Nature, nurture, and mental health
Part 1: The influence of genetics, psychology, and biology

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For some people, mental health may just be a passing thought, whereas for others it can be a daily challenge. Ever wonder why we are all so different, why some of us seem to coast through life while others struggle? Whether coasting or struggling, the more you are aware of "who you are in your world," the more empowered — and hopefully even emboldened — you will be to optimize your mental health and live the life to which you aspire.

When we think of mental health, we tend to think of mental illness, problems, and disorders — the pathological side of it — but mental health also refers to states of mental wellness, emotional resilience, and psychosocial well-being; the side of the continuum we aim to strive towards. Mental disorders are often caused by a combination of, and interaction between, genetic, psychological, biological, and environmental factors (1). The first 3 refer to the personal factors that influence mental health — the *nature* part. The latter refers to the contextual factors — the *nurture* part.

This is the first of a 3-part series delving into the influence of nature and nurture on mental health. This article focuses on many of the nature- or person-related aspects; meaning the genetic, psychological, and biological factors that can influence mental health. The next article will focus on a range of nurture- or environment-related aspects, meaning the exposures and experiences from conception onwards that can influence mental health. The final article will offer a range of strategies to improve mental health, including those aimed to counter the nature and nurture aspects that increase the risk of mental illness. Ultimately, it is through awareness, acceptance, and then action — taking the right steps — that each of us can optimize our mental health.

Mental illness: A brief overview

Nearly 1 in 5 people live with a mental illness or will experience a mental illness in any given year (2). It affects people of all ages, education, income levels, and cultures (2). The prevalence is higher in women (22.3%) than men (15.1%), and by age 40, about 50% will have, or have had, a mental illness (2). Those in the veterinary profession appear to have an increased susceptibility to mental illness (3). Several studies cite that veterinarians have higher rates of serious psychological distress, depression, and suicidal ideation than those in the general public (3–5). The concern about veterinary mental health, related to work-related stress, compassion fatigue, and burnout, has steadily grown in recent years.

Although mental illness and mental disorder can be used interchangeably, mental illness, as a term, is more general because mental disorder is defined by a unique set of symptoms and causes. There are 3 common classes of mental disorders:

- *anxiety disorders* [which include generalized anxiety disorder (GAD), specific phobia, post-traumatic stress disorder (PTSD), panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, and separation anxiety disorder];
- *depressive disorders* [which include major depressive disorder (MDD), bipolar I–II disorders, and dysthymic disorder]; and
- *substance abuse disorders* (which include alcohol abuse, alcohol dependence, drug abuse, and drug dependence) (6).

Anxiety disorders are the most prevalent, followed by depressive disorders and substance abuse disorders, respectively. Of those people having a disorder, 55% have a single diagnosis, 22% have 2 diagnoses, and 23% have 3 or more, meaning that about 45% of people with disorders struggle with comorbidity (6).

Since mental disorders are often caused by a combination of, and interaction between, various factors, it is helpful to understand these factors and how they may influence mental health. This article focuses on the genetic, psychological, and biological factors — the *nature* side of things, noting that nature and nurture (the person and environment) are rarely separable, but rather, mutually dependent.

Hereditary predisposition to mental disorders

Most mental disorders are due to some combination of inheritance and exposure, meaning genes and environment (7). Although no simple genetic cause has been determined (7), certain genes and gene variations are associated with certain mental disorders (2). Disorders such as schizophrenia, bipolar disorder, and depression tend to run in families, posing an increased risk if a person has a relative with a diagnosis (7). Even for those who don't inherit risk genes, genes can change after birth and

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contribute to mental illness through a process called *de novo genetic change* (7). In other words, how a person interacts with their environment, and their life choices, can influence their risk for mental illness.

Neurodiversity

There are several neurodevelopmental conditions that can influence mental health. These include attention deficit hyperactivity disorder (ADHD), autism spectrum disorder, dyslexia, dyscalculia, dyspraxia, developmental language disorder and tic disorders (8). Attention deficit hyperactivity disorder and autism spectrum disorder (traditionally understood as separate conditions) are now increasingly diagnosed together due to a better understanding of the common underlying genetics. Highly genetic, ADHD is a brain-based syndrome that has to do with the regulation of a particular set of brain functions and related behaviors (8). Some people have never been diagnosed, despite the presence of neurodiverse traits. Those with ADHD are 3 times more prone to depression and are at increased risk of an anxiety disorder and substance abuse.

Sensitivity

Sensory processing sensitivity (SPS) is a personality trait regarded as "an increased sensitivity of the central nervous system and a deeper cognitive processing of physical, social and emotional stimuli" (9). Sensory processing sensitivity is moderately inheritable, with 47% attributable to genetic factors (10). It is characterized by *low sensory threshold* (i.e., sensitivity to subtle external stimuli), *ease of excitation* (i.e., being easily overwhelmed by internal and external stimuli), and *aesthetic sensitivity* (i.e., openness for, and pleasure of, aesthetic experiences and positive stimuli) (9). Roughly 20% of the population is thought to be *highly sensitive* (9).

Highly sensitive people tend to be empathetic, artistically creative, intuitive, and highly aware of the needs of others, but they can easily become overwhelmed, exhausted, and burned out, especially with sensing (i.e., "absorbing") the emotional cues of those around them. Loud, crowded, or visually busy spaces can overwhelm sensitive people. Sensory processing sensitivity is associated with higher levels of stress, physical symptoms of ill-health, poor stress management, greater work displeasure (and need for recovery), anxiety, depression, alexithymia, and traits of autism spectrum disorders (9,10).

High IQ and giftedness

Gifted people have traits that set them apart from their average peers, such as complex intellectual ability, divergent thinking, high creativity, excitability, sensitivity, introversion, perceptivity, strong moral convictions, concern for justice, need for truth, and entelechy (i.e., having a goal) (11). Thus, many who are gifted lead their lives feeling different (nearly aberrant) from others, feel they must hide who they really are to be accepted, and engage in social coping strategies to avoid standing out, all of which, as stressors, can place them at risk for mental disorders (12). Research, however, has identified little difference in the incidence of mental disorders between the gifted and non-gifted, apart from *creatively* gifted people (12). Creatively gifted people are at an increased risk for depression and suicide.

Perfectionism

Perfectionism is a personality style characterized by excessively high personal standards and overly critical self-evaluations. It can be self-oriented (expecting perfection of oneself), other-oriented (expecting perfection in others), and socially prescribed (expecting perfection of oneself in response to perceived expectations of society) (13). Although high achievers are driven by intrinsic motivation or a passion for what they're doing, perfectionists are driven by anxiety — by a fear of failure and the sense of never being good enough, of somehow being flawed. Perfectionists thus suffer rather than take joy in the pursuit of excellence (12).

Perfectionism can severely impact mental health. It can not only rob someone of peace of mind and enjoyment of life, but it's also linked to feelings of failure, guilt, indecisiveness, procrastination, shame, and low self-esteem; workaholism; and many mental disorders, including anxiety disorders, depression, bipolar disorder, obsessive compulsive disorder, personality disorders, eating disorders, body dysmorphic disorder, substance abuse, self-harm, and even suicide (13,14). Perfectionism is estimated to be 25 to 40% hereditary.

Self-esteem

Self-esteem is a person's subjective evaluation of their own worth. It's related to the ability to hold a favorable attitude towards the self, and to retain it in situations that are challenging, especially those that include being evaluated by others (15). It is moderately inheritable, with approximately 50% attributable to genetic factors. Self-esteem is an important part of psychological health. The beliefs people hold about themselves determine who they are, what they can do, and what they can become (16).

Those with high self-esteem are more likely to have higher well-being and quality of life, better social relations, greater job satisfaction, and more success in life than their counterparts (15,16). Those with low self-esteem are at risk of an array of social problems (notably poor relationships) and mental disorders, including anxiety disorders, depression, dysthymia, substance abuse, eating disorders, violence, high-risk behaviors, and suicide (15,16). Unfortunately, just as low self-esteem increases the susceptibility for a mental disorder, the presence of a mental disorder, in turn, lowers self-esteem, creating a vicious downward spiral. When more than one disorder is present, the effects on self-esteem are additive.

Personality (the Big Five)

The five-factor model of personality, commonly known as "the Big Five," includes 5 broad personality domains:

- *conscientiousness* (work ethic, organization);
- *agreeableness* (kindness, empathy);
- *emotional stability* (i.e., commonly referred to as *neuroticism*) (composure, flexibility);
- *openness* (curiosity, analytical thinking); and
- *extroversion* (sociability, assertiveness).

Each domain represents a range between 2 extremes. For example, extroversion represents a continuum between extreme

extroversion and extreme introversion, with ambiversion in the middle. Most people lie somewhere between the polar ends of each domain (17). The Big Five are not only universal, characterizing people across the world, they are also inheritable (17). Genetics influences 40 to 55% of personality.

Personality significantly determines the existence, nature, and outcomes of mental disorders. Neuroticism is the *strongest* correlate with mental disorders (18). High neuroticism is associated with the development of anxiety disorders, depression, substance abuse, psychosis, and schizophrenia, as well as general mental distress. Low extroversion (i.e., introversion) is associated with all common mental disorders, but most especially with social phobia, dysthymic disorder, depression, and suicidality (18). Low conscientiousness is associated with most of the common mental disorders (18). Agreeableness is negatively associated with substance abuse disorder (18). Openness is not associated with mental disorders (18).

Optimism

Optimism, which is also a personality trait (19), is the tendency to anticipate favorable outcomes (20). Optimistic people tend to have more positive thoughts, be more hopeful, and view the future in a positive light. When a situation is neutral, an optimist will likely see it as positive, whereas a pessimist will likely see it as negative. Optimists are people who expect good things to happen to them; pessimists are people who expect bad things to happen to them. Genetics accounts for about 25% of a person's likelihood of being an optimist or pessimist (19).

The ways in which optimists and pessimists differ in their approach to the world have substantial impact on their lives. Those who hold positive expectations for the future respond to difficulties in more adaptive ways than those who hold negative expectations. Because optimists expect good things to happen, they take active steps to make sure good things *do* happen. In fact, optimism is associated with taking proactive steps to protect health and well-being, whereas pessimism is associated with behaviors that damage health and well-being. As such, pessimists are more at risk for reduced quality of life and life satisfaction, anxiety disorders, depressive disorders, and suicide (19,20).

Minority group membership

A minority group is a category of people who experience relative disadvantage compared to that of a majority group. Minority group membership is typically based on differences in observable characteristics or practices, such as ethnicity, race, religion, sexual orientation, and ability. Minority group members often face discrimination, especially in housing, employment, healthcare, and education. Discrimination may be experienced through interpersonal interactions, but also through structural inequalities, wherein rights and opportunities are not equally accessible to all.

Minority group members are at risk for mental health problems because they face unique, chronic stressors as a result of their disadvantaged status in society (21). These stressors are experienced in addition to the usual stressors encountered by nonminority individuals. They may also be at risk because of a lack of awareness about mental health, cultural stigma surrounding health care, and inaccessibility of high-quality health care services. Mental health is a particular concern for members of sexual minority groups. Those belonging to a sexual minority are more likely to experience anxiety disorders, depressive disorders, eating disorders, substance abuse, self-harm, and suicidality (21).

Physical health

A clear distinction is often made between mental health and physical health, but the mind and body are inextricably entwined. Physical health problems can lead to mental health problems and *vice versa.* Those with chronic physical conditions (such as diabetes, heart disease, cancer, arthritis, and asthma) are especially at risk of developing mental disorders (22). They experience anxiety and depression at twice the rate of the general population. Co-existing conditions, whether mental illness secondary to physical illness or physical illness on top of mental illness, can reduce quality of life and lead to longer illness duration and worse health outcomes.

Learning about yourself

It's the interplay of one's genetic, psychological, and biological constitution along with the environmental conditions to which one is exposed that gives rise to the unique mental attributes that make each human being different from another. You, meaning your make-up and your life experiences, are one of a kind. The awareness of "who you are in your world" is the first step to be able to optimize your mental health. Optimizing your mental health will better enable you to live your best life.

In the past, debates over the relative contributions of nature and nurture often took a very one-sided approach, with one side arguing that nature was the most important while the other that nurture was the most important. Today, both are recognized to play critical roles in mental health, interacting in important ways throughout life. This article focused on the nature-related factors that can influence mental health. These are aspects intrinsically connected to the person, yet also, more often than not, influenced by the environment. The next article will focus on a range of nurture-related factors, meaning the exposures and experiences from conception onwards, that can influence mental health.

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