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Assignment #3

Effects of Modern Neuroscience on Understanding Autism

Autism Spectrum Disorder (ASD) as defined in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) is extensive and complicated. Since 2013, Asperger's Syndrome is no longer in the Diagnostic and Statistical Manual (DSM), but Social Communication Disorder was added and some people who would have been diagnosed with Asperger's will fall under this diagnosis and others may fall under the newly defined Autism Spectrum Disorder (ASD) (Sole-Smith, 2014). There are five parts the diagnosis, largely relating to social communication deficits, repetitive behavior, and deficits present in early childhood and not explained elsewhere by intellectual disabilities (Reynold & Kamphaus, 2013). There are also 3 levels or severity defined as "requiring support," "requiring substantial support," and "requiring very substantial support" (Reynold & Kamphaus, 2013). The broadness of and lack of hard facts surrounding Autism diagnosis and causation has caused confusion and conspiracy theory treatments. Modern neuroscience research, although adding to our understanding of the disorders has not yet changed diagnosis or treatment vastly.

According to the Autism Science Foundation, some people believe Autism is connected to the parasites in the gut and therefore one treatment that is denounced today (which also happens to be a relatively recent development) is bleach therapy. Bleach therapy is the process of making children drink diluted bleach up to eight times a day, or perform enemas to "cleanse" the gut of bacteria, yeast, parasites, and heavy metals (2017). There have been cases of this seen from California to the UK in the last year of people trying to cure Autism with this therapy.

Besides completely lacking scientific backing, this “therapy” can cause adverse health effects like diarrhea, fever, and vomiting. Another, *slightly* less extreme therapy that is no longer in use is Holding Therapy. In Holding Therapy, someone physically restrains the child with Autism and forces them to make eye contact with their parent to mend the bond between them. Its implementation comes from the misdiagnosis of Autism as some sort of attachment disorder and is dangerous, unethical, and ineffective and has even caused fatalities (Autism Science Foundation, 2017).

There are several levels at which we are beginning to understand the neuroscience behind autism including, neurobiology, neurophysiology, and morphometry, but there is still a lot unknown. With MRI technology volume deficits in several areas of the brain including the cerebellum, brain stem, posterior corpus callosum and parietal lobes are observed in people with ASD (Baron-Cohen, 2004). There are also density packing abnormalities in the hippocampus, amygdala and limbic system which may explain the lack of social competence in some cases (Baren-Cohen, 2004). Electroencephalography (EEG) also provides evidence of hyperactivity in the sensory areas of the brain such as the occipital lobe, and less activity in the prefrontal and parietal lobes (Baron-Cohen, 2004). A recent connection between the Purkinje cell layer of the cerebellum and the delayed coordination, motor control, and eye movements seen in ASD has been made as the cerebellum's role in motor coordination and specifically focusing eye movements (Bergland, 2014). There are also genetic components of ASD as with any disease, but again, due to the broad nature of the diagnosis, there are many (50+) “genes” that contribute to ASD and are affected by epigenetic factors.

Even with these advances in our understanding of the physical characteristics of the Autistic brain, behavioral cues are still largely used for diagnosis in a clinical setting. Since ASD

is on a *spectrum*, it can manifest in many ways and behaviors of concern range from non-verbal children who do not like to interact with people to a child who is verbally fluent but relies on rehearsed or previously learned phrases, which makes it difficult to diagnose (Heurta & Lord, 2012. The physical brain characteristics also vary between patients, and there is not enough evidence or technology to be able to diagnose ASD with an MRI, EEG, MEG, etc. Today, the most common treatments are a large number of therapies including anger management, family therapy, sensory processing, and animal-assisted therapy. However, due to the complex nature and multiple causes, there are several therapies being researched from vitamin B6 and magnesium treatment to NMDA receptor glycine-site partial agonist, GLYX-13 as potential treatments for ASD (Baron-Cohen, 2004). In conclusion, more research is necessary to fully understand causes, diagnosis, and treatment of ASD.

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