

Change How You Think:

In the first segment of this course we're going to talk about how changing how you think actually changes the chemistry, structure and function of your brain.

This course has 9 simple (not easy, but at least straightforward) ways to change your brain, and one complicated way. Of necessity we have to start with the complicated way, because understanding how we can change our biology by changing how we think and act is essential to understanding why the other 9 principles work, so if this first topic seems a little overwhelming-don't give up-the other topics are more straightforward. Let's jump in!

There used to be **two ideas in psychology** that have now been proven wrong:

1. The first wrong theory: That once we hit adulthood **our brains don't really change** much. We now have lots of research showing that our brains don't even stop laying down the "hardware" until we're 25 years old.¹ Scientists have also discovered that our brains are incredibly flexible and have the ability to grow, develop, adapt and change throughout our entire lifespan. This is called neuroplasticity. Meaning that our brain is moldable, shapeable, and changeable throughout our entire life. Experiences and actions can change the physical brain.

2. The second faulty idea was that we could completely **separate the psychological disorders from the biological** disorders in thinking. It used to be believed that the only treatment for the biological aspect of depression was medication, and the only treatment for the psychological disorder was psychotherapy. Now that we have highly advanced imaging tools like a PET scans and fMRIs scientists have been able to demonstrate that how we think changes the actual structure and chemistry of the brain.

Scientists can see changes in brain structure in people who meditate, study for tests, pray, practice gratitude, complain, worry, or other thought patterns.

It has become clear that our biology affects thinking, but our thinking also affects our biology. So our brain chemistry does impact how we think and how we feel, but how we think actually changes our brain chemistry.

One of my favorite examples of neuroplasticity are the stories of people who are blind, who have learned to navigate using echolocation². That means they've learned to navigate their environment using sound waves the way that bats do. This is a skill that their brains didn't have, but developed after they went blind. Scientists can actually see the structural changes in the brain of these people.

It's become increasingly evident that biology impacts thinking (The idea that you have a chemical imbalance that impacts depression, that's true) but it's also become evident that our thinking impacts our biology. So if we consistently think hopeless

¹ <https://hopes.stanford.edu/neuroplasticity/>

² <https://www.psychologicalscience.org/observer/using-sound-to-get-around>

thoughts, then we're going to be more likely to have the biology of depression.

It's really inspiring to see how much our brains can change, and this is true for people with anxiety, depression, and other mental illness. Due to our brain's ability to grow, adapt and change throughout our life, we can improve our brain functioning and abilities in many ways.

I love neuroplasticity because it gives us room to influence our own lives. You are the change agent to improve your own life.

To best understand what we're going to talk about in this course we need to talk for just a minute about how the brain works. There are four aspects of brain performance that we're going to talk about:

1. Brain Structure
2. Brain Chemistry
3. Brain Function
4. Genetics

Brain Structure

The first aspect we're going to cover is brain structure. There are physical structures in our brain and each performs a specific function. And we're not going to learn about all the parts of the brain for this course but we're going to talk about a couple of them. Your brain is made up of distinct structures that change and adapt based on how we use them. For example, there are two structures in our brain that are impacted by depression. The amygdala is the part of the brain that processes fear and the fight, flight, freeze response. In people with depression the amygdala has been shown to be larger and more active than the average person.³ Another part of our brain that's impacted by depression is the hippocampus⁴. The hippocampus processes emotions, and it's been shown that in people with depression the hippocampus is actually smaller than normal. It shrinks when people are experiencing depression.

However, just because these are physical changes associated with depression, doesn't mean those changes are permanent. Recent studies have shown that after a course of therapy many people's brain structures went back to a normal size.

This study examined patients who were experiencing depression and then had them attend eight weeks of therapy. Their hippocampus⁵ was measured before and it was shown to be smaller than average. And then after therapy was measured and shown

³ [Modifiable factors that alter the size of the hippocampus with ageing](#). Nat Rev Neurol. 2012 Mar 13;8(4):189–202. doi: 10.1038/nrneurol.2012.27. Fotuhi M1, Do D, Jack C.

⁴ Bossini L, Casolaro I, Santarneckchi E, et al: [Evaluation study of clinical and neurobiological efficacy of EMDR in patients suffering from post-traumatic stress disorder]. Riv Psichiatri 2012; 47 (Suppl):12–15

⁵ Moustafa, A. A. (2013). Increased hippocampal volume and gene expression following cognitive behavioral therapy in PTSD. *Frontiers in Human Neuroscience*, 7, 747. <http://doi.org/10.3389/fnhum.2013.00747>

to be larger. So the hippocampus, this physical structure in the brain, can change its size just based on something like talking with another person who's helping you change how you think.

In another study therapy didn't just reduce anxiety, but it physically altered the volume and electrical activity in certain parts of the brain⁶. Thanks to new imaging technology, we can actually see how the way we think impacts our physical brain.

Brain Chemistry

Now let's talk about brain chemistry. Your brain uses chemicals to communicate and these are called neurotransmitters. The main ones we're going to be talking about in this course are:

- Serotonin which has to do with confidence and happiness
- Dopamine which has to do with pleasure and reward
- Norepinephrine which has to do with decreased pain sensitivity and feelings of elation
- Oxytocin which has to do with bonding and love, and
- GABA which is associated with anxiety and stress

Now as I've mentioned before, mental illness is associated with differences in brain chemistry, also known as "Chemical Imbalances". But, medication is not the only way to treat a chemical imbalance. So while depression or anxiety can be seen on a chemical level inside the brain that doesn't mean that your only option is to change those chemicals by adding chemicals to your body like medication.

Neither I nor this course are against medication, I often recommend that my clients go to see a doctor to learn about medication options. However, I am a strong advocate for education. Medication is not the only way, nor the most effective way to impact our brain chemistry. Cognitive Behavioral Therapy, changing how we think and act, has been shown to be as effective as medication⁷ as a treatment for mental health disorders like depression and anxiety.

How we think affects our brain chemistry so here's an example. If we interpret a situation like a work assignment as being threatening or impossible or overwhelming then our brain releases chemicals like adrenaline and cortisol⁸. Now people with depression and anxiety have higher levels of adrenaline and cortisol in their brains. And this this creates a heightened stress response so a cycle of being stressed out about being stressed out and they tend to get more stressed out than the average brain than a person who doesn't have depression.

Research shows that with many people if they are taught how to think differently about a situation how to interpret that work assignment as not being stressful or overwhelming then the brain releases less cortisol and is less flooded with adrenaline

⁶ <https://neuro.psychiatryonline.org/doi/pdf/10.1176/appi.neuropsych.13090202>

⁷ <https://www.aafp.org/afp/2006/0101/p83.html>

⁸ How stress affects your health. American Psychological Association. <http://www.apa.org/helpcenter/stress.aspx>. Accessed Feb. 12, 2016.

⁹and therefore creates a more healthy balance of chemicals inside of it.

So we can actually decrease the level of the stress chemicals in our brain by changing how we think.

Brain Function

The third aspect of our brain that we're going to talk about very briefly in this course is brain function. Thoughts travel in our brain along tiny chemical and electrical connections called neural pathways¹⁰. We think along these little neural channels and they're like roads, The ones we use the most become broad like highways the ones that we rarely use are narrow and thin. And when we don't use certain thought pathways at all they get trimmed off because the brain likes efficiency.

So when we start thinking negative thoughts like “This is hopeless” or “I'm no good” or “Nobody's going to like me” then those pathways become thicker and broader and easier for the brain to send signals on. We become habitual in thinking that way. And that shows up in our in our biology, but when we change how we think and we start thinking hopeful thoughts like “I can do hard things” or “I can reach out and love other people” then those neural pathways become broader and wider and our brain functions actually change.

Genes

The last aspect that we're just going to talk about briefly is our genes. Now it's well known that there's a genetic aspect to mental health and mental illness. So, for example, depression and anxiety tends to run in families. For many people this feels like we're predestined to feel the way we feel now.

However, most mental illness is caused by a combination of genetics and other factors. For example, heritability estimates show that depression is approximately 37% influenced by genes and schizophrenia is around 80% influenced by genes. That means that even with the genetic factors, we still have a huge realm of influence with our mental health.

But even more exciting, there's some recent research that has shown that we have the ability to influence which of our genes get turned on and which of our genes get passed on to our descendants based on the experiences that we have¹¹. So how we respond to our experiences and how we think can impact which genes get turned off. This emerging field is called epigenetics¹². It tells us we have some degree of influence over a very impactful part of our mental health, our genes.

⁹ <https://www.sciencedirect.com/science/article/abs/pii/S0306453002001701>

¹⁰

<https://sites.psu.edu/psych256fa1602/2016/09/09/the-power-of-neurons-neural-pathways-and-neuroplasticity/>

¹¹

<https://www.scientificamerican.com/article/descendants-of-holocaust-survivors-have-altered-stress-hormones/>

¹² Weinhold, B. (2006). Epigenetics: The Science of Change. *Environmental Health Perspectives*, 114(3), A160–A167.

So all this research is showing that changing how you think can change your brain chemistry, structure, function and even genetic expression.

Now obviously I can't just hand you these changes in thinking during this course. Therapy is an amazing process where you interact with another human being to create change, and many studies have shown that the therapeutic relationship is one of the biggest influencers when it comes to change. So if you'd like to see big changes, go find a therapist who can help you. Therapy isn't the only way to change our thinking. It's just the one that has the most research behind it. Cognitive behavioral therapy has hundreds of studies showing that it's effective. Research shows that it helps over 70 percent¹³ of people improve their symptoms of depression¹⁴ and anxiety. And we know that it works because it not only changes how we think, but it changes brain biology.

There are other ways to change how we think: Self-help Books, Online Courses, Seminars, and new experiences can all change how we think. Cognitive behavioral therapy is just one approach that's been refined down to a very efficient technique shown to help people change their brain chemistry.

Now I realize that this segment has been more of an overview and if you'd like to learn one specific way to change how you think check out these two videos I made on cognitive distortions: Black and White Thinking and Catastrophizing. Each video will help you identify thinking patterns that lead to depression and anxiety and teach you some ways to change that thinking.

So if you want to change your brain chemistry start changing how you think.

¹³ <https://www.sciencedirect.com/science/article/pii/S0887618517304280>

¹⁴

[https://www.rcpsych.ac.uk/mental-health/treatments-and-wellbeing/cognitive-behavioural-therapy-\(cbt\)](https://www.rcpsych.ac.uk/mental-health/treatments-and-wellbeing/cognitive-behavioural-therapy-(cbt))