which can be little or lots. Around 700,000 in the UK are known to be autistic, which equivalates to about 1 in 100, although the figure in the USA is comparatively higher, with Centres For Disease Control and Prevention (CDC) claiming that it may have risen to around 1 in 59 (as shown in figure 2), a 15% increase from the previous year. However, these are only estimates, and the actual figures could be a little bit higher, as there may be people who have autism but have not been officially diagnosed for all sorts of reasons, mainly not wanting to be labelled as 'autistic' or not expressing the worse symptoms and managing it well enough that they do not need medical help. But then again it could be lower as there was access to more medical records for the more recent studies. Help is available to manage the symptoms of autism such as behavioural and occupational therapy, or speech therapy for those who are at the higher end of the spectrum. There are also certain medications available such as melatonin sleeping pills to help maintain a regular sleep pattern.

Dr Heather Volk of the University of Southern California's Department of Preventative Medicine has led several studies in recent years focusing on the relationship between air pollution and autism, some of which will now be outlined and explained.

Whilst it is clear through many studies carried out all around the world by various research teams that as air pollution has increased, the number of people, mainly children, diagnosed with autism has also increased, we should definitely not assume that air pollution causes autism. Even though different factors have been investigated, as we have seen, none of them has actually been proven to cause autism. As previously discussed, there is no definitive medical test to detect autism, and internationally, the guidelines and diagnostic criteria stating what makes an autism diagnosis, which are already different around the world, are constantly changing. The number of people diagnosed with autism may have increased because diagnoses have increased, which could have been because the symptoms are displayed more, and there is plenty of support services available and special measures given to autistic children, whereas 50 years ago, it would have been a shame on the family and kept secret. It is no longer a bad thing to be autistic, as it was viewed this way in the past. Therefore, there are certain limitations of the studies and possible explanations for the increase in autism, but they are not definite reasons.

As for air pollution on the other hand, there is no denying that the amount of pollution in our atmosphere has increased. There is no reason to discount this vital fact, but there are so many different types of pollutants and particulate matter in the air, most of which we can’t see or smell, meaning that it is rather challenging to assign a particular chunk of the air pollution to different diseases and effects they cause. Trends can be spotted but cannot always be explained. For example, it is medically known that 1 in 50 heart attacks in London alone are triggered by air pollution, but what is not known at this moment is the component responsible for this. The next step for all scientific studies is further research. This will confirm any initial suspicions and back up findings from previous research. All research reports in journals are peer reviewed, meaning a highly respected and trusted professor essentially checks what the team have found and whether the report should be published.

So all pregnant women and babies do not have to sit in their homes with all the windows and doors shut with air purifiers surrounding them, hoping to escape autism; but perhaps reflect on whether the busy streets of London is the best place to raise a child, or if the peaceful countryside is more suited for them. After all, it all comes down to opinion; you could believe everything you come across, no matter how unreal, or you could immediately regard it as fake, so ultimately, what you choose to believe may or may not influence your future.