

MENTAL ILLNESS
VS
THE MIND

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Since I was a young, I've always been interested in the brain and its ability to make the body and the mind function. When mental illness became part of my life, my curiosity became more intense. How does mental illness work? More specifically how does depression affect your brain? Not just your perception, but how can it affect one physically? This project became the perfect opportunity to dive in, and really do the thorough research I've always wanted to do to better understand my unique brain.

I started my research by looking into the anatomy of the brain—what each part is and how each part works. This led me to research neurobiology and neuroanatomy to learn where and how depression functionally affects the brain, and what causes this common illness.

My sculpture depicts an accurate representation of how a brain actually looks; it also includes how my journey with depression has affected me personally. I used foam to carve a realistic rendering of a human brain. While the parts of the brain in the sculpture are all physically accurate, the colors I chose to paint the brain are personal and represent emotions tied to the specific neuroanatomy of my brain.

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This text aims to address the fascination I found in figuring out how the human brain works with a mental illness. Not only does this text address the general functions of the brain as well, it takes a look into my personal experience with receiving a diagnosis of depression, the correlation between stress and depression, and the physical impacts a mental illness can have on the brain.

Throughout my entire life, I've always thought about how I worked as a person. Not necessarily my body, but how my small brain was able to host my entire personality, while also working to keep my physical self going. I remember staying up late at night as a little girl questioning my existence, pretty deep stuff, I know, and trying to uncover the mystery that was me. Wondering, how was I even able to think? How was I able to talk to myself inside my head? How could I retain memories? How could I feel things? How was I my own being? As I got older I realized I was eventually going to drive myself crazy, especially if I was consistently questioning my existence, but the subject always stayed in the back of my head and continued to fascinate me. I knew if I really wanted to find all of the answers, it would take some serious brainpower. Brainpower I didn't quite have at the time. Instead, I let these questions float around in the back of my head, always keeping me curious but thankfully not taking me to the point of an existential crisis like they had the potential to do.

In eighth grade, things started to getting a little more complicated for me. I was going through the expected changes puberty had to offer, but other changes were occurring in my brain, making me not quite feel like myself. I wasn't finding the same enjoyment in the things I loved to do, friends noticed me disconnecting more, some days I felt sad and some days I felt just plain empty. I figured that whatever it was, was a normal thing that most teens had to deal with at the start of their teenage years. But it soon started taking an affect on my daily life and in ninth grade, my doctor diagnosed me with depression.

Let me tell you, ninth grade is already a whirlwind of emotions. You're transitioning into your first years of high school, setting the stage for the next four years of life, trying to climb the social ladder while also dealing with the fact that your best friends crush asked whats-her-face to the dance instead of her. Needless to say, I was pretty confused about what was going on with me. There I was, a 14 year-old girl being tossed around by hormones and drama, trying to find myself and figure out who I was and all of a sudden depression gets thrown into the mix. Though having an official diagnosis for the changes I was experiencing was relieving in a sense, adding a mental illness to this already sensitive time period of being a young teenage girl made me feel like even more of an outsider at a time in my life where it felt absolutely crucial for me to fit in. I now had a part of me I felt I had to hide in order to seem like everybody else. How was I, a girl whose main concern was how many coats of mascara I was going to put on the next day, supposed to tackle an illness I knew absolutely nothing about, let alone make it through my first year of high school.

That moment in the doctor's office brought those existential questions I kept floating in the back of my head, flooding straight to the front. I found myself intrigued by this addition of mental illness. Now I was even more curious about the mechanics of the brain. Not only did I want to know how the brain worked to satisfy my first grade self but I wanted to know so I could figure out why mine was so different. I mean, was mine really that different? Yeah sure, my doctor said it was, but that didn't seem like it was enough for me. Did my brain physically look different or was it all emotional? If there were physical aspects of my brain that looked different, what parts were they and what did they do? Though my interest in the topic became renewed, I wasn't ready to throw myself into the confusing depths of the brain. Since then, I haven't the right opportunity to dive in, until now.

Before I can get into the nitty gritty, we have to start with the basics. What are the different parts of the brain and how did they work to create emotion and moods? As most people learn in their middle school health class, the brain is made up of many different parts, all of which work together to control our bodies and almost everything we do in our daily lives. For

example, the frontal lobe, controls things like our body movement, personality, concentration and emotional reactions. While our parietal lobe interprets touch, pressure, and taste giving us body awareness. The temporal lobe manages hearing, emotion, long-term memory, and allows us to recognize faces and the occipital lobe supervises sight. The cerebellum, in the base and back of the brain, controls our fine motor skills as well as balance and coordination. The limbic system, controls of our emotions like happiness, sadness, and love. (“What Are the Regions of the Brain and What Do They Do?”).

The limbic system is buried in our brain, behind the cerebellum. This part of our brain controls emotions. Not only is the limbic system “responsible for our emotional lives” it’s also responsible for “many higher mental functions, such as learning and formation of memories” (“The Limbic System”). Included in the limbic system is the thalamus, hypothalamus, amygdala, hippocampus, basal ganglia, and cingulate gyrus.

The thalamus and hypothalamus are both “associated with changes in emotional reactivity” (“The Limbic System”). The thalamus acts as a “way-station” (“The Limbic System”) and interprets your sensations as “a sensory impulse travels from the body surface towards the thalamus, which receives it as a sensation” (Robertson). This sensation is then sent to the cerebral cortex for interpretation as a change in temperature, pain, or touch (Robertson).

The hypothalamus is most important for maintaining the body’s internal environment by controlling the autonomic nervous system, internal organs and adrenalin release, and the pituitary gland of the endocrine system, as well as the skeletal muscle system, which is responsible for showing emotions through facial expressions and body posture. The stimulation of the hypothalamus “can activate many functions related to motivation, emotion and reward” (“The Hypothalamus”). However, stimulation in this area can also “trigger aggression indicating anger and/or fear, and many other functions related to motivation and emotion” (“The Hypothalamus”). A study done on animals showed that the same stimulation of the hypothalamus also induced an increase of food intake in these animals, and damage in the area depressed food intake (“The Hypothalamus”).

The amygdala is essential for your ability to feel certain emotions and perceive them in others. Things like the presence of food, rivals, children in distress and other events linked to survival are stimulating to the amygdala as it modulates the reactions and emotions felt towards these events and those like it.

The basal ganglia lies “deep in the subcortical white matter of the frontal lobes” (“The Limbic System”). This part of the limbic system serves as a “gating mechanism for physical movements, inhibiting potential movements until they are to be executed” (“The Limbic System”). Furthermore, the basal ganglia is involved in motor planning, sequencing, predictive control, working memory, rule-based habit learning, choosing from potential actions, and attention (“The Limbic System”).

The cingulate gyrus, though there is much more to learn about it, it is known “that it’s frontal part links smells and sights with pleasant memories of previous emotions. This region also participates in our emotional reaction to pain and in the regulation of aggressive behavior” (“The Limbic System”).

Though “psychologists and neuroscientists dispute the precise role of the hippocampus” (“The Limbic System”), it is generally agreed that the hippocampus plays an essential role in the memory department. It helps to form new memories as well as detect new surroundings and experiences. Some researchers “consider the hippocampus to be responsible for memories that can be explicitly verbalized” (“The Limbic System”). Though “damage to the hippocampus can

lead to loss of memory and difficulty in establishing new memories” (Mandal), research has shown “that damage to the hippocampus does not affect one's ability to learn new skills” (Mandal).

All of these parts, though small in size, play a crucial role in how you feel and what you're feeling. The limbic system is home to some of the most sensitive parts of the brain. Even small manipulation or damage to these areas can easily have an affect on your actions, thinking and personality.

Depression directly affects your emotions as well. For a long time, it was said that depression was simply a chemical imbalance in the brain, however this doesn't capture the complete complexity of depression (“What Causes Depression?”). Use of positron emission tomography (PET), single-photon emission computed tomography (SPECT) , and functional magnetic resonance imaging (fMRI) technology has provided a closer look at the disease, showing it's not just a chemical imbalance, but sometimes physical changes in the brain as well. These changes are mostly found in the limbic system, with the amygdala, thalamus, and hippocampus “[playing] a significant role in depression” (What Causes Depression?”). Research has shown that for some people with depression, the hippocampus is smaller than average. As an example, “in one fMRI study published in *The Journal of Neuroscience*, investigators studied 24 women who had a history of depression” (“What Causes Depression?”). On average these women had a hippocampus that was “9% to 13% smaller... compared to those who were not depressed” (“What Causes Depression?”). It was also found that the hippocampus was smallest in the women with more bouts of depression, which directly relates to stress, as “ongoing exposure to stress hormone impairs the growth of nerve cells in this part of the brain” (“What Causes Depression?”).

At some point in life, nearly everyone encounters a stressful situation. Though “not everyone who faces stresses develops a mood disorder - in fact, most do not - stress plays an important role in depression” (“What Causes Depression?”). Your genetic makeup can play a part in how sensitive you are to stressful life events, and when “genetics, biology, and stressful life situations come together, depression can result” (“What Causes Depression?”). If your stress is short-lived, “the body usually returns to normal... but when the stress is chronic or the system gets stuck in overdrive, changes in the body and brain can be long-lasting” (“What Causes Depression?”). Stress can be defined as “an automatic physical response to any stimulus that requires you to adjust to change. Every real or perceived threat to your body triggers a cascade of stress hormones that produces psychological changes” (“What Causes Depression?”) making it safe to say, stress is a natural thing. With stress, something that can occur in your everyday life, directly relating in some scenarios to a smaller hippocampus and to depression, it's almost as if nature sets you up.

My understanding of the mind and depression has gone through multiple phases over years. Starting with that day in the doctor's office. I thought it was something I would be able to control in some way or another. Little did I know that what happened inside my brain would be completely out of my hands, proven by the fact that your environmental conditions, something you mostly play no part in, can setup the scenario for a mental illness.

Me believing I was in control was only a short-lived phase, and I soon moved on to an almost obsessive phase of trying to find ways to cope. What I was trying to cope with, I wasn't really sure. Sure it was depression, but I wasn't quite confident I knew exactly what that meant. At this point I wasn't even sure it would be possible to find a coping mechanism. After a period of trial and error, I learned it was. However, the coping mechanism I developed was,

unfortunately, not the healthiest. This pushed me into my next and most recent phase, guilt. Though part of me knew I couldn't help most of what was going on, another part of me couldn't help but feel like I still had my hands completely on the situation and I was at fault. I felt like I missed something growing up, and there was something I could have done to prevent the situation entirely. I felt guilty for developing an unhealthy way to manage what I was going through, though I was just doing what I thought was helping. But mostly, I felt guilty that I wasn't getting better.

Much to my surprise, writing this paper has given me new insight on my situation and helped me as I'm still finding new ways to be more comfortable with myself. Though there are still remnants of guilt, and there might always be, my research about depression and its physical aspects has helped me move forward immensely. I now know that my diagnosis was, along with other things out of my control, like my genetic makeup, a result of my brain adapting to the conditions it was put in by nature. Processing my diagnosis proved to be one of the biggest challenges of my life. But I believe the research I have completed and new perspective I gained has put me on the path to the last phase, acceptance.

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