The Levels of Neurotransmitters in the Study of Anxiety

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Anxiety is a disorder that can range from stress over minor events to constant worry about one's perception of themselves (Satpute et al., 2012). Anxiety usually has a negative stigma attached to it but as of now talking about anxiety has become normalized because many people deal with it whether it's minor or major. Neurotransmitters play a huge role when it comes to anxiety such as oxytocin and cortisol. Imbalances of these neurotransmitters can affect anxiety.

For some who choose a mathematical or science field, mathematical anxiety is one of the top struggles students face to achieve in their path (Jamieson et al., 2021). The goal of this research is to link math anxiety to student performance and possible stress responses to certain neurotransmitters within a community college setting. Students were given an opportunity to participate in math courses that ranged from prealgebra to precalculus, on both non-testing and testing days students gave saliva samples, these samples would help determine the levels of testosterone and cortisol within the saliva. Both male and female samples were separated because of the higher rates of testosterone found in males. Samples were then sent off to Brandeis University, where they could be further examined to test the levels of cortisol and testosterone. Results showed that during the testing days, cortisol was leveled higher than usual which led to a stress reaction, whereas testosterone levels didn’t cause a reaction. When it came to neuroendocrine reactions both cortisol and testosterone were linked to exam scoring. Testosterone led to higher exam scoring while cortisol led to lower exam scores. As examined, this research was beneficial in finding how mathematical anxiety can play into

stress, and how both these neurotransmitters can correlate to exam performance within STEM students

(Jamieson et al., 2021).

While this article played a vital role in examining the primary neurotransmitters that play into mathematical anxiety, it does not dive into the types of anxiety there are and how certain brain regions factor into anxiety. Other researchers (Satpute et al., 2012) have dove deeper by using magnetic resonance imaging (MRI) of both anterior and posterior views of the hippocampal subregions. There are 2 main types of anxiety that are described thoroughly in this article, state anxiety and trait anxiety. State anxiety is the type that others experience during minor threatening events such as visiting the dentist, whereas trait anxiety is focused on people's individual personality or perception.

Research was gathered by a total of 22 participants who all went through a functional magnetic resonance imaging or (fMRI) to find links between their hippocampus and both state and trait anxiety (Satpute et al., 2012). To find an accurate association between both, blocks of threat, safety, and a separate baseline block were introduced. About one to three shocks were made to the participants and each participant result varied from high anxiety responses, low anxiety responses, and even laughter during the shocks. The second part of this experiment included fewer threatening conditions; participants completed a shortened version of this task and were then placed on a calibrated scanner. Participants experienced higher rates of state anxiety during the threat period rather than the safety period whereas trait anxiety and the posterior hippocampus were found to have no correlation when activity from the ipsilateral anterior hippocampus was considered. In the end of this research, it was found that state and trait anxiety were linked to the posterior hippocampus when a threat is involved (Satpute et al., 2012).

This article was beneficial in determining how our hippocampus region reacts to threats and how both state and trait anxiety play into reality. One vital component this article left out was how specific neurotransmitters react to threats such as epinephrine and norepinephrine. Whereas other researchers have examined the role of oxytocin in the brain and how it coincides with anxiety (Sobota et al., 2015). This research will consist of how oxytocin reduces activity in the amygdala and how several neurotransmitters function within the brain.

It is known that the amygdala is a vital structure that plays a major role in both emotional and social behaviors in mammals. The amygdala can be divided in many ways, for example lateral, basal, and central (Sobota et al., 2015). The lateral nucleus merges sensory information that comes from cortical and thalamic inputs while sensory afferents terminate and projects to the center nuclei where an anxiety response is created. Individuals who struggle with social anxiety have shown to have increased amygdala activation when recognizing strangers faces. Oxytocin is an amino acid peptide that is made in the supraorbital and paraventricular region in the hypothalamus. Administering oxytocin has been shown to increase sociability (lower social anxiety) within mammals and improve social memory. For patients who struggle with schizophrenia, autism, and social anxiety oxytocin has been the leading neurotransmitter to successfully treat the social debt. This experiment was focused on rats, oxytocin and ketamine were dissolved in saline and then injected into the rats over a period of 9 days. Results showed that ketamine caused a major decrease in social activity although oxytocin did not cure the decrease (Sobota et al., 2015).

As I've read through these articles, I have learned that it takes a lot of precision and patience when conducting experiments like these. For example, having the right dosage of a

certain substance, making sure all the numbers are right when going over the statistical results and organizing your research with your hypothesis and results. The first article mentioned mathematical anxiety and what neurotransmitters played a part in creating anxiety. The second article mentions how state and trait anxiety are linked to different regions of the brain but mainly in the hippocampus, and the third article discusses how certain structures of the amygdala link to emotions and social anxiety and how oxytocin and ketamine play their part in social behavior. I've learned that there are many factors when it comes down to anxiety, it sort of reminds me of the Matryoshka dolls, behind every big thing there's something that goes deeper, and deeper into the subject. Out of these 3 articles I got to learn more about anxiety and how imbalances of oxytocin, dopamine, and many other neurotransmitters can affect it. In the future, I would like to see some more detailed articles specifically about social anxiety and having that topic in focus. I feel as if this topic was a bit challenging due to there not being complete accuracy in my topic choice, but I enjoyed it. If I was a psychologist in the behavioral and neuroscience field, I would want to conduct some of my own examinations and write my own research about what I have found. I would like to create a center to help others who may be dealing with anxiety or any type of social disorder.

References

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