

“The Imagination of a Danger Which Had Never Been Experienced”: A Darwinian
Exploration into the Evolution of Anxiety Disorders

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“My will and reason were powerless against the imagination of a danger which had never been experienced.” This is a quote from a diary entry of Charles Darwin and it accurately encapsulates the feeling of anxiety. Darwin himself struggled with several different anxiety disorders throughout his life. The psychiatrist, John Bowlby, who wrote a biography on Darwin, said that, “Darwin’s conscience was a very painful thing.”¹ Bowlby also noted how self-reproach was indeed second nature to Darwin. Unfortunately, this is common for people suffering from anxiety disorders, overthinking or possessing a hyperactive conscience results in severe self-criticism about every little thing you do. Anxiety disorders are the most common mental illness in the world. The latest global estimates from the World Health Organization, published last year, say that currently two-hundred and sixty four million people every year are suffering from anxiety disorders around the world. In America alone, there are fifty seven million people suffering each year, which is twenty one percent of our population, or one in five people.² Think about just how many people that is for a second, one in five people. That means every single person in this country should either know someone with an anxiety disorder or be someone suffering from an anxiety disorder themselves. With an affliction this widespread and that causes much psychological as well as physiological pain, you’d think we would have more effective treatments to help people suffering, as you will come to find out while reading this paper sadly we have very few effective remedies at our disposal and some treatment methods that have been operating as effective are actually doing more harm than good. In order to better understand

¹ Robert Wright, *The Moral Animal*(New York: Vintage Books, 1994), p.211.

² World Health Organization, “Depression and Other Common Mental Disorders: Global Health Estimates,”2017. Accessed 15 April 2018.<http://apps.who.int/iris/bitstream/handle/10665/254610/WHO-MSD-MER-2017.2-eng.pdf;jsessionid=40C04F35A084411B93451B70EFB20851?sequence=1>.

anxiety disorders we first need to understand the normal anxiety response, this is where we look to Charles Darwin and his theory of evolution by natural selection.

Charles Darwin's, *On The Origin of Species*, was published in November 1859. In this book Darwin outlined the theory of evolution by natural selection, which is the process that ensures the passing on of favorable traits to propagate the survival and reproduction of genes. One hundred and fifty nine years later in 2018 Darwin's theory of evolution has become a widely accepted scientific theory taught in schools around the world. Knowing the widespread adoption of this postulate it may surprise you to know just how little evolutionary theory is taught and applied in the mental health community of clinicians and researchers, the science that can explain the origin of diseases and disorders is not usually even a prerequisite to attending a medical school or becoming a mental health clinician. In fact most medical students do not even accept the theory of evolution.³ Within the medical and mental health communities there has been a major lag in incorporating evolutionary theory into research and treatment even though this knowledge revolutionized our understanding of behavior long ago. It seems like you would need the theory of evolution not only to explain the origins of diseases and disorders, but also to explain why humans are vulnerable to them in the first place and to guide research into what treatment methods would be the most effective. However, most mental health clinicians and researchers still view evolution as an interesting or even threatening alternative, instead of recognizing it as an essential basic science for understanding mental disorders. We need to understand how evolutionary theory explains the development and persistence of anxiety disorders in order to inspire the mental health community to recognize evolution for the essential

³ Randolph M. Nesse and Stephen C. Stearns, "The Great Opportunity: Evolutionary Applications to Medicine and Public Health," Wiley Online Library, 25 January 2008. Accessed 15 April 2018. <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1752-4571.2007.00006.x>.

science that it is and incorporate it into their practice. The dangers of continuing on without an evolutionary foundation can include, serious errors in treatment, and the classification of disorders which can lead to medications that actually worsen conditions instead of improving them and the misdiagnosis of conditions. After all, before you can come up with the solution to a problem you have to be able to see the whole problem or your solution is always going to be lacking something. Currently, the mental health community has not seen the whole problem because they have failed to incorporate evolutionary theory into their repertoire.

Normal Anxiety Response

As Peter Medawar, a British biologist whose work was fundamental to the practice of tissue and organ transplants, once said, “It is not informative to study variations of behavior unless we know beforehand the norm from which the variants depart.” Before we can begin to understand anxiety disorders and how to best treat them we have to understand the normal anxiety response, we can do this by examining its evolutionary function and the mechanisms underlying it. As *The Canadian Journal of Psychiatry* put it, “The function of the human anxiety response, and homologous in other species, is to prepare the individual to detect and deal with threats.”⁴ Anxiety is a functioning adaptation that is useful in protecting species against potential dangers. Anxiety is something we all experience, while recognizing that it is helpful in some circumstances it's also just as easy as to recognize the unpleasant symptoms associated with the nervousness it incites. Robert Wright, American journalist, scholar, and world winning author, said in his book *The Moral Animal*, “Natural selection never promised us a rose garden. It

⁴ Melissa Bateson, DPhil, Ben Brilot, PhD, and Daniel Nettle, PhD, “Anxiety: An Evolutionary Approach.” *The Canadian Journal of Psychiatry*, 12 December 2011. Accessed 20 March 2018. file:///home/chronos/u-3c7c7e3511cb5589cb2d8c8a055656158aa989ef/Downloads/Anxiety_An_Evolutionary_Approach.pdf.

doesn't "want" us to be happy. It "wants" us to be genetically prolific."⁵ Natural selection does not result in "perfect" traits, it results in traits that are going to be unrivaled in the struggle for existence, passing on those genes to the next generation.

Put into terms of evolutionary psychology, you can see this cost-benefit asymmetry associated with being over or under anxious. The Smoke Detector Principle states, if you compare the fitness consequences of not feeling anxious when we should with the consequences of feeling anxious when we shouldn't, then it immediately becomes clear that we should err on the anxious side of the equation. As Randolph Nesse, a physician and evolutionary biologist, put it, "The cost of getting killed even once is enormously higher than the cost of responding to a hundred false alarms."⁶ Anxiety may cause you to worry about situations that haven't even happened yet and come up with the worst possible outcomes which, undoubtedly, causes a great deal of distress. From an evolutionary perspective, however, that anxiousness is a necessary byproduct to ensure you are prepared. The criteria that natural selection operates on is very different from the standards used to demarcate clinical boundaries in psychiatry, which are mainly based on level of suffering and quality of life. Although, if a mechanism is producing distress or impairing quality of life this does not necessarily mean that it is malfunctioning in the evolutionary sense.⁷ For example the pain system, while certainly unpleasant, if it did not operate functionally under the appropriate circumstances, then the individual's viability would be reduced. Pain itself is

⁵ Robert Wright, *The Moral Animal* (New York: Vintage Books, 1994), p.211.

⁶ Will Reader and Lance Workman, *Evolutionary Psychology: Third Edition* (Cambridge: Cambridge University Press, 2014), p.368.

⁷ Melissa Bateson, DPhil, Ben Brilot, PhD, and Daniel Nettle, PhD, "Anxiety: An Evolutionary Approach." *The Canadian Journal of Psychiatry*, 12 December 2011. Accessed 20 March 2018. file:///home/chronos/u-3c7c7e3511cb5589cb2d8c8a055656158aa989ef/Downloads/Anxiety_An_Evolutionary_Approach.pdf.

objectionable, but in the case where there is an absence of the pain system, congenital insensitivity [A condition that inhibits the ability to perceive physical pain], many health issues can go undetected and this leads to reduced life expectancy. Anxiety is quite similar to the pain system in that it causes unfavorable symptoms in order to ensure the individual's survival in that it causes the individual to be aware of threats. Wright, in talking about the burden of an overactive conscience poses these questions, "What burdensome mental appliances are we stuck with? How, if at all, can they be defused? And at what cost-to ourselves and others?"⁸ Mental appliances, much like how your kitchen could not effectively function without its accompanying appliances, neither could your brain. Here Wright questions these burdensome additions to our mental state and ponders if we could ever eliminate them and at what costs. Establishing that anxiety is a functioning adaptation that evolved and persists because of its continued functionality to humans, what then causes anxiety to the level of disorder? This is where we turn to the theory of evolutionary mismatch.

Evolutionary Mismatch Theory

Modern humans exist in environments critically different from those in which we evolved. Some current disorders may be the direct result of evolved adaptations interacting negatively with modern environments. The theory of evolutionary mismatch explains that human morphology and behavior originally evolved in zones of time called EEA's, or environments of evolutionary adaptation. These zones were in effect from the first pre-human beings, and as they continued to evolve, step by step, into modern humans.⁹ While humans and our culture are still

⁸ Robert Wright, *The Moral Animal* (New York: Vintage Books, 1994), p.211.

⁹ Kent G. Bailey, PhD, "Human Paleopsychology: Mismatch Theory," Virginia Commonwealth University, 1995. Accessed 20 March 2018. <http://kentgbailey-paleopsychology.com/mismatch-theory>.

evolving today it is at a much slower pace than during these environments of evolutionary adaptation. This slower pace can be attributed to our cultural innovations, such as the agricultural and industrial revolutions which have shaped our modern diets, created pollution, as well as things like decreased social connectedness due to technological advancements that change the way we interact with people, that eliminate selection on some traits. For example, hospitals and modern medicine keep many people alive that in ancient times would have died in the absence of those innovations. This explanation is congruent with the greater prevalence of some disorders in industrialized nations, like America. Due to this modern human beings often find their naturally evolved selves at odds or mismatched with the current physical, social, and cultural environments. The ways of modern life have come about relatively quickly as far as the evolutionary time frame goes. Kent G. Bailey, PhD in clinical psychology, professor emeritus of psychology at Virginia Commonwealth University, and author of the book *Human Paleopsychology*, calls this phenomenon the regression-progression theory and says, “Whereas regression is easily effected and merely needs a releasing stimulus, the development and maintenance of modern technological culture [phylogenetic progression] requires thousands of years to develop in the first place.”¹⁰ Bailey uses the example of humans having to go to school for almost two decades just to have a chance at competing economically in our modern culture. Learning how to function in our modern society, and survive on your own takes time, but falling back into the normalcy and comfortability of human nature takes no time at all. Bailey says, “When highly stressed and/or provoked, a person easily slips back into earlier evolutionary adaptive programs that may have served our ancestors well in pre-cultural times but are

¹⁰ Kent G. Bailey, PhD, “Human Paleopsychology: An Overview,” Virginia Commonwealth University, 2002. Accessed 20 March 2018. <http://kentgbailey-paleopsychology.com/overview>.

amoral/immoral, socially chaotic, and even pathological today.”¹¹ Anxiety disorders are seen as pathological and assumed to be malfunctions of the brain; not only is this incorrect it also plows ground for stigma to grow. Since anxiety disorders have this pathological nature, “Unlike physical disabilities, persons with mental illness are perceived by the public to be in control of their disabilities and responsible for causing them.”¹² Part of this fundamental misunderstanding surrounding mental illnesses is this lack of an evolutionary foundation. As Nesse put it when he talked about why incorporating evolutionary theory into the mental health realm is important, “Equally valuable is the deeper empathy fostered by an evolutionary perspective on life’s vicissitudes.”¹³ It is not the individual's own fault or a “mistake” in their genetic makeup.

To further understand this evolution of anxiety and what is causing disorder let’s look at immediate versus delayed return environments. The modern human brain, as we know it today, evolved while homo sapiens were living in an immediate return environment. When living in an immediate return environment, your actions deliver immediate benefits, your life revolves around the present moment. Take a deer for example. A deer is not worried about what is happening a month from now, a deer is concerned about getting through the day. This includes finding food and water, staying away from predators, and having a safe shelter, the deer’s actions have immediate consequences for the deer. In this type of environment anxiety is a useful adaptation that could help the deer live to see tomorrow. This is the type of environment that your brain evolved for and this is quite the opposite from the environment we are currently living

¹¹ Kent G. Bailey, PhD, “Human Paleopsychology: An Overview,” Virginia Commonwealth University, 2002. Accessed 20 March 2018. <http://kentgbailey-paleopsychology.com/overview>.

¹² Patrick W. Corrigan and Amy C. Watson, “Understanding the Impact of Stigma on People With Mental Illness,” *World Psychiatry Journal*, 2002. Accessed 1 February 2018. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1489832/>.

¹³ 32. Randolph M. Nesse, “Evolutionary Psychology and Mental Health,” in *The Handbook of Evolutionary Psychology*, ed. David Buss (Hoboken, NJ: John Wiley and Sons, 2005), 903.

in. We are currently living in a delayed return environment, where most of the choices you make today will not benefit you immediately. Many aspects of our modern society are designed to delay rewards until some point in the future, and this is true of our problems as well, we constantly worry about problems of the future. In this type of environment uncertainty levels are very high, and anxiety feeds off of uncertainty. James Clear, an author in disciplines such as biology, neuroscience, and psychology, said of this type of environment, “Unfortunately, living in a delayed return environment tends to lead to chronic stress and anxiety for humans. Why? Because your brain did not evolve to solve the problems of a delayed return environment.”¹⁴ Your brain evolved to value immediate returns. Anxiety is a normal response to feeling stressed or threatened but once the situation that caused the anxiety or feeling of danger has been mediated then the anxiety is supposed to cease. In a delayed return environment the mediation process may take much longer and this is not a scenario your brain evolved to respond to. “The “normal” functioning of some adaptations may still be adaptive in modern environments but nevertheless classified as “disorder” because it causes distress or is culturally disfavoured.”¹⁵ An example of a delayed return is, you go to work today, but you won’t receive your paycheck for a couple more weeks. Or you have been saving money to go on vacation but will not actually get to take that vacation for a year or more, these are delayed returns and this is a breeding ground for increased levels of anxiety.

Evolutionary Theory and the Mental Health Community

¹⁴ James Clear, “The Evolution of Anxiety: Why We Worry and What to Do About It,” 2018. Accessed 30 January 2018. <https://jamesclear.com/evolution-of-anxiety>.

¹⁵ Paul w. Andrews, PhD, JD, Zachary Durisko, PhD, Kwame McKenzie, BM, MRCPsych, and Benoit H. Mulsant, MD, MS, “Using Evolutionary Theory to Guide Mental Health Research,” *Can J Psychiatry*, 6 March 2016. Accessed 10 February 2018. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4813423/>.

Can J Psychiatry said in a study done in 2016, “Knowing whether a harmful condition is caused by the natural functioning of an adaptation or the breakdown of an adaptation leads to different models of illness, different directions of research, and most importantly, different approaches to treatment.” The issue with the current approach to psychiatric nosology, which is the branch of medical science that is dealing with the classification of diseases, is that it does not differentiate between “functional” and “dysfunctional” routes to distress and impairment. We can see this issue in the *Diagnostic and Statistical Manual of Mental Disorders*, which is essentially the encyclopedia for all mental disorders. The DSM classifies mental disorders as a malfunction of the brain that leads to distress and impairment. Nesse argues that the DSM fosters a crude biological view of disorders, he says, “An evolutionary view highlights the central flaw in the DSM criteria; they do not reflect the most basic distinction in medical diagnosis: that between diseases and symptoms of diseases.”¹⁶ For example, a cough can be a symptom of many things, the problem is more a dysregulation of a response that can be normal and useful. If you understand the functions of the cough this can guide the search for the problems causing it, and decisions about when it is expressed normally or abnormally. If you base your diagnosis off of purely observable symptoms that have no understanding of the function of the emotions involved in the emotional disorder there is a risk of misdiagnosis. Understanding the function of emotions, or understanding their original purpose, is an aspect missing from the majority of medical and mental health students' education. In a scholarly article from the *Proceedings of the National Academy of Sciences of the United States of America* they spoke about this alarming gap, “New applications of evolutionary biology in medicine are being discovered at an accelerating rate, but

¹⁶ 32. Randolph M. Nesse, “Evolutionary Psychology and Mental Health,” in *The Handbook of Evolutionary Psychology*, ed. David Buss (Hoboken, NJ: John Wiley and Sons, 2005), 909.

few physicians have educational backgrounds to use them fully.”¹⁷ The benefits of employing an evolutionary perspective will never be fully realized if we don’t first address this educational issue in our medical community. In a study that Nesse completed on evolutionary applications and how it applies to mental health, “The magnitude of the gap is impressive. Studies of medical education found that most medical schools in the UK and the US have not even one evolutionary biologist on the faculty.”¹⁸ This is shocking, evolution is an essential basic science for understanding diseases and disorders and somehow it is just casually being left out of the curriculum of the people who are going to be diagnosing and treating these diseases and disorders. We live in a very religious country but even still that is shocking, to go into a profession that is very scientific- based but completely reject the idea of one of the most essential scientific theories to understanding our origins and how we operate. Even when these professionals or students do accept the theory of evolution they ask, how can I apply it in the clinic presently? For many physicians and mental health professionals, patients come to them with a problem and they try to help them solve it immediately. Learning where the problem came from and how its mechanisms work seems a little abstract if they already have a solution that will work right now, although we can raise the questions on how much more effective those solutions might be if they sprung from an evolutionary base. As Nesse and Stephen C. Stearns, professor of ecology and evolutionary biology at Yale University, said in a study they conducted,

¹⁷ Randolph M. Nesse, et al., “Making Evolutionary Biology a Basic Science for Medicine,” *Proceedings of the National Academy of Sciences of the United States of America*, 2 August 2009. Accessed 18 April 2018. <file:///home/chronos/u-3c7c7e3511cb5589cb2d8c8a055656158aa989ef/Downloads/Evolutionary%20Science%20and%20Medicine.pdf>.

¹⁸ Randolph M. Nesse and Stephen C. Stearns, “The Great Opportunity: Evolutionary Applications to Medicine and Public Health,” Wiley Online Library, 25 January 2008. Accessed 15 April 2018. <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1752-4571.2007.00006.x>.

“Darwinian medicine does not give direct practice guidelines. Instead of phenomena as specific as acid-base balance, evolution helps doctors make sense of why a disease exists at all, what environments increase the risk, and how treatments work. It has direct applications to medical research, but it also provides an otherwise missing paradigm for understanding why our bodies are vulnerable to disease.”¹⁹ Nesse claims that utilizing an evolutionary approach will unite all aspects of the medical and mental health communities into a biopsychosocial model. Mental illnesses such as anxiety disorders are far too often kicked to the lower rung of the ladder and still to this day not seen as equal to physical illnesses, even though they can be equally detrimental to the person suffering from them. Integrating an evolutionary view cannot only help research, classification, and treatment; it can also aid in the medical community realizing that mental illnesses need to be thought of as having the same weight as physical illnesses. Maybe if this was better understood the mental health budget in our country would not be getting cut right now. In Texas, the largest provider of mental health care is county jails. *The Houston Press* says of Harris County, “The Harris County criminal courts are doing, arguably, the best they can for people like Dolphin [an inmate diagnosed with a chronic disorder], by letting them go and transferring them to the custody of mental healthcare providers. But once they do, that's when both jails and the local mental health authorities run into the big problem: There is no room at the hospital. And so patients like Dolphin will wait in jail until there is — even though they are no longer charged with a crime.”²⁰ Texas’s mental health care budget is abominable, situations like

¹⁹ Randolph M. Nesse and Stephen C. Stearns, “The Great Opportunity: Evolutionary Applications to Medicine and Public Health,” Wiley Online Library, 25 January 2008. Accessed 15 April 2018. <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1752-4571.2007.00006.x>.

²⁰ Meagan Flynn, “The Revolving Door Between Jail and Mental Health Care in Harris County,” *Houston Press*, 11 April 2016. Accessed 19 March 2018. <http://www.houstonpress.com/news/the-revolving-door-between-jail-and-mental-health-care-in-harris-county-8312008>.

this are all too familiar for people who need to be treated in a mental hospital but can't because of the lack of room. In some situations even chronically ill patients that have little chance of being able to function on their own are turned away because of the scarce space available, and that is where we have instances of innocent people sitting in jail waiting for a spot to open up. This is the kind of story you would never hear for someone who was terminally ill. The hospital wouldn't turn them away or tell them to try not to die and come back later when they have fewer patients. There would be outrage if that happened, it would be plastered on the front page of every news site. For some people struggling with mental disorders though, this is their reality, and no one cares enough to put it on the front page of anything. This is due, in part, to the general public having the misconception that people suffering from mental disorders are in control of them; much like a person with cancer has no control over it, the same is true of mental disorders. This long held misconception needs to be corrected, looking at these disorders through an evolutionary lens can help.

Stigma and How To Change

In the *World Psychiatry Journal* in an article written titled, "Understanding the Impact of Stigma on People with Mental Illness", they described the impact of stigma on an individual as, "They struggle with the symptoms and disabilities that result from the disease. They also are challenged by the stereotypes and prejudice that result from misconceptions about mental illness." "The impact of stigma is twofold, public stigma is the reaction that the general population has to people with mental illness. Self-stigma, is the prejudice which people with

mental illness turn against themselves.”²¹ This is important, if someone told you everyday that you were a failure at first you might reject the comments but if it continues day after day you might start to think, what if I am a failure? A similar situation occurs with mental disorders and it's why many people suffering from mental disorders are embarrassed and don't tell their family members about it because of fear of judgement. They already self-criticize themselves all the time and struggle with feeling confident and then the stigma from their environment only helps them confirm their own criticisms. Every time a tragedy occurs, mental illness is the headline of every news channel, our president talks about mental illness and the people suffering from the illnesses as if they are one in the same. Back in February, when president Trump had a listening session with teachers, parents, and students following the Parkland shooting where he was repeatedly asked about how to improve mental health care his reply was, “Today, if you catch somebody with a mental illness they don't know what to do with them. He hasn't committed the crime but he may very well. There's just no mental institution, there's no place to bring them.”²² This sort of language, putting everyone who is suffering from a mental illness in the same box with someone who would go out and shoot seventeen people, is nauseating. This is the kind of talk that is coming from the leader of our country, and the media and other entities certainly don't do enough to disavow this view. At that same listening session a woman whose son was killed in the Sandy Hook shooting in 2012, Nicole Heckley, responded to Trump's benighted

²¹ Patrick W. Corrigan and Amy C. Watson, “Understanding the Impact of Stigma on People With Mental Illness,” *World Psychiatry Journal*, 2002. Accessed 1 February 2018, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1489832/>.

²² “Read a Transcript of the Listening Session at the White House After the Parkland School Shooting,” *Boston Globe online*, last modified February 22, 2018, <https://www.bostonglobe.com/2018/02/21/read-transcript-listening-session-white-house-after-parkland-school-shooting/OVGdHawYv3YanJ1saijw2H/story.html>.

statements regarding mental health in part by saying, “One point on the mental health issue, and I think it's important to note, that someone with a mental illness is highly unlikely to ever commit an act of violence, what we are really dealing with here is more of a lack of mental wellness. This is around anger and fear and that’s not something you can diagnose and put in mental health hospitals. This is more about funding for mental health services to help these individuals that are at risk.”²³

Mrs. Heckley is right, another negative impact that results from stigma is a lack of empathy from the public. If people are not thoroughly educated on mental disorders this is only going to continue to support the public stigma and deleterious impact on obtaining good jobs and leasing safe housing, just a few more issues that people suffering with mental illnesses also have to deal with from people who choose to stay within their scope and avoid people who threaten it. Looking into some strategies for changing public stigma we turn back to WPJ in which they outlined three approaches to changing public stigma: protest (the reactive strategy), education, and contact. All three of these approaches are highly valuable and do inspire great progress in ridding our society of stigma, the one I am going to be focusing on here though is contact, which the WPJ found to be the most effective approach. The WPJ, when speaking about the contact approach, said, “Stigma is further diminished when members of the general public meet persons with mental illness who are able to hold down jobs or live as good neighbors in the community.”

²³ “Read a Transcript of the Listening Session at the White House After the Parkland School Shooting,” *Boston Globe online*, last modified February 22, 2018, <https://www.bostonglobe.com/2018/02/21/read-transcript-listening-session-white-house-after-parkland-school-shooting/OVGdhawYv3YanJ1saijw2H/story.html>. ”

²⁴ The general public is not well educated on mental illnesses, even though everyone should know at least one person suffering from a mental illness many people do conceal it from their family and friends. Education is great, but if they can realize that someone they know and love or someone who is successful is also suffering from a mental illness they can replace those stereotyped images in their mind with that of the person, or people, they know. Let's look back towards Charles Darwin for an example; many psychiatrists have analyzed Darwin's symptoms, which included such maladies as abdominal pain, dizziness, backache, heavy breathing, insomnia, and many more, and diagnosed him with our modern knowledge of mental illnesses. One such study conducted by Thomas J. Barloon, MD and professor at Carver College of Medicine, and Russell Noyes Jr, MD, psychiatrist, and professor at the University of Iowa, was entitled "Charles Darwin and Panic Disorder". They concluded from this study of Darwin's symptoms, "His symptoms, when considered individually, suggest a variety of conditions, but taken together they point toward panic disorder with agoraphobia [which involves debilitating anxiety and fear that arise frequently and without reasonable cause along with fear of places and situations that might cause panic]. This diagnosis brings coherence to Darwin's activities and explains his secluded lifestyle, including difficulty in speaking before groups and meeting with colleagues."²⁵ This as well as other studies confirm that Darwin did indeed suffer from an anxiety disorder but the question at large is, did that anxiety help or hinder him in his research and ultimate success with the theory of evolution? I was emailing with Dr.Noyes, who was part

²⁴ Patrick W. Corrigan and Amy C. Watson, "Understanding the Impact of Stigma on People With Mental Illness," *World Psychiatry Journal*, 2002. Accessed 1 February 2018.<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1489832/>.

²⁵ Thomas J. Barloon, MD and Russell Noyes Jr., MD, "Charles Darwin and Panic Disorder," *JAMA Network*, 1997. Accessed 20 February 2018.<https://jamanetwork.com/journals/jama/article-abstract/412929?redirect=true>.

of the aforementioned study, in which I asked him about this inquiry, his response was, “ As far as Darwin goes, my coauthor and I felt that his anxiety disorder may have indirectly contributed to his work on evolution by isolating him socially and redirecting his attention.” While his anxiety disorder was a great hindrance to Darwin in many areas of his life, it may have actually contributed to the success of his theory. Using an influential figure, like Darwin, when educating the public on mental illnesses would be a great tool. While this is a little different from the contact approach, many great, influential figures in history suffered from mental illnesses, Abraham Lincoln being another example. In a student paper written last year by Joshua Wolf Shenk, titled “Lincoln’s Melancholy”, this student inspected how Lincoln’s depression impacted his life. “Lincoln is a prime example on how someone can make the most out of one’s situation and yet be successful. The president leveraged his melancholy and achieved greatness.”²⁶ These individuals are easily recalled by the majority of people. Name recognition has power in more ways than one and in this case if people know someone as highly respected in science as Darwin suffered from anxiety disorders it may have the same effect as the success of the contact approach.

Antidepressant Plague

Antidepressants are arguably the most popular drug being used in the mental health community to treat patients suffering from disorders. Since the release of one of the more well known antidepressants, Prozac, in 1988 the number of people that are taking these drugs has skyrocketed. In America, one in nine Americans are taking some type of antidepressant every

²⁶ Joshua Wolf Shenk, “I Hope to Have God on my Side, but I Must Have Kentucky”:How Lincoln’s Depression Helped Maintain Kentucky in the Union and Save the Country,” Sample student paper. Humanities 1302.

single day.²⁷ With this many people in America alone being so dependent on a drug that is supposed to stabilize their feelings of well-being it's scary to think there are still so many unanswered questions surrounding these drugs. There is a lot of controversy and debate about the value of these drugs on treating mental disorders and while a lot of research into their effectiveness has been done, the psychiatric literature seems to be dominated by mainly industry funded studies, funded by the very pharmaceutical companies that make the drugs, which, not surprisingly, show an overwhelming majority of positive results. A New York Times article released just last month by Aaron E. Carroll, professor of pediatrics at Indiana University School of Medicine, put this into context, "It's not that there is a lack of research, the problem is that this has been a prime example of publication bias: positive studies are likely to be released, with negative ones more likely to be buried in a drawer."²⁸ The larger issue in this selective publication affair is the coupling of two very different sectors, that of corporations and science. This conflict is outlined in an article published by Peter Lurie MD and MPH, president of the Center for Science in the Public Interest and Allison Zieve, director of the Public Citizen Litigation Group on the Public Citizen website, "Progress in science is based on the free publication of study results and on the public release of data, allowing scientists to build on the experiences of others. In contrast, the governing ethic in the corporate section is secrecy-- the withholding of any information from which a competitor might benefit. There is perhaps no realm in which these competing viewpoints are presented more starkly than in the area of access

²⁷ Jun Yan, Pharm D, "Percentage of Americans Taking Antidepressants Climbs," American Psychiatric Association, 15 September 2017. Accessed 15 April 2018. <https://psychnews.psychiatryonline.org/doi/full/10.1176/appi.pn.2017.pp9b2>.

²⁸ Aaron E. Carroll, "Do Antidepressants Work?" *The New York Times*, 12 March 2018. Accessed 15 April 2018. <https://www.nytimes.com/2018/03/12/upshot/do-antidepressants-work.html>.

to pharmaceutical data at the FDA [Food and Drug Administration].”²⁹ The extent of this problem can be seen clearly in a study done in 2008 by *The New England Journal of Medicine* titled, “Selective Publication of Antidepressant Trials and Its Influence on Apparent Efficacy”. The conviction fueling this study was, “Evidence-based medicine is valuable to the extent that the evidence base is complete and unbiased. Selective publication of clinical trials — and the outcomes within those trials — can lead to unrealistic estimates of drug effectiveness and alter the apparent risk–benefit ratio.”³⁰ Within this study they analyzed seventy-four FDA registered studies, accounting for about 3449 participants who were taking a variety of antidepressants across the studies. The results of this analysis were, “According to the published literature, it appeared that 94% of the trials conducted were positive. By contrast, the FDA analysis showed that 51% were positive. Separate meta-analyses of the FDA and journal data sets showed that the increase in effect size ranged from 11 to 69% for individual drugs and was 32% overall.”³¹ The differences among these apparent positive results is concerning, particularly when you start looking at the real effects of overstating the results, the study published on the Public Citizen website shows this distinctly, “The first example involves the selective publication of data on the efficacy of selective serotonin reuptake inhibitor (SSRI) antidepressants in children. Despite objective evidence demonstrating that SSRIs are, at best, moderately effective in children, published studies generally exaggerated the benefits of these drugs, while certain negative

²⁹ Peter Lurie and Allison Zieve, “Sometimes the Silence Can Be Like Thunder: Access to Pharmaceutical Data at the FDA,” *Law and Contemporary Problems*, 2006. Accessed 22 April 2018. <https://www.citizen.org/our-work/health-and-safety/article-law-and-contemporary-problems-access-pharmaceutical-data>.

³⁰ Erick H. Turner, MD, et al., “Selective Publication of Antidepressant Trials and Its Influence on Apparent Efficacy,” *The New England Journal of Medicine*, 17 January 2008. Accessed 24 April 2018. <https://www.nejm.org/doi/full/10.1056/NEJMsa065779>.

³¹ *Ibid.*

studies provided to the FDA were never published. Industry-funded academic scientists withheld from publication some studies that failed to demonstrate drug efficacy, the inclusion of which would have altered the risk-benefit profile of the drugs.”³² The overwhelming amount of positive studies pushed into the public eye cloud consumers minds with a mirage of headlines that declare antidepressants not only work but how life changing they are and unless these individuals dig deep they will never know much more than that until they themselves are suffering the adverse effects of antidepressants which can include increased suicidal ideation and increased levels of anxiety and depression actually worsening the individual's condition.

The underlying assumption that antidepressants work off of is that the root causes of mental illness has more to do with genes and chemical deficiencies in neurotransmitters such as serotonin, dopamine, and Norepinephrine, known as monoamine theory; although, neuroscience, to date, has not characterized the optimal brain state, nor even how to assess it. A study that was published by *Science Direct* in March of 2017 titled, “Optimal Trajectories of Brain State Transitions” looked into the mechanisms of how we transition from one cognitive state to another. “Intuitively, these trajectories can map out the mental states that our brain may pass through as we go about the activities of daily living [including feeling anxious]. In a mathematical sense, these transitions can be thought of as trajectories through an underlying state space. While an understanding of these trajectories is critical for our understanding of cognition and its alteration following brain injury, fundamental and therefore generalizable mechanisms

³² Peter Lurie and Allison Zieve, “Sometimes the Silence Can Be Like Thunder: Access to Pharmaceutical Data at the FDA,” *Law and Contemporary Problems*, 2006. Accessed 22 April 2018. <https://www.citizen.org/our-work/health-and-safety/article-law-and-contemporary-problems-access-pharmaceutical-data>.

explaining how the brain moves through states have remained elusive.”³³ This study showed that white matter structure, which is the paler tissue of the brain and spinal cord, constrains how the brain transitions from one cognitive state to another, however, the actual mechanics, or reasoning, behind the initiation of this movement remains unknown. The absence of an evolutionary understanding of the disorders antidepressants are meant to treat coupled with the lack of understanding of how the brain transitions between cognitive states, including disordered thinking, brings into question how antidepressants were even developed, missing this large foundation of knowledge. In a study done by Joanna Moncrieff, British psychiatrist and a leading figure in the Critical Psychiatry Network and David Cohen PhD in social welfare and professor at the University of California Los Angeles, titled “Do Antidepressants Cure or Create Abnormal Brain States?”, they dive into how antidepressants came into the market and what the real, long-term effects of using them are. Both these individuals are prominent critics of the modern psychopharmacological model of mental disorder and drug treatment, and the role of the pharmaceutical industry. “Antidepressants are believed to exert their therapeutic effects by acting on brain monoamines [a compound having a single amine group, especially one that is a neurotransmitter], which are believed to be important determinants of mood. However, in a circular chain of logic, the monoamine theory of depression was itself formulated primarily in response to observations that early antidepressants increased brain monoamine levels.”³⁴ They were working backwards, observing the effects the drugs had on patients and then assuming what the drugs were correcting. Independent evidence has not confirmed that there is a monoamine

³³ Shi Gu, et al., “Optimal Trajectories of Brain State Transitions,” *Science Direct*, 1 March 2017. Accessed 21 March 2018. <https://www.sciencedirect.com/science/article/pii/S1053811917300058#!>.

³⁴ David Cohen and Joanna Moncrieff, “Do Antidepressants Cure or Create Abnormal Brain States?” *Public Library of Science Medicine*, 6 June 2006. Accessed 24 April 2018. <http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030240>.

abnormality in depression or anxiety. In fact, the findings of brain imaging studies of serotonin abnormality are contradictory. In a study done by *JAMA Psychiatry* in 2015 analyzing levels of serotonin in the brains of people diagnosed with anxiety disorders through positron emission tomography [PET], a type of imaging test that shows how organs and tissues are working, camera scans found that too much serotonin can actually increase anxiety symptoms.³⁵ This goes back to the foundational error in subscribing to the theory that chronic anxiety is caused by a chemical imbalance, using the theory of evolutionary mismatch we can prove this is not the case and that the entire pedestal antidepressants sit upon is riddled with miscalculations due to this. Prior to antidepressants there was a scientific vacuum in the area of treating mental disorders and as psychiatrist Dr. Daniel Carlat said, “And where there is a scientific vacuum, drug companies are happy to insert a marketing message and call it science. As a result, psychiatry has become a proving ground for outrageous manipulations of science in the service of profit.”³⁶ Kelly Brogan, MD, a holistic women’s health psychiatrist, describes this as an industry and profession working together to maintain a “house of cards theory” in the face of contradictory evidence. In speaking about her experience with her own patients, “I have countless patients in my practice who report new onset of suicidal ideation within weeks of starting an antidepressant.”³⁷ She explains that it is not part of medical training to discontinue psychiatric medication. We have a global situation in which increases in prescribing are resulting in increases in severity of illness, including numbers

³⁵ Rob Wipond, “Researchers Suggest Anxiety is Caused By Too Much Serotonin,” *JAMA Psychiatry*, 24 June 2015. Accessed 16 March 2018. <https://www.madinamerica.com/2015/06/researchers-suggest-anxiety-is-caused-by-too-much-serotonin/>.

³⁶ Kelly Brogan, MD, “Why Depression Isn’t Caused By Low Serotonin,” 2015. Accessed 29 March 2018. <http://kellybroganmd.com/depression-serotonin/>.

³⁷ Ibid.

and length of episodes, relative to those who have never been treated with medication. In a study done by WHO titled “Medicated Patients Stop Getting Better After Three Months”, it displayed how over the course of the first three months the patients taking antidepressants severity of symptoms went down at a quicker pace than those patients not taking the drug. As the study hit the three month mark, the patients taking the antidepressants seemed to plateau while the patients not on the drug continued to improve.³⁸ This short term efficacy can be seen across antidepressant studies and is often what is used to justify the statement “antidepressants work”. According to the study conducted by Moncrieff and Cohen, this short term efficacy can be attributed to the abnormal states caused by these drugs, “This drug-centred model suggests that instead of relieving a hypothetical biochemical abnormality, drugs themselves cause abnormal states, which may coincidentally relieve psychiatric symptoms. Alcohol's disinhibiting effects may relieve symptoms of social phobia, but that does not imply that alcohol corrects a chemical imbalance underlying social phobia.”³⁹ Nor that alcohol would be a long term fix for treating something such as social phobia. Antidepressants, which are supposed to produce mood elevating effects, require an increasing dose to maintain this effect [tolerance] and are associated with a compensatory dysphoria on discontinuation. This dysphoric state experienced upon discontinuation of the drug is more like withdrawal symptoms but is often mistaken for relapse of the disorder to which many doctors and psychiatrists advise their patients to keep taking the drug so they won't “relapse” again. A study done by Harvard Psychiatry on the long-term

³⁸ World Health Organization, “Medicated Patients Stop Getting Better After Three Months,” *British Journal of General Practice*, 1998. Accessed 2 April 2018. <https://www.madinamerica.com/2018/03/do-antidepressants-work-a-peoples-review-of-the-evidence/>.

³⁹ David Cohen and Joanna Moncrieff, “Do Antidepressants Cure or Create Abnormal Brain States?” *Public Library of Science Medicine*, 6 June 2006. Accessed 24 April 2018. <http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030240>.

consequences of antidepressant use found that, “Long-term antidepressant use may be depressogenic [substance that causes or can cause depression, usually as a side effect. They are the functional opposites of antidepressants, suppositively], it is possible that antidepressant agents modify the hardwiring of neuronal synapses, which not only render antidepressants ineffective but also induce a resident, refractory depressive state.”⁴⁰ With this realization, we can see that the basis of the argument for the efficacy of antidepressants is only looking at the short-term effects. As Moncrieff and Cohen put it, “Our analysis indicates that there are no specific antidepressant drugs, that most of the short-term effects of antidepressants are shared by many other drugs, and that long-term drug treatment with antidepressants or any other drugs has not been shown to lead to long-term elevation of mood. We suggest that the term “antidepressants” should be abandoned.”⁴¹ These drugs are meant to rectify a chemical imbalance that doesn’t exist, and without an evolutionary lens to shape our future medical and mental health research the majority of the public will continue to believe in the monoamine theory.

This past February a study was released by the Royal College of Psychiatry that claimed they had proven once and for all that antidepressants work. They declared that this was a definitive study and that any debate over the drugs was now over.⁴² Moncrieff and others have written detailed critiques of that study, with a major point being that the meta-analysis relied on

⁴⁰ Adele C. Viguera, MD, et al., “Discontinuing Antidepressant Treatment in Major Depression,” *Harvard Rev Psychiatry*, 1998. Accessed 22 April 2018. <https://www.madinamerica.com/wp-content/uploads/2011/12/Discontinuing%20antidepressant%20treatment%20in%20major%20depression.PDF>.

⁴¹ David Cohen and Joanna Moncrieff, “Do Antidepressants Cure or Create Abnormal Brain States?” *Public Library of Science Medicine*, 6 June 2006. Accessed 24 April 2018. <http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030240>.

⁴² Andrea Cipriani, MD, et al., “Comparative Efficacy and Acceptability of 21 Antidepressant Drugs For the Acute Treatment of Adults with Major Depressive Disorder: A Systematic Review and Network Meta-analysis,” *The Lancet*, 21 February 2018. Accessed 20 March 2018. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)32802-7/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)32802-7/fulltext).

an outcome measure that inflates the perceived efficacy of the drug. Diving more into this critique Irving Kirsch, a professor at Harvard medical school, and some of his colleagues started doing meta-analyses of studies including the Royal College study and ones similar to it, incorporating industry funded randomized controlled trials as well. Looking at the symptom reduction scores from these studies they dissected,

“Kirsch and others have calculated “effect sizes” of around .3 for antidepressants based on symptom scores. As shown in the graph below, this means there is an 88% overlap in the distribution of drug-treated and placebo patients. Given the placebo response rate in these trials, an effect size of .3 produces an NNT-number needed to treat-of eight. This means you need to treat eight people to produce one additional person who benefits from the treatment, as compared to placebo. Thus, the risk benefit equation from this symptom-reduction data can be summed up in this manner: 12% of patients will benefit from treatment, while the remaining 88% will suffer the adverse effects of treatment without any additional therapeutic benefit beyond placebo.”⁴³

These are the odds a person with an anxiety disorder considering taking an antidepressant needs to know and these are also the odds that the industry funded studies that dominate the psychiatric literature will never tell them. Pharmaceutical companies have no vested interest in looking more into the real, long-term effects of their drugs on the consumers, in fact, they have everything to gain by not looking more into it and no regulatory agency is currently requiring more data. If patients want answers, then they will have to demand the research themselves.

⁴³ Irving Kirsch, et al., “Initial Severity and Antidepressant Benefits: A Meta-Analysis of Data Submitted to the Food and Drug Administration,” *Public Library of Science Medicine*, 2008. Accessed 5 March 2018. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2253608/>.

Therapy and Moving Forward

Set the scene, you are laying across a couch thinking about your life tribulations and pouring out your feelings to a person you barely know who listens intently while perched on a chair across the room, dutifully taking notes all the while. Therapy is among the most popular forms of treatment for anxiety disorders and while sometimes tethered alongside medications, therapy can flourish on its own. Some of the most popular types of therapies are cognitive behavioral therapy, psychodynamic therapy, and humanistic therapy. Cognitive behavioral therapy helps patients learn to understand how their thoughts contribute to the symptoms of anxiety disorders, and how to change those thought patterns to reduce the likelihood of occurrence and the intensity of reaction. This approach is often combined with behavioral techniques to help the individual gradually confront and tolerate fearful situations in a controlled, safe environment.⁴⁴ Psychodynamic therapy is a form of depth psychology, the primary focus of which is to reveal the unconscious content of a client's psyche in an effort to alleviate psychic tension.⁴⁵ Humanistic therapy is a positive approach to psychotherapy that focuses on a person's individual nature, rather than categorizing groups of people with similar characteristics as having the same problems. The aim of this approach is to help the client develop a stronger, healthier sense of self.⁴⁶ In a study done by CJP in 2011 on an evolutionary approach to anxiety, they examined the effectiveness of current treatment methods, including therapy. "Only around 46%

⁴⁴ American Psychological Association, "Anxiety Disorders: The Role of Psychotherapy in Effective Treatment," APA, 2008. Accessed 23 April 2018. <https://www.apa.org/practice/programs/campaign/fyi-anxiety.pdf>.

⁴⁵ Michelle Craske, PhD, "Psychotherapy For Generalized Anxiety Disorder in Adults," 1 March 2018. Accessed 22 April 2018. <https://www.uptodate.com/contents/psychotherapy-for-generalized-anxiety-disorder-in-adults>.

⁴⁶ Maureen O'Hara, "Historic Review of Humanistic Psychology," Association of Humanistic Psychology, 1992. Accessed 25 April 2018. <https://www.ahpweb.org/about/what-is-humanistic-psychology.html>.

of anxiety disorder patients show a clinically significant response to psychological therapy.”⁴⁷

While substantially more effective than antidepressants there is still plenty of room for improvement within therapy approaches.

Abraham Maslow, psychologist and one of the founding sponsors of the humanistic approach, once said, “The ability to be in the present moment is a major component of mental wellness.” Humanistic psychology is closely aligned with Darwin’s theory of natural selection in that the approach roots its origins in the belief that the universe is inherently meaningless. The universe is amoral and humans are fortunate enough to be burdened with a conscience. Carlos Ruiz Zafon, a Spanish novelist, articulated it best, “Man is a moral animal in an amoral universe and condemned to a finite existence with no other purpose than to perpetuate the natural cycle of the species.” This view of the world and our existence within it can undeniably be taken quite negatively. Humanists choose to see themselves as ultimately free creatures though able to define their own personally meaningful lives. An article found on Psychologist World that elucidates Maslow’s “A Theory of Human Motivation”[An article in which Maslow first presented his hierarchy of needs], describes this approach as, “The aim of positive psychology is to catalyze a change in psychology from a preoccupation only with repairing the worst things in life to also building on the best qualities of life.”⁴⁸ To apply this to treating chronic anxiety, Maslow knew that anxiety doesn’t come from thinking about the future, it comes from trying to control it. Therefore, if we can learn to live in the present moment, be more self-aware, and learn to take

⁴⁷ Melissa Bateson, DPhil, Ben Brilot, PhD, and Daniel Nettle, PhD, “Anxiety: An Evolutionary Approach.” *The Canadian Journal of Psychiatry*, 12 December 2011. Accessed 20 March 2018. file:///home/chronos/u-3c7c7e3511cb5589cb2d8c8a055656158aa989ef/Downloads/Anxiety_An_Evolutionary_Approach.pdf.

⁴⁸ Psychologist World, “Humanistic Approach,” 2018. Accessed 25 April 2018. <https://www.psychologistworld.com/issues/humanistic-approach>.

responsibility for our own happiness then we can foresee a more attainable recovery from an ailment such as chronic anxiety. My rationale for digging deeper into the humanistic approach is that I anticipate that funneling our evolutionary knowledge into a humanistic outlook holds great potential for the future improvement in the area of psychological therapy. With the aspirations of moving forward I offer the following brief suggestions in hopes that they will stir discussion and action within the medical and mental health communities; it needs to be a requirement that every medical and mental health student learns evolutionary theory and how to apply it in their prospective fields. Additionally, we need to strive towards fading out antidepressants and finding alternative treatments based on the fact that anxiety, even to the level of disorder, is a functioning adaptation.

Conclusion

In order to make substantial progress in the area of understanding and treating anxiety disorders the only viable option is to incorporate evolutionary theory into the field. The pervasiveness of these disorders and their resistance to treatment indicate a need for a more profound awareness of the sources of anxiety. An evolutionary perspective provides the missing paradigm of why humans are vulnerable to diseases and disorders in the first place, and why these maladies exist at all. It replaces the misconstrued monoamine theory. If we understand why these disorders exist, and that they spring from a functioning adaptation not a chemical imbalance, then we can come up with more comprehensive solutions to treat them. Appreciating that you cannot completely rid someone of anxiety, nor should you, but you can help an individual learn to cope with their current environment. Returning to that beginning quote by Darwin, “My will and reason were powerless against the imagination of a danger which had

never been experienced.” Darwin wasn’t wholly correct, your will and reason aren’t powerless; given the proper knowledge your will and reason can become your greatest assets in the push for a clear mind.

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