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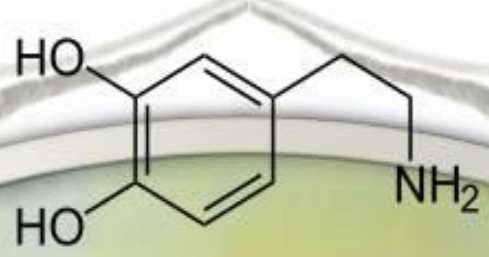


SPECIAL COLLECTION

Personality of Extreme People

www.cbrne-terrorism-newsletter.com

MONTHLY Publication

Dopamine, receptors and extreme personality

My interest in title combination started during the preparatory phase of 2004 Olympic Games in Athens, Greece while ordered to deploy a hospital-based CBRN Response Unit specifically designed for the Games. Although personality tests are not panacea and well beyond my own medical specialty, I made a little bibliography search on this subject and I am still interesting in this topic. It would be very interest to read one day a scientific paper discussing personality profiles relevant to CBRN First Responders and if possible to be based on finding regarding dopamine receptors or NPY that seem to be the common denominators (?) for such extreme people's personalities. ■ **Editor-in-Chief**

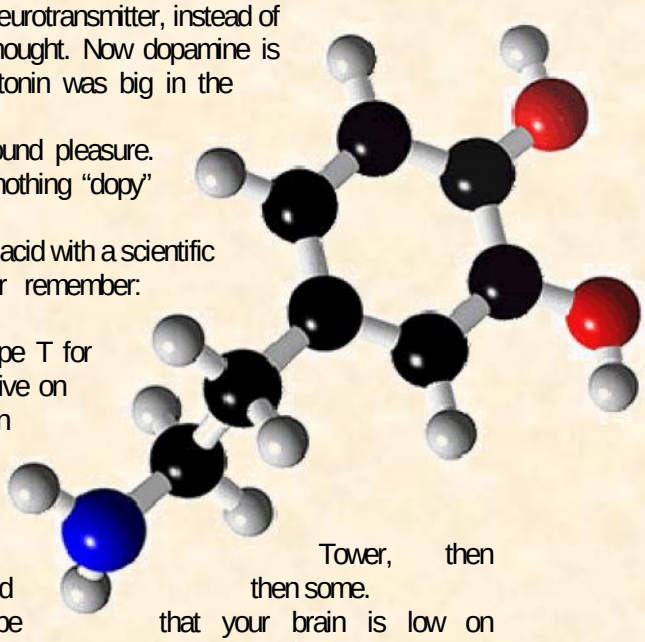
Below are some interesting articles on dopamine receptors and T-personality characterizing those who are involved in dangerous missions and extreme activities:

10 things you might not know about dopamine

Source: http://www.theadrenalist.com/extreme/performance/the-motivation-molecule/

1. Also called DA, dopamine is surprisingly tiny, consisting of 22 atoms. Dopamine works by unlocking the "motivation circuitry" in your head.

2. The chemical key to success was discovered by Swedish pharmacologist Arvid Carlsson in 1952. Five years later, Carlsson proved that dopamine was a neurotransmitter, instead of a bit-part precursor to adrenaline as most scientists thought. Now dopamine is today's hip pop-science neurotransmitter, just as serotonin was big in the Prozac-obsessed 1990s.



3. Unlike serotonin, dopamine does not revolve around pleasure. Dopamine is all about drive and motivation. There is nothing "dopy" about it.

4. The word "dopamine" comes from Dopa – the amino acid with a scientific name like a captcha or password you could never remember: "C9H11NO4".

5. The go-getter neurotransmitter is linked to the Type T for "thrill" personality. That means someone who loves to live on the edge. Type T people range from the comedian John Belushi to the gangster John Dillinger. Also factor in any adrenaline sports enthusiast you care to name – of any age. One topical example: Kiwi daredevil Wilmina van Hoof, 81, who jumped off Auckland's Sky Tower, then had an ear-to-ear grin for 15 minutes, on "cloud nine" and then some.

6. If, like Van Hoof, you are Type T, the reason may be that your brain is low on dopamine-inhibiting receptors that act as a block. So each time you, say, ski a double-black-diamond, dopamine runs rampant, flooding your bloodstream. The resulting buzz drives you to chase the next sporting high repeatedly.

7. For anyone, everyday thrills also trigger a tingle. "People talk of getting their 'dopamine rush' from chocolate, music, the stock market, the BlackBerry buzz on the thigh — anything that imparts a small, pleasurable thrill," notes science writer Natalie Angier.

8. Even such a low-exertion event as crossing the street can spark release. If you push the button, expecting the light to change in 30 seconds and it takes five, dopamine gives you a stab of satisfaction.

9. Your dopamine levels slump in the face of stress, anxiety, starvation, trauma or just a low-carbohydrate diet. Feeling down? You might do well to amp up the "carbs". Try pasta. Or bite into a chocolate bar. Eating chocolate fuels your psychoactive "opioid" levels. Cue a spike in your brain's dopamine stock, which gives you your mojo back.

10. The downside of dopamine is that it can fuel impulsiveness. Binge-shoppers and serial daters living at whim may be driven by the potent neurotransmitter. Dopamine is double-edged, not quite the slam

dunk feel-good force it appears. But don't knock it. You need it to chase away the blahs: those wearisome motivational dips. Spice of life!

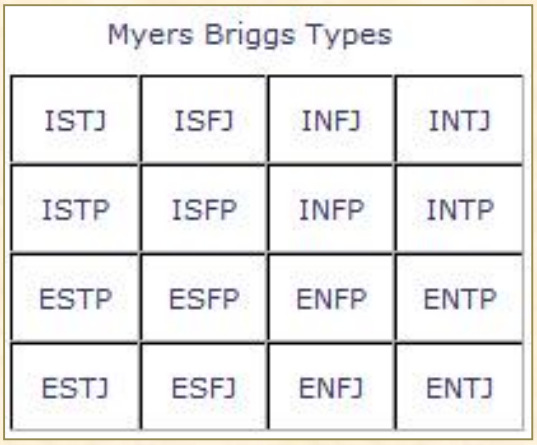
Myers Briggs Personality Types

Source: http://www.teamtechnology.co.uk/tt/t-articl/mb-simpl.htm

You are a unique individual.
You also share some characteristics with other people.
The Myers Briggs model of personality tells you about some of those similarities and differences. By raising awareness of yourself and others, it can improve your relationships. It can also help you make better decisions about your future, your career, and your development.

Myers Briggs theory

The Myers Briggs model of personality was developed by Katherine Briggs and Isabel Briggs Myers in the mid-20th century. It is based on four preferences:



- E or I (Extraversion or Introversion)
- S or N (Sensing or iNtuition)
- T or F (Thinking or Feeling)
- J or P (Judgment or Perception)

You combine the preferences to give your Myers Briggs personality type. Eg: having preferences for E and S and T and J gives a personality type of ESTJ. There are sixteen Myers Briggs personality types.
A frequently used analogy is handedness - where you have a preference for one hand but use them both. Similarly, you have all eight facets in your Myers Briggs personality profile. Whilst your personality type indicates that you have a preference for some of them, you nevertheless use all of them.

The four preferences in more detail

Where, primarily, do you prefer to direct your energy?

If you prefer to direct your energy to deal with people, things, situations, or "the outer world", then your preference is for **Extraversion**. This is denoted by the letter "E".
If you prefer to direct your energy to deal with ideas, information, explanations or beliefs, or "the inner world", then your preference is for **Introversion**. This is denoted by the letter "I".

How do you prefer to process information?

If you prefer to deal with facts, what you know, to have clarity, or to describe what you see, then your preference is for **Sensing**. This is denoted by the letter "S".
If you prefer to deal with ideas, look into the unknown, to generate new possi2bilities or to anticipate what isn't obvious, then your preference is for **Intuition**. This is denoted by the letter "N" (the letter I has already been used for Introversion).

How do you prefer to make decisions?

If you prefer to decide on the basis of objective logic, using an analytic and detached approach, then your preference is for **Thinking**. This is denoted by the letter "T".
If you prefer to decide using values and/or personal beliefs, on the basis of what you believe is important or what you or others care about, then your preference is for **Feeling**. This is denoted by the letter "F".

How do you prefer to organise your life?

If you prefer your life to be planned, stable and organised then your preference is for **Judging** (not to be confused with 'Judgmental', which is quite different). This is denoted by the letter "J".
If you prefer to go with the flow, to maintain flexibility and respond to things as they arise, then your preference is for **Perception**. This is denoted by the letter "P".

16 Types
When you put these four letters together, you get your personality type code, and there are sixteen combinations. For example, INTJ indicates that you prefer Introversion, iNtuition, Thinking and Judging (remember, this indicates *preferences* only - an INTJ also *uses* Extraversion, Sensing, Feeling and Perception).

Living on the Edge: Extreme Sports and their Role in Society

Source: http://www.summitpost.org/living-on-the-edge-extreme-sports-and-their-role-in-society/214107

With regard to extreme sports, the perception of the general public is that people who choose to take risks are irresponsible 'adrenaline junkies' who are ultimately a burden to society. When a person takes unnecessary risks, and becomes injured or in need of rescue, the expenses for coming to their aid are often borne by taxpayers. It should not be surprising then, that these same taxpayers question why they should have to pay for these seemingly foolish actions. A backcountry rescue after skiers trigger an avalanche, for example, will cost thousands of dollars. Skateboarders cause damage to both private

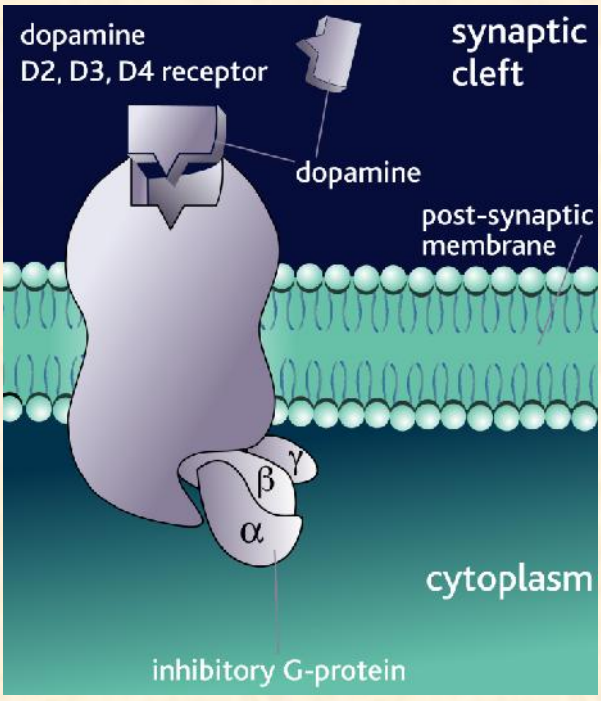
and public property, and injure themselves. While these issues have been discussed at great length in the media, rarely does discussion focus on the negative impact of limiting access to these types of risky sports. What would be the effect on society if we made it more difficult for people to engage in these types of activities? In fact, by curbing a person's passions and limiting access to their chosen sports– even those the public may consider risky– these athletes may well find outlets for their energy that is much more burdensome to society.
While it is true that extreme sports do not appeal to the masses, there are still a significant number of people to whom these activities are an important and fulfilling part of their lives. It is our differences that make a society interesting, so while it may not be for everyone, high-risk activities contribute to the diversity of our culture. We all crave adventure to some degree or another. As author, outdoorsman, and Idaho State University faculty member, Ron Watters explains in his essay "The Wrong Side of the Thin Edge", everyone needs a little adventure. But some people need more than the normal forms of life's excitement and take it one step further, participating in high-risk activities- sports played on the

edge, where the consequences are far greater, and where as the great American mountaineer and outdoor philosopher Willi Unsoeld once said, 'It has to be real enough to kill you.' (258) Psychologist Frank Farley has studied thrill seeking risk-takers for decades, and has developed the term "Type T" (for thrill seeking). Farley describes Type T personality types as "risk-takers and adventurers who seek excitement and stimulation wherever they can find or create it." (qtd. in Roberts)

Type T's are not just the mountain climbing daredevils of the world however. They are often our best inventors, entrepreneurs and explorers. They are CEOs, surgeons, and civil rights leaders. Take high altitude mountaineer Dr. Kenneth Kamler for example, a New York microsurgeon and listed in the New York Guide to Best Doctors as well as in Who's Who in America. We wouldn't be the progressive, vibrant society we are today if no one was willing to take risks. Farley argues that history's most crucial events are shaped by Type T individuals exhibiting Type T behaviour, from Boris Yeltsin to Martin Luther King, Jr. The act of emigration, he says, is an intrinsically risky endeavor that selects individuals who are high in sensation seeking. Consequently, countries built upon immigrant population--America, Canada, Australia--probably have an above-average level of risk takers. He warns that much of the current effort to minimize risk and risk taking itself runs the risk of eliminating "a large part of what made this country great in the first place." (qtd. in Roberts)

But for all their positive attributes, Type T personalities also have a dark side. They often bore easily, and without other options their craving for stimulation can lead them to abuse drugs and alcohol, gamble, or engage in other destructive behaviours. Marvin Zuckerman, a psychologist at the University of Delaware and a pioneer in the study of risk's biological roots notes that without healthy psychological outlets, "the main forms of sensation seeking include sex, drugs, heavy drinking, gambling, and reckless driving." (qtd. in Roberts) People who engage in extreme sports do take risks, but there are far more dangerous 'highs' they could be seeking. Rock climbing, mountain biking and snowboarding offer a high that can only be achieved through self discipline, hard work, and a healthy lifestyle. People who are serious about extreme sports are highly trained athletes who take care of their bodies and tend to be very safety conscious.

There is evidence to show that the Type T personality is something people are born with. It isn't a lifestyle choice. In fact risk taking has been linked to levels of dopamine, a chemical found in the brain that regulates mood and pleasure. Published research conducted by Dr. Ernest Noble of the University of California links the D2 and D4 dopamine receptor genes to risk-taking behaviour. After his 1998 study, Noble estimated that 20 per cent of people are born with the D2 dopamine receptor while 30 per cent are born with both the D2 and the D4 dopamine receptors. (CBC Online Archives)



The predisposition to risk-taking is not a new genetic development. It is likely hardwired into our evolutionary makeup from ancient times, when our survival depended upon the ability to hunt and defend ourselves from attack from predators or other humans. We have been successful in eliminating the vast majority of risk from our daily lives: seatbelts, airbags, and other safety advancements have greatly reduced the dangers associated with driving a car. Most people wear helmets when they bike and rollerblade. Coffee cups even warn us now that the beverage we are about to enjoy is extremely hot. As Watters explains:

The world has become far too safe, and heretofore unknown lands are mapped in far too much detail. As a consequence, we need as many outlets as possible for people to participate in challenging outdoor activities. We need wilderness lands; we need rock climbing areas; we need wild rivers; we need outdoor schools, and given proper environmental safeguards, we

need free and unfettered access to outdoor areas. The right to risk is unalienable. It makes our society healthier and more vibrant. (259)

It is getting increasingly difficult to take any risks in the course of a day, and yet we still have this innate need for exhilaration. Without relatively safe outlets for this drive, people predisposed to risk taking behaviors will seek out other activities, with potentially greater personal, social, and economic consequences.

Take for example an extreme mountain biker who experiences a serious fall. He may be badly injured, but the overall scope and consequence to society as a whole is relatively small. A medical team will attend the victim and transport him to a hospital, where he will be cared for. He will likely take some time off work to recuperate. There could be some strain on the immediate family in the short term but before long, life will return to normal. What might happen if the North Shore trails were closed to mountain biking? Might the same man stop by the casino on his way home from work in search of a little excitement? Might he then return there on the weekend in an attempt to stave off boredom? If he is predisposed to risk-taking behaviour, it might not be long before he is gambling beyond his means as he seeks his next 'high.' Gambling addiction is a serious problem that can quickly devastate individuals, destroy marriages, break up families and lead to other addictions and health problems. Many people never recover and become a long term drain on the public purse as they require rehabilitation, welfare, and often expensive, ongoing medical care.

It is easy for the issue of health to be overshadowed by the more dramatic problems like addiction for example, but it is an issue that should be of particular concern to the taxpaying public. Consider the kids in the skateboard park. Without the park at the local community center where they can practice and refine their skills, they might follow the lead of many of their peers, opting for a more sedentary existence playing video games which has proven links to obesity. In a study published in the June 2004 issue of the journal Obesity Research, researchers from The Children's Hospital of Philadelphia and the University Hospital Zurich present a strong association between playing electronic video games and childhood obesity in school-aged Swiss children. "Childhood obesity has increased fivefold in the past 20 years," said Dr. Peter Katzmarzyk of the Canadian Heart and Stroke Foundation. "Opportunities for physical activity for children are critical to turning that trend around, and avoiding heart disease and other health problems down the road." In a day and age where heart disease and type 2 Diabetes are on the rise, we really shouldn't be discouraging anyone from pursuing physical activities. The long-term costs associated with treating the inevitable outcome of obesity and heart diseases are far greater than the cost of setting a few broken arms and repainting a few railings.

Instead of shunning and discouraging extreme athletes, we should celebrate them for their differences and do what we can to support them as they climb higher, go faster and push the limits of human endurance and athleticism. As T.S. Elliot once said, "Only those who will risk going too far can possibly find out how far one can go." With public support, extreme athletes can expand our boundaries and contribute to our diverse and evolving society. By curbing their passions and limiting access to activities some consider too dangerous, we may be inviting even greater risk in the form of addictions, crime and health problems the end result of which is a heavy burden for society to bear.

The sniper experience

Source: http://www.arenholm.com/sniper/person.htm

The thrill seeker personality has many various definitions. Some behaviors that unite us all are the fact that we constantly are in need of stimuli in various forms. Trough our lifetime we are referred to as many things; restless, dare-devils, suicidal, distracted, challenging, never satisfied, impulsive, spontaneous, adventures, creative, inpatient, un-stimulated, and so on.

My personality is best described as a person in constant need of stimuli, new impressions and organization. When life around me gets to mellow and I get stuck in routines and maintenance I get bored and loose interest and enthusiasm. I always want to learn and discover something new, go somewhere else and am in constant need of excitements. If there is no action in my life, I make sure I get it. I am either overly exited or closed to depressed. I call it "on or off" or "either or personality". I am either psyched about what I am doing or I am falling asleep. There is nothing in-between.

To satisfy my needs over the years I have seen and done many things. Almost to the point that people think I am lying when I talk about my experiences. Also significant for my personality is my call for perfectionism and order, as well as the fact that I am a very emotional and passionate person. Some think this personality might be a problem, but not if you learn to accept, use and live with it. We can't all stand by the same assembly line at Volvo all our lives. Some of us have the need to travel the world and try everything life has to offer. My website show pictures from doing just that!
In market in and promotion we use the terms *need*, *want* and *demand* to determine the level of desire for a certain product or service. When it comes to a personality like mine I have learned that it absolutely crucial that I satisfy my needs. Otherwise I fall in to boredom and likely minor depression. In other words, my need of stimuli is a defined as a need. I rare cases we do see people die of boredom if they do not learn to cope with a new inactive lifestyle. Their meaning of life.
Need: an object or necessity for survival such as food, shelter and life saving medicines or water.
Want: a desire for things above and beyond what is needed.
Demand: a forceful request for either a needed or wanted item, often created my marketing or branding.
I don't know if I am inventing a term now, but I have a repetitive reaction that I get every time I get back from a longer journey, vacation, or just an action packed weekend. I call it Post Adventure Depression (PAD). Very simplified it is cooping with getting back to every day repetitive activities. This depression is affecting work and my personal life. At work I just wish there was more action, and after work I get very lonely. The closest to a cure I get is to activate myself on daily basis after work. I find all kinds of extreme sports giving me some satisfaction. I spend my thoughts planning and focusing on my next adventure, to the point where people calls me a dreamer.
Below are some definitions and explanations to the personality Sniper has been categorized in. I will also give a brief understanding of terminology that you will come across reading about thrill seeking personalities. I hope you get a better understanding of me and also find explanations why you feel like you do...

Personality descriptions

TYPE-T personality
Psychologist Frank Farley added this to personality type to the traditional duo of Type-A personality and Type-B personality. Type-T is characterized by taking risks and constantly seeking excitement, novelty, and other stimulation. Type-T personalities can be channeled either creatively and/or destructively.
Brain researchers found that some people lack an enzyme *(called MAO)* that facilitates neuron transmission between receptors. Adventure and thrill seekers seem to be deficient in this *MAO* enzyme. The only way a type-T person can get elevated levels is by doing high-adrenaline activities." True adrenaline junkies are the ones who cannot be happy unless they push the limits in some way. They are these extreme people who do their work with great professionalism, but when you go out to a pub with them, they're completely different. They spend life in a fast intense way, and love trying everything life has to offer. They don't seem to be afraid of anything.

Adrenaline junkie
An adrenaline junkie is somebody who appears to be addicted to *adrenaline*. The term came into use in 1993. Originally, it was used to describe argumentative people who deliberately (consciously or unconsciously) find excuses to get an adrenaline fix. This mode of receiving a fix is deemed just as addictive as a recreational drug (such as heroin, hence the term "junkie"), but can be considered more harmful if it involves other people. The phrase adrenaline junkie was used in the 1991 movie Point Break to describe the "Ex-Presidents."
Adrenaline junkies enjoy engaging in activities that stimulate the *adrenal glands*, which are responsible for producing a broad spectrum of hormones which cause the stress response, also known as the *fight-or-flight response*. Adrenaline is the most well-known hormone in this family, although each of the hormones, including *noradrenaline*, cortisol, and various other catecholamines and corticosteroids, play a part in the stress response. The effects include hyperarousal, increased blood flow, heightened pulse rate, and increased physical performance, which adrenaline junkies find an enjoyable and invigorating state of mind and body.

Any number of extreme sports or dangerous activities could be associated with the phenomenon, such as dirt bike riding, downhill skiing, skydiving, base jumping, whitewater kayaking, martial arts or rock climbing. Some prefer more aggressive activities such as picking real fights. Less physical pursuits include gambling, stock market trading, graffiti, or even shoplifting. Anything to get a trill.
Although the term "adrenaline junkie" is normally used facetiously and without any genuine implication of addiction, there may be an element of truth to the description. Psychological addiction to an "adrenaline rush" has been reported numerous times. An *adrenaline* rush is usually accompanied by an increase in *endorphin* activity. *Endorphins* are responsible for feelings of well being, as well as pain relief.
For an *adrenaline* junkie endorphin-stimulating activity, whether it is extreme sports or just laughter, sex, artistic expression or religious experience result in addictions and the need for constant rush activities.

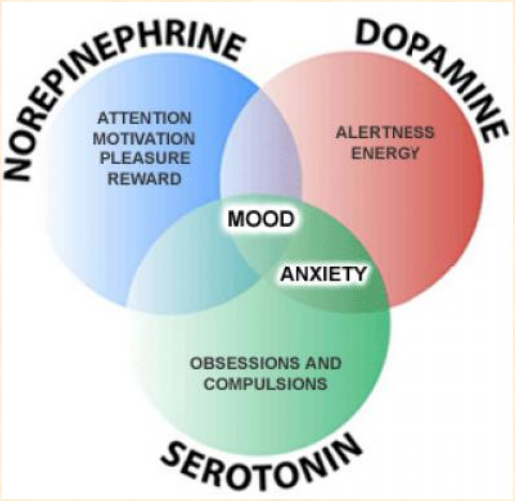
ADD / ADHD (Attention-Deficit (Hyperactivity) Disorder)
ADD and ADHD is diagnose. Adults with these diagnoses are often bored with tedious, repetitive tasks. They may also trouble with planning and organization. Procrastination is common. Impulsivity may lead to frequent job changes, troubled romantic relationships, financial problems and a tendency to interrupt others. College students may have trouble staying focused on paperwork or lectures. Because of difficulties following through on commitments, the individual is often called selfish and immature.
People with these conditions often have learning disabilities, dyslexia and often end up in need of *stimuli* in form of drugs or extreme sports. The condition is a result of lack of *dopamine* and/or *noradrenalin* into the brain. Simply put, these substances are the ones telling the brain we are satisfied. People with this diagnose is basically in need of far much more *stimuli* than the average person.
Treatment of adults often involves teach how to structure his or her life, while allowing for some spontaneity. Time management and planning are important skills. Daily planners and task lists are beneficial. Often the individual can enlist the help of family or coworkers to help him stay organized. It is important that the adult with these conditions chose a vocation that suits his or her interests and personality style. It is often best to avoid jobs that emphasize weaknesses such as repetitive tasks, and find jobs that focus on one's energy, and ability to shift from task to task. Individuals who experience physical restlessness should try to schedule regular exercise or work breaks.
While these conditions can be a burden for some, it can also be a gift. If it were an entirely negative trait, it would have died out thousands of years ago. Individuals with ADHD are often energetic, creative and willing to take risks. Often this gift comes into focus after the individual acquires a degree of self-knowledge and learns to channel his energy and creativity.
Some *Norepinephrine (adrenaline)*, along with *dopamine*, has come to be recognized as playing a large role in attention and focus. For people with ADD/ADHD, psychostimulant medications are prescribed to help increase levels of *norepinephrine* and *dopamine*.

Descriptions

MAO enzyme (Monoamine Oxidase)
MAO is an enzyme that plays a vital role that MAOs play in the inactivation of neurotransmitters. MAO dysfunction (too much/too little MAO activity) is thought to be responsible for a number of neurological disorders. For example, unusually high or low levels of MAOs in the body have been associated with depression, substance abuse, attention deficit disorder, and irregular sexual maturation. MAO inhibitors are one of the major classes of drug prescribed for the treatment of depression, although they are last line treatment due to risk of the drug's interaction with diet or other drugs. Excessive levels of catecholamines (*epinephrine*, *norepinephrine*, and *dopamine*) may lead to a hypertensive crisis, and excessive levels of serotonin may lead to serotonin syndrome.
The genes encoding MAO are located side-by-side on the short arm of the X chromosome, and have about 70% sequence similarity. A version of the primate MAO-A gene has been referred to as the "Warrior gene".

Epinephrine/adrenalin
Epinephrine, also called adrenaline is a hormone and neurotransmitter. It is a catecholamine, a sympathomimetic monoamine derived from the amino acids phenylalanine and tyrosine. Epinephrine is

a "fight or flight" hormone, and plays a central role in the short-term stress reaction. It is released from the adrenal glands when danger threatens or in an emergency. Such triggers may be threatening, exciting, or environmental stressor conditions such as high noise levels or bright light (*Fight-or-flight* response).
When secreted into the bloodstream, it rapidly prepares the body for action in emergency situations. The hormone boosts the supply of oxygen and glucose to the brain and muscles, while suppressing other non-emergency bodily processes (digestion in particular).
It increases heart rate and stroke volume, dilates the pupils, and constricts arterioles in the skin and gut while dilating arterioles in skeletal muscles. It elevates the blood sugar level by increasing catalysis of glycogen to glucose in the liver, and at the same time begins the breakdown of lipids in fat cells. Like some other stress hormones, *epinephrine* has a negative effect on the immune system.
Although *epinephrine* does not have any psychoactive effects, stress or arousal also releases *norepinephrine* in the brain. *Norepinephrine* has similar actions in the body, but is also psychoactive.



Norepinephrine/noradrenalin
Norepinephrine is synthesized from *dopamine* by *dopamine*. It is released from the adrenal medulla into the blood as a hormone, and is also a neurotransmitter in the central nervous system and sympathetic nervous system where it is released from noradrenergic neurons.
As a stress hormone, norepinephrine affects parts of the brain where attention and responding actions are controlled. Along with epinephrine, norepinephrine also underlies the *fight-or-flight* response, directly increasing heart rate, triggering the release of glucose from energy stores, and increasing blood flow to skeletal muscle.
However, when *norepinephrine* acts as a drug it will increase blood pressure, triggering a compensatory reflex that overcomes its direct stimulatory effects on the heart. The reflex, called the baroreceptor reflex, results in a drop in heart rate called reflex bradycardia.

Dopamine
Dopamine is a hormone and neurotransmitter. In the brain, dopamine functions as a neurotransmitter, activating five types of dopamine receptors, and their variants. Dopamine is produced in several areas of the brain, including the substantia nigra. Dopamine is also a neurohormone released by the hypothalamus. Its main function as a hormone is to inhibit the release of prolactin from the anterior lobe of the pituitary.
Dopamine can be supplied as a medication that acts on the sympathetic nervous system, producing effects such as increased heart rate and blood pressure. However, because dopamine cannot cross the blood-brain barrier, dopamine given as a drug does not directly affect the central nervous system.

Endorphin
Endorphins are responsible for feelings of well being, as well as pain relief. Due to synaptic plasticity, increased endorphin activity creates an increase in endorphin receptor sites, which in turn can create a stronger desire for endorphins. Synaptic plasticity and receptor site proliferation are widely believed to be the mechanisms by which chemical addictions are developed.
Endorphins are produced by the *pituitary gland* and the hypothalamus in vertebrates during demanding exercise, excitement, and orgasm; and they resemble the opiates in their abilities to produce a sense of well-being. Endorphins work as "natural pain killers", whose effects may be enhanced by other medications.
The term "endorphin rush" has been adopted in popular speech to refer to feelings of exhilaration brought on by pain, danger, or other forms of stress, supposedly due to the influence of endorphins. However, this term does not occur in the medical literature

Another widely publicized effect of endorphin production is the so-called "runner's high", which is said to occur when strenuous exercise takes a person over a threshold that activates endorphin production. Endorphins are released during long, continuous workouts, when the level of intensity is between moderate and high, and breathing is difficult. This also corresponds with the time that muscles use up their stored glycogen. Workouts that are most likely to produce endorphins include running, swimming, cross-country skiing, long distance rowing, bicycling, weight lifting, aerobics, or playing a sport such as basketball, soccer, or American football.

Stimuli/stimulation

Stimulus is the incoming information from an action. Stimulation is the action of various agents (stimuli) on muscles, nerves, or a sensory end organ, by which activity is evoked; especially, the nervous impulse produced by various agents on nerves, or a sensory end organ, by which the part connected with the nerve is thrown into a state of activity.

Stimulation in general refers to how organisms perceive incoming stimuli. As such it is part of the stimulus-response mechanism. Simple organisms broadly react in three ways to stimulation: too little stimulation causes them to stagnate, too much to die from stress or inability to adapt, and a medium amount causes them to adapt and grow as they overcome it. Similar categories or effect are noted with psychological stress with people. Thus, stimulation may be described as how external events provoke a response by an individual in the attempt to cope.

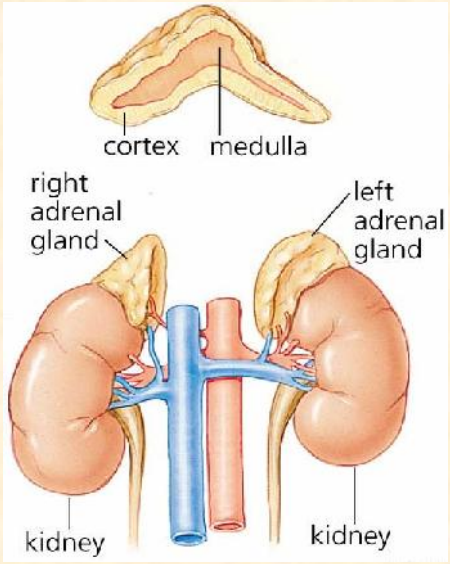
A high level of stimulation ("over-stimulation") can lead to psychological problems. For example, ADHD is, theoretically, a condition in which over-stimulation is a part. It is hypothesized that long term over stimulation can result eventually in a phenomenon called "*adrenal exhaustion*" (sensory overload and burnout) over time, but this is not medically accepted or proven at this time. What is sure is that ongoing, long term stimulation, can for some individuals prove harmful, and a more relaxed and less stimulated life may be beneficial.

Fight-or-flight response

The fight-or-flight response, also called the fright, fight or flight response, hyperarousal or the acute stress response. The response simply tells us how we respond in a stressful situation, fighting or fleeing. This response is the first stage of a general adaptation syndrome that regulates stress responses among vertebrates and other organisms.

Hypoadrenia (adrenal exhaustion/adrenal fatigue)

Hypoadrenia is a term for a hypothesised condition of the *adrenal glands*. The terms adrenal exhaustion or adrenal fatigue are often used (and connected to hypoadrenia) by complementary and alternative therapists, and can be fatal if in its later stages. People with hypoadrenaia have a tendency to gain weight and are unable to lose it, especially around the waist. High frequency of getting the flu and other respiratory diseases and these symptoms tend to last longer than usual, tendency to tremble when under pressure, reduced sex drive, lightheaded when rising from a lying down position, unable to remember things. Lack of energy in the mornings and also in the afternoon between 3 to 5 pm. Feel better suddenly for a brief period after a meal. Often feel tired between 9 - 10 pm, but resist going to bed. Need coffee or stimulants to get going in the morning. Crave for salty, fatty, and high protein food such as meat and cheese, feels better when stress is relieved, such as on a vacation, difficulties in getting up in the morning Lightheaded. Symptoms also include mild depression, food and or inhalant allergies, lethargy and lack of energy, increased effort to perform daily tasks and dry and thin skin.



Adrenal glands

The adrenal glands are part of the body's mechanism for short term stress response and management; they are

involved in the production of the hormone *adrenaline* (also known as *epinephrine*), the famous fight or flight chemical released in stressful situations, which increases the body's metabolic rate and muscular contraction strength. Along with the thyroid gland they are also part of the body's metabolic energy regulation and control system, and thus control to an extent the energy available to body systems.

What is the neurological basis for 'daredevil' behaviour?

Source: http://cogsci.stackexchange.com/questions/4668/what-is-the-neurological-basis-for-daredevil-behaviour

Dopamine receptor agonists related to reckless driving and gambling

There are three case reports provided by Reactions Weekly (2010) demonstrating correlations between treatment with dopamine receptor agonists and reckless driving:

Reckless driving occurred in three patients during treatment with dopamine receptor agonists (DA) ... DA are associated with impulse control disorders, and may alter how the brain perceives and avoids risk. DA-associated impulse control disorders include pathological gambling and hypersexuality. Reckless driving may be another manifestation of DA-associated impulse control disorders.

Some further evidence is provided to suggest neurological correlates between dopamine receptor agonist and risky choices in a gambling task (Riba et al., 2008):

In summary, the present findings indicate that the dopamine D2/D3 receptor agonist pramipexole is capable of blocking reward-related activations in the rostral basal ganglia and midbrain and may lead to a behavioral disinhibition characterized by increases in risky choices in a gambling task.

Neurological correlates between voluntary and involuntary risk taking in the brain

A study used functional magnetic resonance imaging (fMRI) and administered a modified BART with an active choice mode and a passive no-choice mode in order to examine the neural correlates of voluntary and involuntary risk taking in the human brain (Rao et al., 2008):

In summary, the present study modified the BART in both active and passive modes for use during fMRI and the findings provide direct visualization of voluntary and involuntary risk processing in the human brain. Regardless of the involvement of voluntary decision making, risk in this task is processed in visual pathway regions in the occipital and parietal lobes. However, during active decision-making, risk is associated with additional robust activation in dopamine rich mesolimbic (VTA-striatum) and frontal regions (insula, ACC/MFC, and DLPFC). Voluntary decision making per se, is associated with activation in the right DLPFC, which is absent in the involuntary no-choice condition. These results contribute to understanding the neural basis of normal and high risk behavior. Extending this paradigm to pathological populations characterized by impaired decisionmaking, such as patients with drug addition and compulsive gambling, may allow the specific neural components of impaired risk behavior to be distinguished, and may ultimately inform more effective clinical treatment interventions.

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Psychology of extreme sports

Source: http://en.benessere.com/psychology/articles/psychology_extreme_sports.htm

The challenges and exhibitions common to 'extreme sports' draw attention from spectators and this has led on to an increase in studies about types of behaviour relating to such sports. Today, we know a lot about the motivational aspects which push people to practise extreme sports over other sports, the psycho-physiological processes which fuel these unconventional passions and the participants'

inaccurate psychological mechanisms of assessment. The requirements and useful habits needed, in terms of mental preparation, are also known, and all of this knowledge contributes, together with scientific knowledge, to promoting safety and preventing accidents and injuries.

Going to the limit

The reason why risk-lovers are attracted to challenges in dangerous places, to the possibility of finding themselves face to face with unknown or uncontrollable elements of nature and to conditions in which one experiences abnormal feelings is undoubtedly related to their relationship with life, their personal needs to challenge themselves and feel like they are in control of even the most uncertain of events. These aspects have different depths, but they need to be looked into and revised if one notices that destructive tendencies dominate and that the risk is not calculated or not considered important or when one observes that there is a feeling of omnipotence present when one challenging one's abilities. In cases such as these, behind the tendency to risk everything could be an overestimation of oneself, or an underestimation of life, along with more or less conscious depression-type traits which can get the risk-lover closer to what is latently desired or overestimated: death. However, most extreme sport lovers are not motivated by self-destructive tendencies.

One of the main aspects which exerts great fascination about 'beyond the limit' sports is the possibility to do things which let you feel alive in a different way, which let you experience euphoria, which is described with sayings such as 'being in the eye of the hurricane', 'getting goose pimples' or even 'getting an adrenaline kick'.

For some people, these experiences are the only **possibility to feel like they have a body**, since, for some, contact with one's body is only felt when under hyperactive conditions and when their safety is at risk or, more simply, in situations in which physical certainties are removed (such as places where you can regain your balance or orientation).

The pleasure of getting the shivers

Research has tried to explain the neuropsychological reasons which guide some people to look for 'no limit' experiences and such studies have associated the ability some activities have to increase the secretion of adrenaline to certain people's need to take risks, their inclination to look for extreme feelings and their extravagant and varied tendencies in everyday life. The body's chemical response is related to the **ability certain 'no limit' situations have to activate a feeling called 'attack or flight'**, which can make us get the shivers, a pleasurable experience for those who often search for this type of experience. In fact, these people experience a feeling of danger which activates survival mechanisms as a response to stress and in order to cope with the neuro-physiological changes within them. However, it is usually possible to activate attack or flight responses when doing safe and predetermined activities as they allow us to face more uncertainty or change compared to everyday habits, such as small challenges to our daily lives at a fairground, which is safe yet still able to provide feelings of euphoria.

A connection has been found between emotional experiences which are not felt everyday and **hyperactivation of secretions of activating neuromediators**, that is, the physiological release of neurotransmitters which occurs in a massive way in situations in which one faces unknown and uncommon factors, such as facing a drop into 'nothingness' on a theme park ride. In these cases, the body produces a large amount of natural chemical substances, like *dopamine*, which tends to generate pleasurable feelings similar to those experienced when we drink alcohol, take stimulating drugs or have sex. The brain's response to these types of situations, which are experienced differently from person to person, is to flood itself with dopamine, which explains (together with the presence of adrenaline) why people smile or laugh uncontrollably whilst going through these experiences. This common attraction to such experiences has been studied in relation to genetic mutation and studies implied *the presence of fewer dopamine receptors*, a factor which has been seen to be present in many people who are attracted to extreme sports and which has been claimed to be a physiological reason which can explain the inclination to search for activates which activate the overproduction of stimulating neuromediators: so as to obtain physiological effects which other people experience at a lower threshold, given that they have a higher number of dopamine receptors.

The charm of vertigo

The descriptions of the emotions felt by extreme sport lovers have lead on to identifying a simple and important characteristic which these activities possess and which fascinates numerous individuals and makes them practise sports which are over the limit, especially sports which involve rotating or being suspended in the air. This characteristic has the ability to stimulate an internal state called 'dynamic joy', that is, pure fun, which can be the result of rotation or dangling in space and this originates from childhood when we were rocked or swung around.
This pleasure seems to keep people practising extreme sports and such people especially enjoy activities involving falling or being thrown through the air, vertiginous rotation, speed and lineal or rotary acceleration. The precocious attraction to these activities can be seen in babies who squeal with joy when they experience *the psycho-physical ilinx pleasure*, which can remain a central stimulant which guides the physical activities of many adults.

Passion for strong feelings versus the need to be careful

Many studies about the type of personality which characterises lovers of risky sports have identified the presence of a specific trait that fuels **the search for extreme feelings**. This trait is the tendency to look for strong emotions and it has resulted in naming extreme sport lovers 'sensation seekers', a psychological aspect which unites many parachutists, free climbers and other people who practise extreme sport.
Psychological research about a similar approach compared the differences between normal people and **goosebump lovers** and distinguished two groups by using a curve which represents the tendency to look for extreme activities. At the bottom of the curve there are the so called 'Big T' or 'type T' people, which stand for people who enjoy big Thrills, or Thrill type activities. At the other end of the curve are so called 'small T' people, that is, people who really stay clear of dangerous situations, who live life with extreme prudence or, as the author of a study said, who 'hold on tightly to handrails', an attitude which is translated into an abiding respect for rules, customs and traditions, so much so as to reduce unforeseen events in life as much as possible.
Of course, in the centre of the curve, which is where most people lie, there is an average tendency which may lean more versus one pole than the other.
It is easy to see that 'pure big T' people represent a small amount of individuals who take part in extreme sporting activities. They are people who are characterised by looking for activities which induce emotion and which are far from simple since they need a lot of intense stimuli because, like drug addicts, they develop a form of tolerance to goose bumps, or in other words, they continually need even more intense stimuli in order to feel the same emotions. It is almost as if they get used to an extreme challenge and so they look for a bigger challenge in order to get the shivers, thus becoming less able to assess the risks and being totally focused on their needs to the point when they come close to death, just like in cases of drug addiction.
B.A.S.E. jumping lovers are part of this category of people, an activity which is a very dangerous transformation of bungee jumping. The level of excitement in B.A.S.E. jumping is higher due to the increased physical danger of jumping from low heights, such as from a building, tower, bridge or natural bases, hence the name B.A.S.E. which stands for Buildings – Antennas – Span – Earth. It is actually illegal to practise this activity. Challenging standard limits, which involves a dramatic escape after the performance, is one element which acts as a stimulant for those who measure themselves against these off-limits activities, however, there is obviously another exciting factor in play represented by the satisfaction of narcissism during exhibition, which can be seen in the flashy clothes worn by extreme sports lovers, as they get the attention of the mass media, law enforcement and spectators.
There is a true *dark side to hunting for the shivers* though, which is very distant from normal human needs concerning physical and sporting activities: it is personified by so called 'negative T' people, that is, those who tend to risk things in a negative way and who satisfy their needs for adventure through self-destructive activities, like drinking, car racing, drug abuse or carrying out anti-social and delinquent activities. In these situations, the need to look for excitement is part of a deteriorated system of values and thus negative or criminal attitudes, fuelled by an altered sense of life. The result is pursuing this passion and putting other people at risk.

Immunisation to fear

For many people, extreme challenges are faced as if they were a sort of **vaccine against fear**, a way to find security in dangerous situations. These people experience feelings as a way to overcome their fears, guided by the thought (or more or less explicit hope) that, if they overcome big challenges, they will become less intimidated by everyday tests.
In these cases, going past the limits means transforming human fears into challenges through a war between personal insecurities, and this is why people choose activities which allow them to experience the *possibility to manage their fears* by putting themselves through preparatory training, which offers reassurance about the possibilities of controlling the risks, and going through mental preparation, which occurs before the challenge and during which people feel some of the things they will feel when they do the activity. They are also guided to properly imagine the activity, just like effective forms of psychological change recommend which are based on multisensory imaginative visualisation. By doing this, the use of comprehensive visualisation techniques, completed during physical training, which may be done (if necessary) alongside relaxation and regulation techniques for one's psycho-physiological functions (for example, Autogenic Training), becomes an opportunity, together with the extreme challenge, to learn how to transform terror into the 'thrill of fear'.

Imperfect assessment of risks
There are some mistakes which can be made when assessing the risks of an extreme activity and extreme sports lovers must know about these.
One is made up of the tendency to overestimate one's chances of success based on the assessment of previous, identical and failed tests, a reasoning error called the "fallacy of the player". In such cases, challenges which are not dependent on one another are considered to be interconnected on the basis of the erratic belief that, in a sequence of independent events, the outcome of the previous events can influence the outcome of future events, starting from the idea that, sooner or later, success is inevitable.
Furthermore, an important element in risk assessment is the estimation of how much events depend on chance or, on the contrary, on the individual's ability (locus of control). In general, *those who tend to feel like beginners in something* tend to take less risks since they consider the intervention of chance more realistically.
On the contrary, *increased confidence in one's abilities*, which is typical of professionals, tends to result in a growing (but not real) tendency to take on risks. This explains why, in sporting contexts, incidents often occur when athletes start to consider chance events as dependent on their will or person skills, which, ironically, makes them run more risks than beginners.
Despite precautions taken by using safety equipment and preparatory studies about the knowledge of physics, the 'human element', however imperfect, remains a fundamental factor which must be understood in depth when carrying out extreme challenges, since it is this that takes over when faced with unexpected factors which, in terms of natural elements, are always present.

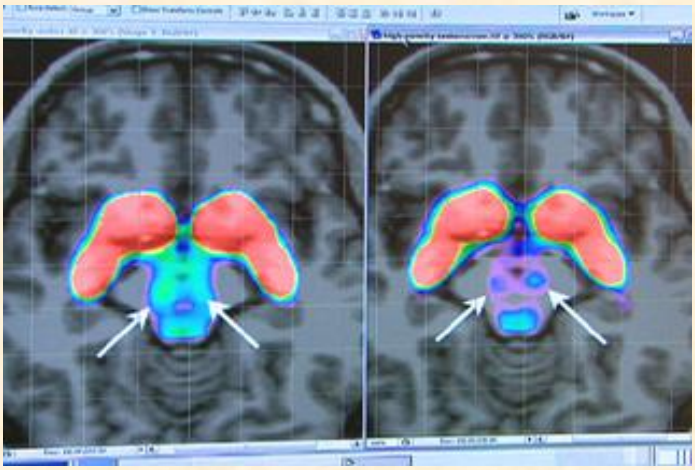
Thrill-seeking

Source: http://www.deathreference.com/Sy-Vi/Thrill-Seeking.html

Americans dangle from hang gliders and parachutes; they race their cars, powerboats, snowmobiles, and dirt bikes; they stand on their hands upon skateboards, climb rocks without safety ropes, and pay to bungee-jump off towers. Less adventurous "adrenaline junkies" ride roller coasters with lethal-sounding names like Roaring Lightning or Big Death.
Why, despite the well-publicized lethality of such recreational risk-taking, do people continue to engage in such behaviors? Is there perhaps some need to flirt with death in order to feel "alive"? Scholars have discerned a blend of physiological, psychological, social psychological, and cultural causes.
Three-quarters of adolescent deaths are caused by accidents, homicide, and suicide, indicating a propensity for lethal risk-taking. Accidents alone account for 60 percent of this total. Though most recognize adolescence as a developmental period when risk-taking is a common form of testing one's identity and abilities, such behaviors need not be life threatening. As accidental deaths became the leading cause of death in this age group (which was the only one in which mortality had increased since 1960), in 1987 the federal government and various foundations financed research to study the reasons for the reckless behavior.

Psychological paradigms predominated, with explanations focusing on adolescents' lesser ability to evaluate risk and a life cycle, developmental need for excitement that blunts comprehension of risk. In addition, as suicide rates nearly tripled from the mid-1960s to the mid-1980s among boys and girls age ten to fourteen, and doubled among those fifteen to nineteen, suspicions arose that a portion of lethal accidents might actually be "subintentioned suicides." Similarly, increases in teenage smoking rates throughout much of the 1990s has coincided with teens' increasing suicide rates, particularly among blacks.

Analysts also noted the role of sensation- or thrill-seeking personality types. Even in adulthood, such risk-takers are more prone to high-risk undertakings like parachuting from planes, risky business deals, substance abuse, or even criminal activity. Such risky business might have a biological underpinning. A 1998 UCLA study reported the discovery of two types of mutant genes underlying compulsive novelty-seeking behaviors. The researchers claimed that 30 percent of the population is born with one of the thrill-seeking genes, and 20 percent with both. In addition, the neurotransmitter dopamine has been linked to sensation-seeking behavior and, at elevated levels, to drug abuse and schizophrenia. Richard Epstein and his fellow researchers found a link between novelty-seeking and a form of the D4 dopamine receptor gene.



Brain scans of a low thrillseeker (left) and high thrill seeker (right) show differences in the autoreceptor concentration. Image courtesy: David Zald

Another psychological thesis is that a portion of such behavior stems from the quest for immortality. World-class athletes and those in the midst of a potentially lethal situation describe the sensation of transcendence while in "the zone," which they describe as a timeless and deathless realm where everything seems to stop and go silent.

Risk-taking is also a means of attracting attention and thus enhancing self-esteem, as when teenage girls were found demonstrating their toughness by having unprotected sex with HIV-infected gang members in San Antonio, Texas. Thrill-seeking behavior has long been a way that young adult males have attempted to win the admiration of their peer groups and to attract members of the opposite sex. War is one traditional social solution for harnessing such drives by putting them into the service of the state.

The argument for a cultural component to thrill-seeking is reinforced by the absence of reports of extreme sports and other thrill-seeking activities in developing nations. For instance, in the late 1990s the world's top-ranked male paragliders were from Austria, Japan, Switzerland, and Italy; the top women were from Denmark, Czech Republic, Japan, Great Britain, Germany, France, and Norway. Perhaps where death is a risk in everyday life, such contrived dangers are superfluous. In the past, society controlled the opportunities for such experiences: for example, in painful and challenging rites of passage and war, and in dangerous occupations as fishing, mining, and logging. Nature did her part with frequent bouts of lethal disease. Like animals in zoos, humans in modern societies do not face the environmental challenges for which they are hardwired.

A study comparing Indian males who had applied for Canadian immigration visas with a matched nonimmigrant group found that sensation-seeking and belief in an unpredictable world were two of the personality types that distinguished the two groups. Given the fact that the United States is basically populated with immigrants (the 2000 Census found 10.4% of the population to be foreign-born) and their descendents, it would seem reasonable to assume that among the developed nations, the United States has a disproportionate share of thrill- or sensation-seeking personality types, as psychologist Frank Farley claims.

Countering such risk-taking appetites has been the trend in modern countries to eradicate risk, such as through seatbelt regulations, Pure Food and Drug Act, bankruptcy laws, and the U.S. Consumer

Product Safety Commission. Warning labels abound, with laws requiring their placement on five-gallon buckets (so children will not fall in them and drown) and step-ladders (30% the price of which goes to cover potential liabilities). On the packaging of one brand of electric iron appeared "Do not iron clothes on body"; on a child's Superman costume: "Wearing of this garment does not enable you to fly."
Out of this sanitized and risk-free cultural setting emerged during the end of the century extreme sports, featuring such activities as dirt-jumping on bicycles, sky surfing, inline skating, freestyle motocross (which combines motorcycles and ski-like jumping), ice cycling, snowboarding, and skateboarding on half pipes—reactions against what the extreme skier Kristin Ulmer, in *The Extreme Game,* calls a "scaredy-cat culture." Risk-taking became commodified leisure as the marketplace, seeking to profit from the new norm, generated extreme sports parks, new lines of clothing and footwear, nutritional additives, and televised X-games. The movement was significant enough that in 1999 the United States became the first country to honor extreme sports on its postage stamps.

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The Extreme Gene

Source: http://stoked4life2.blogspot.gr/2010/09/extreme-gene.html

"It is only by risking our persons from one hour to another that we live at all."
(James Williams, Philosopher.)

The extreme gene. Those extreme sports athletes must be different from the rest of us, only a crazy man would do that! Indeed they are different, genetically. Many extreme sports athletes have a trait called the High Sensation Seeking Trait (HSS). People with this trait are genetically predisposed for the need to experience varied, novel, and complex sensations and have a willingness to take risks to obtain such sensations. Recent research has yielded a clear definition of this trait and has traced the manifestations of the trait through an advanced biological theory into the social realm.

Overview

Your typical adrenaline junky probably scores high in the HSS scale. People with this trait generally like intense complex music like rock and techno. Frank Farley, a researcher on sensation seeking, classifies HSS people as "type-T positive physical." That is to say someone who is a sensation seeker and has manifest their needs via socially acceptable physical activities like extreme sports. In his experience general character traits include extroversion, creativity, and cravings for novelty and excitement. In a closely aligned personality type are the Einsteins', "type-T positive mental." Because of the biological pathways sensation seekers are often lured into delinquency when there is no other outlet. Both T-positive and T-negative forms of HSS are prone to take physical risks to obtain their high, especially between ages 15 and 25. This is not surprisingly the same age group that watches ESPN's X-Games; on the other hand, it is also the same age group that commits a significant portion of violet felonies. Why are these people willing to take such risks as life and limb? It has to do with their conception of risk and reward. As one approaches the physical limits of skill, a heightened level of brain activity kicks in and there is entrance into a state of exceptional problem-solving skill. Many claim that they feel most vibrantly alive when straddling the line between safety and danger. Studies have found that skiers with

high sensation seeking scores have significantly few accidents that the general distribution of skier, because of this heightened mental and physical capacity.
High Sensation Seeking is distributed amongst the population with out regards for race or creed. There are some demographic distributions however. Males generally score higher than females in sensation seeking and it also is concentrated in people from age 16 to 20 where it stabilizes and then slowly decreases with age to 25 years of age.

Biological Explanation
Keith Johnsgard, a professor at San Jose State University, suggests that HSS has a strong basis in biogenetic directives. His view is corroborated by independent Israeli and American research teams that found special D4 Dopamine receptors in the brain. The mesolimbic dopamine system is the brain's major reward pathway and with sensation seekers, this pathway is stimulated by adrenaline sports in the same way that drugs do. The feeling is similar to taking cocaine or having great sex. The structure of this specialized system makes people with HSS especially susceptible to heroin addictions. High sensation seeking is also linked to unusually low levels of Monoamine Oxidase B (MAO B), which plays a key role in the regulation of pleasure via the dopamine receptors. The hypothesis under investigation is that low levels of MAO B dampen the effects of dopamine so sensation seekers require extremely arousing activities to get the same pleasure a normal person would get from conversation over dinner. There is also an unclear link between sensation seeking and low levels of adrenaline.

Social Ramifications
The behavior associated with high sensation seeking has had a wide variety of social reactions and has created some myths. The drug and crime aspects of some type-T individuals has created a negative stigma and put sensation seekers in a generic stereotype of social irresponsibility. Even T-positive people may be furthering the asocial perception in that they serve their own needs for adrenaline over social needs. The regular population has a difficult time understanding the need for intense sensation and has labeled HSS people as having a death wish and being emotionally unstable, however, they would not bother with extensive and elaborate safety equipment if they desired death. In fact, according to a University of Barcelona study, sensation seekers test out exceptionally low on the scale of neuroticism and are highly stable emotionally. No significant signs of depression, anxiety, or fear. In recent years American society has begun to embrace the high energy and excitement of the extreme sports world. The corporate sector has made major moves to align themselves with adrenaline and excitement. Even the United States government has jumped on the bandwagon pushing the marines as an extreme sports group with purpose.
The bottom line is that extreme sports are here to stay as society and corporations look to high sensation seekers for the hip new thing. As safety technology progresses you can expect to see more people get in touch with their biology. In addition, as adrenaline sports move to the mainstream the prices of equipment will drop opening up new avenues of release for at risk teens. Keep in mind ESPN's maxim: If you're not living on the edge then you're taking up too much space!

Sensation Seeking Scale
Are you wondering if you might be a high sensation seeking person? Dr. Marvin Zuckerman, one of the original researches on HSS has developed a test to determine the level of sensation seeking of a subject. He developed a massive assessment that consisted of four main sections.

- Thrill and Adventure
- Experience Seeking
- Disinhibition
- Boredom Susceptibility

The test for Thrill and Adventure seeking has been reproduced here as a self-scoring JavaScript application. You will need to have a script enabled browser to view this content. Take the Test!

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Theories on why some skiers can risk it all

Source: http://freeskier.com/stories/head-game-theories-on-why-some-skiers-can-risk-it-all

Mike Wilson is known for throwing backflips off massive cliffs during both winter and summer. In 2004, Wilson introduced freeskiing's first off-axis double-flipping rotation—the Wilsonflip. His spinning doubles and triples off a mega rope swing he built over the Truckee River garnered half a million views on YouTube last summer, prompting the police to take the swing down. Last winter, he built the world's biggest zip line by running 5,000 feet of cable 3,300 feet high across a canyon between two mountains. He zipped to the middle and BASE jumped off.

F1 pilot Michael Schumacher sustained severe head injury after skiing accident (Dec 2013)

You might think Wilson is crazy. You might think he's fearless. Why is he willing to put it all on the line? According to many psychologists, Wilson is a sensation seeker. Theories point to a pathological personality trait or a dopamine deficiency. Most research into the psychology of action sports has lumped participation in such sports with risky behaviors such as drug use.

But Wilson doesn't fit the mold of the self-destructive thrill seeker. He is a highly trained individual. He's been honing his skills for most of his life. Wilson has been a gymnast since he was a toddler. He was jumping his BMX bike into his own foam pit in the backyard at age 10. From ages 11 to 15, he spent four to five hours a day on the trampoline practicing tricks. He's spent thousands of hours on skis, diving boards, trampolines, water ramps, rollerblades, cliffs, rope swings and zip lines. Wilson also meticulously plans and prepares to minimize his risk. He measures distances with a 300-foot tape measure and a rangefinder, he uses a GPS to drop waypoints and measure the distances, and he uses

a radar gun and an accelerometer to calculate speeds. To pull off the zipline BASE project, he worked for two months on calculations.

Wilson always asks himself, "What can go wrong?" He only moves forward once he's thought everything through and ensured there's a safe way out in every scenario. "Once you've minimized risk, there's no reason for fear," says Wilson.

That doesn't ring true for most skiers. It might be that Wilson's brain has fewer dopamine-inhibiting receptors, and therefore, when he takes risks, his brain isn't able to inhibit the neurotransmitter adequately and it's flooded with the feel-good chemical. He's probably hyperstimulated by novel experiences.

But studies linking action sports athletes with dopamine addiction have fueled the perception of athletes as reckless adrenaline junkies who heedlessly put their lives at risk to trigger the next rush. Eric Brymer, a kayak coach turned sports psychologist at the University of Queensland in Australia knows the psychological stereotypes are an oversimplification. His research inquires into the experiences of the athletes themselves.

"What sets serious extreme athletes apart from high-sensation seeking junkies is preparation, knowledge of and honesty about personal capabilities—emotional and psychological—knowledge of their environment, their activity… and the ability to walk away," he says.

Extreme sports are traditionally explored from a risk-taking perspective that often assumes that participants do not experience fear. Seth Morrison says there's always a level of fear. "If you're skiing the resort, then you go straight to Alaska, you're going to be scared," says Morrison. "If you ski in the backcountry throughout the season, you can build up to things. Someone once told me to watch a bunch of scary movies to scare the fear out of you."

That fear, according to Brymer, is exactly what sets serious extreme athletes apart from your high-sensation seeking junkie.

"You just wouldn't expect a thrill seeker to feel fear," he says. "The ability to recognize fear and use it as information but still be able to function and undertake an activity in a rational way enables us to move through fear but still respect what fear is telling us. It's courage because we have moved through intense fear and humility because we know that fear is telling us that this environment has the potential of killing."

Athletes that set attainable goals within the range of their technical ability are more successful at channeling fear into focus, as opposed to fight, flight or freeze—the body's typical response to a fear-induced adrenaline rush. Freezing up while skiing a big line could be catastrophic. The world's best skiers, like Morrison, do not freeze with fear; instead their perceptions seem to open up, resulting in the same heightened sense of awareness and calmness associated with meditation.

"It's a tunnel vision of concentration," says Morrison. "Nothing else matters but the moment. Your body becomes numb to emotions. Sometimes it's 30 seconds, sometimes it's four hours, like on a complicated line in Chamonix." Morrison lives for those moments of focus, in which he says he finds peace.

This mental state of complete involvement and focus, a loss of self-consciousness and a sense of passing time is what psychologists term "flow." For centuries, practitioners of Eastern religions have sought flow through meditation. Brymer finds that many extreme athletes report transcendental flow experiences similar to those of meditation practitioners.

The term "flow" was conceived by Mihaly Csikszentmihalyi, a Hungarian psychology professor who served as the head of the department of psychology at the University of Chicago. According to Csikszentmihalyi, flow is completely focused motivation. It is a single-minded immersion, harnessing the emotions that help us to perform and learn. In flow, the emotions are not just contained and channeled but are positive, energized and aligned with the task at hand. The hallmark of flow is a feeling of spontaneous joy and peace while performing a task. Flow is also described as a deep focus on nothing but the activity—not even oneself or one's emotions.

Sports psychologist Kim Cusimano at the UC Davis Sports Medicine Center references Csikszentmihalyi's flow concept. "Athletes like Mike Wilson may just know how to enter the flow experience more easily," she says. "Basically, letting something happen without the mind getting in the way." Cusimano thinks Wilson's brain operates differently in that it's able to let go so far that fear isn't there. She's seen this similar capability among action sports athletes.

"They have that capacity to let go so much, their brain is no longer in the way," she says.

Wilson says he skis the best when he doesn't overthink it. "When it's just natural instinct," says Wilson. "The best I've ever skied was the day after I broke up with my girlfriend, and I hadn't slept in 48 hours. If you have to think about it, you probably shouldn't be doing it."

Brain researchers call this the default mode network, when the self-conscious, narrative aspects of thinking are missing. "There is just sensory and kinesthetic experience—pure reaction without deliberation," says Arne Kozak, a professor in psychiatry at the University of Vermont College of Medicine.

As Kozak describes, the basic maneuver is to move our brain activity from the prefrontal cortex to the motor and somatosensory strips of the brain (these run laterally and side-by-side to each across our heads from ear to ear). Experience that develops expertise is what can help us move from self-conscious action to action that is directed less consciously by the motor strip. "They have done studies, and the novice is very self-conscious while learning," says Kozak. "That brain will be very active in the frontal cortex. The expert's brain who may well be in 'flow' will be active in the motor strip. There is no sense of he or she actually doing the activity. "In other words, mastery is the key to reducing self-consciousness.

According to scientists at the University of Regensburg in Germany, as soon as someone starts to practice a new sport, his brain begins to change, and the changes continue for years. As the brains of athletes become more efficient, they learn how to make sense of a new situation sooner.

"It's a matter of experience," says Wilson. "I grew up on skis. I was hitting 60-foot jumps at age 12, so it made sense that by the time I was 13, I could hit the 100-foot jump. It wasn't a mental thing I had to overcome. The bigger I went, the more comfortable I got. I never felt like I was pushing myself. I have put in thousands of hours on skis. That's the biggest difference between me and other people. It's a matter of time spent on the hill."

Morrison agrees, "We live what we do. The people who are weekend warriors, they lead a different life than we do. Their moments of skiing are every so often, ours are everyday."

It's also the case that we are born with individual differences in what we perceive as a threat. Some of this is also learned and developed through experience. Some of us will be more comfortable getting closer to that edge, while others will be more cautious. It's a basic comfort difference with risk taking.

The answer may start with brain chemistry. In the '90s, Israeli researchers identified a "risk" gene—behavioral coding that changes the reabsorption of the neurotransmitter dopamine. It affects how people responded to stress or anxiety. Basically, the higher your tolerance for those feelings, the more risk you can take on. But that accounts for only 10 percent of thrill-seeking behavior. The University of Delaware followed up with a study suggesting risk takers had lower levels of serotonin, another neurotransmitter that inhibits impulsive behavior.

In 2009, David Zald, a psychology professor at Vanderbilt University, performed some of the first tests on thrill-seeking personalities using PET scans. His subjects' brains did have fewer autoreceptors (dopamine regulators) than the average human's. The brain's enzyme monoamine oxidase (MAO) keeps neurotransmitters like dopamine and serotonin in balance. A form of MAO called type B is particularly related to sensation seeking and to regulation of dopamine. The link between MAO and dopamine is notable in light of the fact that the dopamine D4 receptor gene has been connected to sensation seeking, and another dopamine receptor, D2, has been connected with substance abuse, a particular form of risk-taking behavior. He concluded high-sensation seekers have lower levels of MAO. Interestingly, levels of MAO are known to be higher in women than in men, and MAO levels in the brain and blood rise with age.

According to Erik Monasterio, a New Zealand medical doctor specializing in forensic psychiatry, people who excel in action sports appear to have a biological makeup that is different than the average person. These differences in brain chemistry help to explain why athletes put themselves in perilous situations. In Monasterio's recent study "Personality Characteristics of BASE Jumpers" in the Journal of Applied Sport Psychology, he writes that extreme athletes with lower levels of circulating dopamine "may be in a state of under arousal, which may in turn contribute to engagement in risk-taking sports."

Monasterio's research found that the personality of climbers and BASE jumpers was different to that of average people. Climbers scored higher in the areas of novelty-seeking and self-directedness and lower on harm-avoidance. What this suggests is that climbers generally enjoy exploring unfamiliar places and situations. They are easily bored, try to avoid monotony and so tend to be quick-tempered, excitable and impulsive. They enjoy new experiences and seek out thrills and adventures, even if other people

think that they are a waste of time. When confronted with uncertainty and risk, climbers tend to be confident and relaxed. Difficult situations are often seen by climbers as challenges or opportunities. Climbers also have good self-esteem and self-reliance and therefore tend to be high achievers.

"What these findings suggest is that biology and genetics play at least a moderate role in determining who will take up these sports," says Monasterio. "We know that the amount of harm-Avoidance, Novelty-Seeking and Sensation-Seeking are inherited from our parents and are determined by the levels of a number of dopamine and serotonin."

Although Morrison's perceptions of what constitutes risk are different from the average person's, his risks are still calculated, which sets him apart from a thrill seeker. Morrison says he skis within his comfort zone about 90 percent of the time. He feels he's most at risk while filming.

"You're crunched into a smaller time window. You're worried about money. Other athletes are pushing. There are outside influences affecting your decisions. It's similar to the freeride events. People are pushing it on days when they wouldn't normally be skiing that stuff. When you're doing it for yourself, you're taking danger out of it. The fewer people, the fewer reason for things to go wrong."

The only time Wilson has felt truly uncomfortable was when he hit a 185-foot jump in Aspen to break a world record. "I thought, I probably shouldn't be doing this," says Wilson. "I was in Whistler hitting a 120-foot jump, and I was prepared to hit a 140-foot jump. I showed up and it was 195 feet. Even when they got it down to 185 feet, I knew I shouldn't do it. But there was a lot of money on the line and a lot of pressure."

Wilson undershot the gap and was seriously injured. He pushed his heel bones through the muscles in the bottom of his feet, suffered partial tears in ligaments in both knees, broke his back in three places, collapsed a lung and broke his right thumb. Prior to the crash, he'd never broken a bone. "Now, I don't let that happen," he says. "I don't hit anything unless I'm 100-percent comfortable."

As the opportunities to challenge himself on skis wane, Wilson needs a different rush. Now, he gets more out of proving the impossible wrong. "For me, it's more about doing things that haven't been done or things people say can't be done."In terms of skiing, Wilson wants to hit jumps that are over 200 feet and learn tricks nobody has done before. He says he'd like to break the world record high dive (172 feet) by jumping from a height of over 200 feet.

There's little in terms of *measurable* science when it comes to describing how the action sports athlete's brain works. Brain imaging devices that can be used while someone is jumping off a cliff or skiing down a mountain are too basic and don't explain much. Tests using heart meters have only recently begun. The science surrounding risk taking is still relatively new.

So are the world's best skiers dopamine addicts or are they psychologically sound people who have mastered a sport? As in most things, the reality probably lies somewhere in the middle. Not everyone has the mental makeup to excel in dangerous pursuits, but those who do are, for the most part, highly calculating individuals who are prepared for the risks they take. "In my view, adventure sports are rewarding and exhilarating beyond the explanation of biology," says Monasterio.

Involvement in risk-taking sports is clearly more fulfilling and profound than the simple thrill of a chemical release. As Morrison says, "I'm seeking enjoyment, fun and adventure. It's not that I need to do something because it's the gnarliest thing to do, I'm seeking a new experience."

Risk-Taking and the I-Function

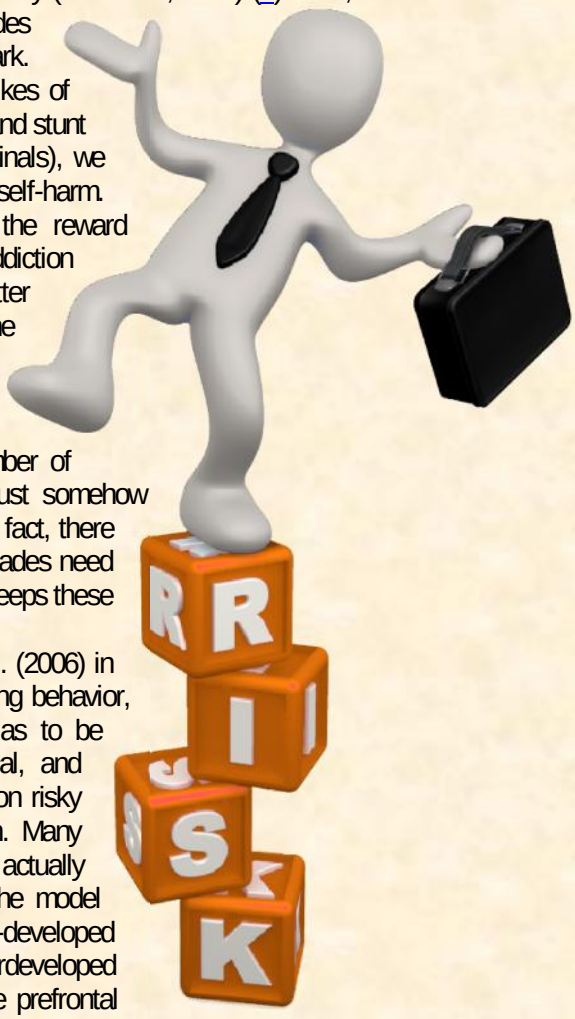
Source: http://serendip.brynmawr.edu/exchange/node/2305

At first glance, engaging in an activity that puts one's life at risk may seem evolutionarily un-adaptive. However, much research and discussion has been initiated with just the opposite idea in mind. Risk-taking tendencies apparently lie deep within our evolutionary framework; our hunger-gatherer ancestors had no choice but to put their lives in danger in pursuit of food, shelter, or protection from danger. As Eric Perlman, a filmmaker specializing in extreme sports, said, "We are designed to experiment or die" (Greenfield, 1999)(1). Moreover, current generations of American descent can ascribe their thrill-seeking desires to a more recently developed national characteristic: if not for our risk-taking, heroic forefathers, the United States would not have been established, much less expanded in order to fulfill our Manifest Destiny, nor would it have become one of the most powerful countries in the world. That being said, Darwinian evolution in conjunction with national pride still does not seem to be a sufficient

explanation as to why people put their lives at risk for fun, be it BASE (Building +Antenna tower + Span + Earth) jumping, unprotected sex, day trading, or substance abuse. Researchers believe the biopsychosocial model is at work, incorporating genetic, environmental, and cultural factors, in deciding whether or not to take a risk.

Ernst, Pine, and Harden (2006) define risk-taking behaviors as favoring "the selection of courses of action with uncertain and possibly harmful consequences" (299) (2). Similarly, Schneider, Butryn, Furst and Masucci (2007) describe risk as having three separate elements of thought: losses, these losses' significance, and the uncertainty associated with the losses (3). However, these definitions do not address the reasoning behind choosing this type of lifestyle. Freudian theory suggests such individuals have a death wish and are actually "expressing suicidal tendencies" (Pain & Pain, pS33, 2005) (4). Even if this were the case, the individuals themselves would never know it. Schneider, et al. (2007) believes extreme athletes have learned how to manage their fear, and it is actually this fear that keeps them safe and realistic (3). In addition, research from the mid-1990s on unprotected sex in a population of homosexual men reveals almost a sense of surrender. The men have accepted the almost inevitable possibility of contracting the HIV virus, and have decided to choose quality of life over quantity. (1)

Frank Farley, a psychology professor at Temple University, created a classification system in order to differentiate the various types of impulsive behavior mentioned previously (Greenfeld, 1999) (1). First, all risk-takers are recognized as having Type T personality. This includes the day trader, the heroin addict, Albert Einstein, and Lewis and Clark. However, once we subclassify into Type T intellectual (among the likes of Galileo and Van Gogh), Type T physical (among the race car drivers and stunt doubles), and Type T negative (along with the delinquents and criminals), we can see the difference between choosing temporary danger or chronic self-harm.



The neurobiological explanation for risky behavior is based on the reward pathways located in the limbic system. Blum (as cited in The Brief Addiction Science Information Source), suggests a cascade of neurotransmitter release, with dopamine being the signal discharged at the end of the chain reaction. Although Blum's model is meant to embody the nervous system of an addict, we can expand this model to encompass the similar feedback reactions occurring in thrill-seeking individuals. In such people, the cascade is abnormal and the number of dopamine receptors becomes decreased so that the individual must somehow release more dopamine to compensate and suppress his cravings. In fact, there have been genetic links to cascade inhibition. Not only do these cascades need more stimulation to be effective, but a continual lowering of tolerance keeps these individuals pushing their limits. (5)

In addition, a motivation-behavior model was designed by Ernst, et al. (2006) in order to explain what is occurring in the adolescent brain in risk-taking behavior, impulsivity, and reward/novelty-seeking. Adolescence was chosen as to be observed because it is during this time that physical, neurological, and psychological changes are occurring. In fact, much of the literature on risky behavior is focused on the adolescent and young adult population. Many researchers have endorsed the effort to reform this generation without actually attempting to understand why they might be behaving this way. The model proposed by Ernst, et al. (2006) attributes such behaviors to a well-developed nucleus accumbens, which is involved in the reward pathway, an underdeveloped amygdala, leading to less harm-avoidant behavior, and an immature prefrontal cortex, causing ineffective self-supervision. (2)

Such efforts explain what is going on inside the body to rationalize these decisions from a physiological standpoint. However, as noted earlier, the biopsychosocial model calls attention to the interaction between society, the environment, and genetics. Perhaps this is where I-function comes into play. In adults, an individual with low dopamine receptor levels must somehow decide if he wants to travel the road of fleeting risk or the dangerous path of chronic self-harm. He must look to his I-function for directions; this is one possible explanation for the process by which one might become T physical, T intellectual, or T negative.

The I-function seems to have a mysterious, somewhat vague role, yet each of us has one and is dependent on it in many ways. The I-function can be what makes the difference between deciding to perform stem-cell research, climb Everest, or do a line of cocaine. It is not just the self, not just consciousness, but it is what distinguishes the mountain climber from the drug addict, or at least it is what is responsible for the processes by which one becomes a mountain climber or a drug addict. While it is clear that a decision can be made without using the I-function, decisions are first directed to the I-function so as to remain consistent with previous choices. Then, Type T individuals with low numbers of dopamine receptors (or in adolescents whose brains are not fully developed) stand out in society and appear reckless and insane, but their I-function has been interacting with their nervous system their whole lives and they know what they are doing is only quenching a thirst that not many others share; they are in a "chronic state of underarousal" (Pain & Pain, S33). (4)

We can further deduce the role of the I-function by pinpointing when it is not in use, as in the case of what Pain and Pain (2005) denote as "flow". (4) Flow is the "suspension of time and the freedom of complete absorption in activity" (S34). Similar to "the zone," experienced by many (non-extreme) athletes and performers of all kinds, flow is an escape of reality, and an entrance into the action; you are not doing the action, but the action (be it playing tennis, singing opera, or writing a dissertation) is being done to you. While individuals of the T negative type allow the action to seize and usurp their I-function, Type T physical people seem to be well aware of their limits and keep the attainment of flow at a safe distance from their I-function. Extreme athletes are aware of the risks they take and are very meticulous in planning each voyage. Type T intellectuals, too, are careful to step over only the most necessary of boundaries in order to accomplish their goals. As cited in Schneider, et al. (2007), Zuckerman believes that the risk itself is not the goal; thrill-seekers do not risk for the sake of risk, but instead, type T individuals are more willing to accept the impending dangers involved. (3) This behavior was exhibited previously in the "surrender" of the population of homosexual men having unprotected sex. They have decided to accept the consequences of their risky behaviors. This acceptance is most likely due to their low dopamine levels resulting in a higher thrill threshold. Therefore, Type T intellectual and physical individuals' I-function is not overwhelmed and overshadowed by attainment of flow, as is often the case of Type T negative, who can often feel lost and become vulnerable to their abnormal neurotransmitter release. This is not to say, however, that Type T physical and intellectual people are not susceptible to becoming addicted (in a loose sense of the term), especially when the pliable cascade structure is at the source. Many extreme sportists admit to the high they get, calling it "magic" (Greenfeld, 1999). (1)

An interesting feature of the Type T population is its prevalence and the possible future implications for the nation. Founded on risk as the United States may be, with the number of T negative and physical ever increasing, perhaps America is on the verge of biting off more than it can chew. As mentioned in Schneider, et al. (2007), ours has become a "culture of risk" (354) (3). The risks are becoming exponentially more dangerous, and whether Type T individuals are willing to take that risk or not seems to be becoming of less and less concern. When does T physical blend into T negative? And why does it seem as if the Type T intellectual population has gone missing? Perhaps it is the lack of media coverage and public interest in venturesome intelligence, but as more T physical turn T negative, perhaps, too, T intellectual are intermingling with its counterparts. If this trend continues, the number of "lost" I-functions would escalate rapidly.

As noted above, the majority of the literature focuses on young adults, particularly men, because of societal views that at an early age boys should be allowed to "play rough" and take more risks than girls (6). Perhaps along with an underdeveloped amgydala and prefrontal cortex, the youthful brain also has a seriously confused I-function. Poor choices are made because under the direction of an underdeveloped I-function, the central pattern generators have not yet established a reliably consistent pattern. Intervention strategies should focus on altering the central pattern generators' configurations so as to direct output that will compensate for low dopamine levels in a constructive manner: by concentrating on living the T intellectual or T physical rather than the alluring T negative lifestyle.

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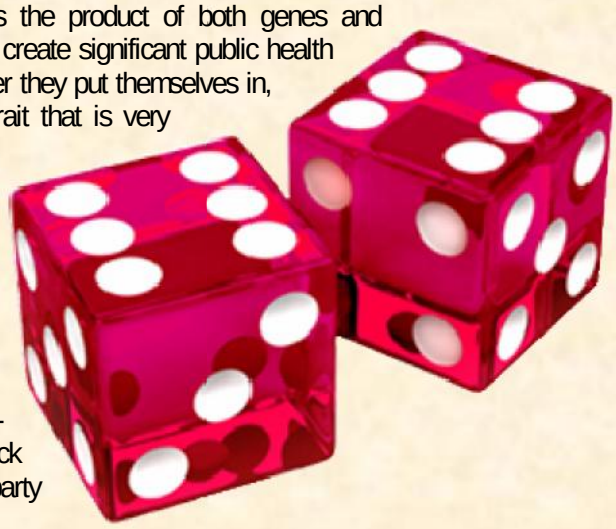
Are You a Risk Taker?

Source: http://www.psychologytoday.com/articles/200011/are-you-risk-taker

Rita lives for excitement. She dies of boredom when life becomes too predictable. She has a wide circle of friends but no tolerance for dullards. She likes meeting exciting new people, even if she knows that they are unreliable. She smokes tobacco and marijuana and drinks hard—and parties heavily on weekends with cocaine and Ecstasy, or any new drug that appears on the scene. She thinks nothing of going to bed with someone she just met, without obtaining character references or condoms. She has a Porsche that she drives...fast. She also likes to gamble at the casino—often losing more than she can afford.

Rita's behavior encompasses many kinds of risk. In the long term, the most dangerous of her activities are smoking and drinking. There are nearly 80 times as many deaths per year from tobacco and alcohol as from cocaine and heroin. But Rita thinks only of today's gratifications, not their associated dangers.

Rita is a fictional character, but she represents a kind of general risk-taker, one whose behavior encompasses many different activities. Such broad-spectrum risk-takers not only exist, I have discovered, but have a distinctive personality makeup that is the product of both genes and experience. It is important to identify such people because they create significant public health problems, for others as well as themselves. But for all the danger they put themselves in, they personify—perhaps magnify is more precise—a human trait that is very much responsible for our survival as a species.



Over the decades I have studied a personality trait called sensation-seeking—the pursuit of novel, intense and complex sensations and experiences, and the willingness to take risks for the sake of such experience.

Risk-taking is not the main point of sensation-seeking behavior; it is merely the price such people pay for certain kinds of activities that satisfy their need for novelty, change and excitement. In fact, many of the things that high sensation-seekers do are not at all risky. They enjoy high-intensity rock music, view sex and horror films, travel to exotic places, and party without drugs.

Sensation-seeking can also extend to the physical, involving unusual or extreme sports such as skydiving, hang gliding, scuba diving, auto racing, rock climbing and whitewater kayaking. An interest in participating in such sports describes one subcategory of sensation-seeking: thrill- and adventure-seeking.

There are other kinds of sensation-seeking that are expressed not through physical action but through the casting off of inhibitions in a social setting (disinhibition), through deviant lifestyles (experience-seeking), and through the pursuit of change for change's sake (boredom susceptibility). This variety of sensation-seeking has been related to such risky activities as smoking, drinking, drugs, unsafe sex, reckless driving and gambling.

Some psychologists have suggested that risk-taking is linked to neuroticism, a personality trait. They see it as an expression of neurotic conflict, a form of acting out or counter-phobic behavior. Our

previous research on physical risk-taking refutes such an explanation; it suggests that risk-takers do not expressly exhibit traits of neuroticism or anxiety.

It has also been suggested that high-risk behaviors like reckless driving, an antisocial activity if ever there was one, are a vehicle for expressing aggressiveness and hostility. Or perhaps risk-taking might be just an expression of a generalized need for activity itself, as is the case with hyperactive individuals, who provide their own stimulation through activity to overcome boredom.

Yet many risky activities, such as drinking and drug use, are done in a social setting. So it is possible that these activities, particularly in a college population, may be related to sociability. In a study, my colleagues and I looked at college students, many of whom were currently engaging in some or all six kinds of risky activities: smoking, drinking, drugs, sexual behavior, reckless driving and gambling. We attempted to answer two questions: Is there indeed such a thing as a generalized risk-taking tendency, as our earlier studies had suggested, and if so, what type of personality traits is associated with this tendency?

Our prediction was that many or all of the kinds of risky activities would be related to impulsive sensation-seeking. But we also looked at the role of neuroticism-anxiety, aggression-hostility, sociability and activity.

We measured these traits using the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ), a five-factor personality test that I developed with my colleagues.

We also assessed smoking, drinking, drug use, sex, driving and gambling on separate risk-taking scales related to each particular kind of risky behavior. The driving-risk scale asked about typical driving speeds, response to traffic signals and following distances at high speeds, among other factors. To assess risky sexual behavior, we asked about the number of sexual partners and whether or not a condom is used, and if so, how consistently.

The first question we sought to answer was whether the six arenas of risk are interrelated, pointing to a concept of generalized risk-taking.

As it turned out, smoking, drinking, sex and drugs work in tandem with each other. Among both males and females, students who did one tended to do the others. (We know from other studies that they also listen to rock and roll.)

Reckless driving, however, was related to only one other arena of risk: drinking. Unfortunately, this connection is often deadly.

Among males, gambling was related to drinking and sex. But among women, it was not related to any other kinds of risk-taking.

With the single exception of gambling among women, we felt justified in computing a generalized risk-taking score based on all six kinds of risk-taking. On the basis of their total risk-taking score, we divided the participants into high, medium and low risk-takers and compared these three groups on the five personality scales in the ZKPQ.

The results were similar for both men and women. The high risk-takers scored high on three of the five personality traits: impulsive sensation-seeking, aggression-hostility and sociability, proving them the most salient predictors of risk-taking personality.

Among the groups representing three levels of risk-taking, there were no significant differences on neuroticism-anxiety or activity, suggesting these traits plays an insignificant role in risk-taking behavior.

There were, however, notable links between other personality traits and specific kinds of risky behavior. Heavy drinking was associated with all three of the personality traits related to general risk-taking tendency: impulsive sensation-seeking, aggression-hostility and sociability.

But smoking and drug use beyond marijuana were related only to impulsive sensation-seeking and aggression. That finding is interesting because in a previous study we found that the same two traits were also higher among prostitutes than among a control group. The combination of impulsive sensation-seeking and aggression was also related to antisocial personality disorder among male prisoners and to level of cocaine abuse.

Previous research has shown that the use of illegal drugs, even of marijuana, relates to a higher degree of sensation-seeking than is found among those who use only alcohol. The step from legal drugs (tobacco and alcohol) to illegal ones is one taken only by the higher sensation-seekers. The illegal drugs provide more novel and intense sensations and experience at the cost of greater legal and social risks.

In our study, as well as in others, men proved higher risk-takers than women. They also scored higher on impulsive sensation-seeking than women. When we analyzed the gender difference in risk-taking we found that it was entirely a function of the difference between men and women on impulsive sensation-seeking. This is only one of several pieces of evidence suggesting that impulsive sensation-seeking is a basic personality dimension.

Humans are a risk-taking species. Our ancestor Homo sapiens originated in East Africa, and within the relatively short span of 100,000 years or less spread over the entire globe. It turns out that explorativeness may be the key to the survival of the species.

The hunting of large and dangerous game by men required a type of thrill- and adventure-seeking that also contributes to the success of the human race. Over the millennia, men also found in combat and war an outlet for their need for adventure.

Mating, too, was a dangerous game that required risk-taking. The innate incest taboo drove men to seek mates outside their small groups, sometimes from unfriendly groups.

The fact that a trait like sensation-seeking characterizes our species does not mean that individuals don't differ in the degree to which they have that trait. Genetic assortment may maintain variation in a trait like sensation-seeking, which is most adaptive when it is in the middle range: Too much risk-taking leads to an early death, too little to stagnation.

Studies of the heritability of sensation-seeking in humans have used classical twin-comparison methods. Comparisons of identical and fraternal twins in which both siblings were raised in the same families show that sensation-seeking is about 60% genetic. That is a high degree of heritability for a personality trait; most range from 30% to 50%.

A study of identical and fraternal twins separated at birth and adopted into different families showed the same heritability. It also indicated that the environmental contribution to sensation-seeking (accounting for 40% of the trait, or less) is due not to the shared family environment but to the environment outside of the home, such as friends and accidental life experiences.

If children resemble parents or siblings in sensation-seeking, it is probably due to shared genes rather than the influence of the family. Friends and others outside of the home may provide behavioral models and reinforce the disposition carried in the genes.

Genes play yet another role in risk-taking: They influence two other personality traits associated with general risk-taking, including the traits of aggression, or its obverse, agreeableness, and for sociability, the main component of extroversion.

Molecular genetics has made it possible to identify major genes influencing personality and forms of psychopathology. A group of scientists in Israel were the first to find an association between novelty-seeking (a trait very highly correlated with impulsive sensation-seeking) and a gene that codes for a class of dopamine receptor, the dopamine receptor-4 (DRD4) gene.

Dopamine is an important brain neurotransmitter, active in pathways related to the brain's intrinsic reward and pleasure centers. It responds to stress, and enables people not only to see rewards but to take action to move toward them.

Two major forms of the dopamine receptor-4 gene exist, a long and a short version of the same base DNA sequences. The long form is found in a preponderance of those individuals who are high in novelty-(sensation-) seeking. The same form of the gene is found in a high proportion of opiate drug abusers, a high sensation-seeking group.

The particular gene accounts for only about 10% of the genetic variance. But now that the human genome has been defined, many of the other genes contributing to this and other personality traits may soon be discovered.

Genes, however, do not directly make traits. They make proteins that shape our nervous systems. Between a gene and a behavior stand, among other things, the structure and function of the brain and the biochemistry of neurotransmitter systems.

The greatest risk-takers are young males in their adolescent years—a fact reflected in their high rates of auto accidents, binge drinking, drug use and pathological gambling. The military has always preferred younger men for soldiers, not only because of their physical strength but for their willingness to risk their lives in combat.

Young men of this age are also at their peak on sensation-seeking. And, not surprisingly, they are at their peak in levels of the sex hormone testosterone. Testosterone correlates particularly with the disinhibitory types of sensation-seeking—those associated with drinking, drugs, sex and antisocial

behavior. It is also associated with normal traits like dominance, sociability and activity. As testosterone levels drop, men's aggressive, antisocial tendencies begin to mellow. Sensation-seeking scores of men aged 50 to 59 are half those of males aged 16 to 19.

Women also have testosterone, but less of it. Still, the hormone is linked to behaviors in women similar to those in men, such as assertiveness, aggression and sexual arousal.

Another biological correlate of sensation-seeking is the enzyme monoamine oxidase (MAO), active in the brain. Monoamine oxidase functions as a regulator, keeping neurotransmitters in balance. It could also contribute to the gender and age differences in sensation-seeking and risk-taking.

A form of monoamine oxidase called type B is particularly related to sensation-seeking—and to regulation of dopamine. The link between MAO and dopamine is notable in light of the fact that the dopamine-4 receptor gene has been connected to sensation-seeking, and another dopamine receptor, D2, has been connected with substance abuse, a particular form of risk-taking behavior.

The enzyme monoamine oxidase is low in high-sensation-seekers, implying a lack of regulation. What is more, levels of MAO are known to be higher in women than in men, and MAO levels in brain and in the blood rise with age. Further evidence that MAO is involved in sensation-seeking is that low MAO levels are also found in forms of psychopathology characterized by impulsive tendencies to seek immediate rewards without regard for consequences.

Sensation-seekers who are drug users have found a direct pathway to activate the brain's pleasure centers. Others seek the same arousal through exciting stimuli and experiences. Risk is not a necessary requirement for sensation-seeking, although it does intensify the thrill for a high sensation-seeker.

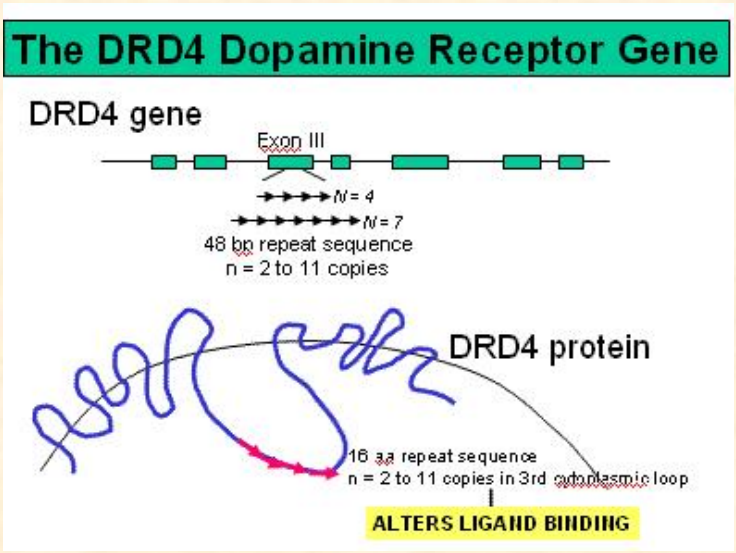
Although risk-taking has negative aspects and can even prove fatal, it is a positive force as well. Without risky experiences, humanity would stagnate; there would be little impetus for discovery. Risk-taking was obviously adaptive in earlier hominids. The trait persists—but there is little left to explore. What is more, work is anything but exciting for many people.

Modern life, with its protected cultures and curtailment of war, has not wiped out the need for excitement. Some people find it through other people, in relationships and sex. Others need more of a thrill, and go hang-gliding or bungee-jumping, although the most common everyday outlet for sensation-seeking is reckless driving. My work has shown that people have basic need for excitement—and one way or another, they will fulfill it.

Gene tied to excitable personality

Source: http://www.thefreelibrary.com/Gene+tied+to+excitable+personality.-a017811939

Evidence gleaned from twin and adoption studies over the past 20 years has led scientists to theorize that inheritance shapes various broad aspects of individual personality. Now, researchers assert that they have cornered for the first time a gene that participates in shaping a specific personality trait. One version of the so-called D4 dopamine receptor gene, or D4DR, appears frequently in people who report high levels of "novelty seeking," according to two independent studies reported in the January Nature Genetics.



Some investigators conceive of novelty seeking as a discrete personality trait. People scoring high on this characteristic enjoy exploring new environments, are excitable and quick-tempered, and seek out thrilling sensations. Those scoring low are reflective,

deliberate, and orderly.

"This work provides the first replicated association between a specific genetic locus involved in neurotransmission and a normal personality trait," contend Richard P. Ebstein of Sarah Herzog Memorial Hospital in Jerusalem and his colleagues. Ebstein's group performed one of the newly reported studies.

Both investigations took inspiration from a theory advanced by C. Robert Cloninger of Washington University School of Medicine in St. Louis. Cloninger argues for the existence of four independent temperamental traits-novelty seeking, harm avoidance, reward dependence, and persistence (SN: 3/5/94, p. 152).

Based on animal and earlier clinical studies, Cloninger proposed that the way brain cells handle the chemical messenger dopamine shapes an individual's propensity for novelty seeking.

Ebstein's group administered Cloninger's personality questionnaire to 124 unrelated Israeli adults, most of them Ashkenazi or Sephardic Jews. Each volunteer also donated a blood sample for genetic analysis.

Volunteers scoring high in novelty seeking were much more likely to bear a slightly longer form of the D4DR gene than low novelty seekers, the scientists maintain. The D4DR gene helps to regulate the formation of one class of receptors, or molecular gateways, for dopamine transmission in the brain. The longer gene may endow a person with receptors that respond to dopamine by promoting novelty-seeking behavior, Ebstein and his colleagues theorize.

In the other study, Jonathan Benjamin of the National Institute of Mental Health in Bethesda, Md., and his coworkers recruited 315 people in the United States, most of them pairs of male siblings. Volunteers completed a questionnaire that yielded scores on five personality traits-extroversion, openness to experience, neuroticism (being prone to distress and impulsiveness), agreeableness, and conscientiousness. Many psychologists currently favor this classification.

No single trait of the five showed an association with any D4DR variation. However, the long version of the D4DR gene corresponded to a substantially elevated frequency of answers to individual questions that signify novelty-seeking behavior, Benjamin's group asserts.

In a commentary accompanying the new results, Cloninger argues that they support the further use of his personality model for studying the genetics and neurobiology of personality.

Genetics alone does not determine personality, however. An individual's mix of temperamental traits affects responses to the environment and underscores character development throughout adulthood, Cloninger theorizes. In his model, character consists of commitments to goals, cooperativeness, and spiritual beliefs that transcend the self.

The identification of genes contributing to temperament may help to unravel the roots of some psychiatric disorders, Cloninger adds. For instance, a predisposition to novelty seeking may play a role in some cases of schizophrenia, he suggests. One antipsychotic drug, clozapine, specifically targets D4 dopamine receptors, which schizophrenic patients often possess in unusually high numbers. However, prior studies have found that the same patients do not exhibit a preponderance of any particular form of the D4DR gene.

It may be useful to reexamine D4DR in groups of schizophrenics to find how often the longer variety occurs together with novelty seeking, Cloninger contends.

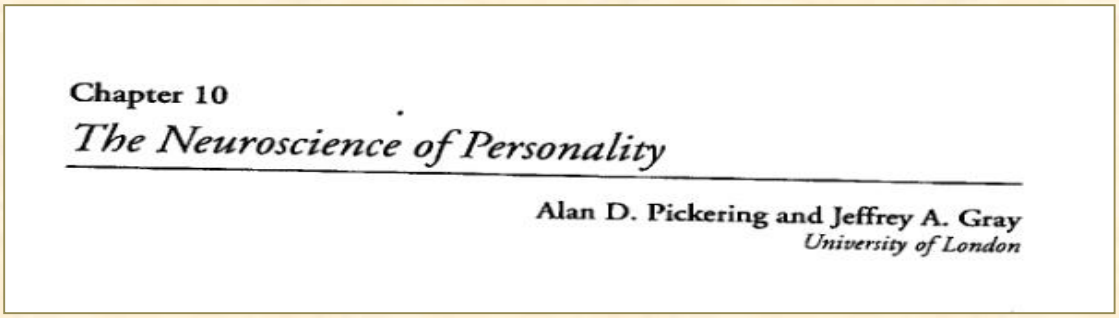
Fewer Dopamine Receptors Means More Novelty Seeking

Source: http://www.futurepundit.com/archives/005838.html

For risk-takers and impulsive people, New Year's resolutions often include being more careful, spending more frugally and cutting back on dangerous behavior, such as drug use. But new research from Vanderbilt finds that these individuals--labeled as novelty seekers by psychologists--face an uphill battle in keeping their New Year's resolutions due to the way their brains process dopamine. The research reveals that novelty seekers have less of a particular type of dopamine receptor, which may lead them to seek out novel and exciting experiences--such as spending lavishly, taking risks and partying like there's no tomorrow.

The research was published Dec. 31, 2008, in the *Journal of Neuroscience*.

The neurotransmitter dopamine is produced by a select group of cells in the brain. These dopamine-producing cells have receptors called autoreceptors that help limit dopamine release when these cells are stimulated.
"We've found that the density of these dopamine autoreceptors is inversely related to an individual's interest in and desire for novel experiences," David Zald, associate professor of psychology and lead author of the study, said. "The fewer available dopamine autoreceptors an individual has, the less they are able to regulate how much dopamine is released when these cells are engaged. Because of this, novelty and other potentially rewarding experiences that normally induce dopamine release will produce greater dopamine release in these individuals."
The researchers used positron emission topography (PET) brain scans to help them reach this conclusion.
The researchers used positron emission topography to view the levels of dopamine receptors in 34 healthy humans who had taken a questionnaire that measured the novelty-seeking personality trait. The questionnaire measured things such as an individual's preference for and response to novelty, decision-making speed, a person's readiness to freely spend money, and the extent to which a person is spontaneous and unconstrained by rules and regulations. The higher the score, the more likely the person was to be a novelty seeker.
The researchers found that those that scored higher on the novelty-seeking scale had decreased dopamine autoreceptor availability compared to the subjects that scored lower.
If it becomes possible to use a drug to increase the number of dopamine autoreceptors will some thrill-seekers or perhaps some drug abusers opt to change their brain in such a fundamental way in order to gain greater ability to control and restrict their own actions? I can imagine compulsive spenders opting for such a treatment. But skiers, skydivers, and other thrill seekers might decide they'd rather continue to pursue extreme sports.



Chapter 10

The Neuroscience of Personality

Alan D. Pickering and Jeffrey A. Gray
University of London

► **Source**:http://www.rc.usf.edu/~jdorio/Personality/NEUROSCIENCE%20OF%20PERSONALITY.pdf

Risk takers, drug abusers driven by decreased ability to process dopamine

Source: http://www.eurekalert.org/pub_releases/2008-12/vu-rtd122208.php

For risk-takers and impulsive people, New Year's resolutions often include being more careful, spending more frugally and cutting back on dangerous behavior, such as drug use. But new research from Vanderbilt finds that these individuals--labeled as novelty seekers by psychologists--face an uphill battle in keeping their New Year's resolutions due to the way their brains process dopamine. The research reveals that novelty seekers have less of a particular type of dopamine receptor, which may lead them to seek out novel and exciting experiences--such as spending lavishly, taking risks and partying like there's no tomorrow.
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Dopamine has long been known to play an important role in how we experience rewards from a variety of natural sources, including food and sex, as well as from drugs such as cocaine and amphetamine. Previous research has shown that individuals differ in both their number of dopamine receptors and the amount of dopamine they produce, and that these differences may play a critical role in addiction. Zald and his colleagues set out to explore the connection between dopamine receptors and the novelty-seeking personality trait.

"Novelty-seeking personality traits are a major risk factor for the development of drug abuse and other unsafe behaviors," Zald and his colleagues wrote.

"Our research suggests that in high novelty-seeking individuals, the brain is less able to regulate dopamine, and this may lead these individuals to be particularly responsive to novel and rewarding situations that normally induce dopamine release," Zald said.

Previous research in rodents showed that some respond differently to novel environments. Those who explore novel environments more are also more likely to self-administer cocaine when given the chance. Dopamine neurons fire at a higher rate in these novelty-responsive rodents, and the animals also have weak autoreceptor control of their dopamine neurons. Zald and colleagues speculated that the same relationships would be seen in humans.

The researchers used positron emission topography to view the levels of dopamine receptors in 34 healthy humans who had taken a questionnaire that measured the novelty-seeking personality trait. The questionnaire measured things such as an individual's preference for and response to novelty, decision-making speed, a person's readiness to freely spend money, and the extent to which a person is spontaneous and unconstrained by rules and regulations. The higher the score, the more likely the person was to be a novelty seeker.

The researchers found that those that scored higher on the novelty-seeking scale had decreased dopamine autoreceptor availability compared to the subjects that scored lower.

Dopamine Madness Approaches Critical Mass: The Addiction Myth May Crumble!

Source: http://www.thecleanslate.org/dopamine-madness-approaches-critical-mass-the-addiction-myth-may-crumble/

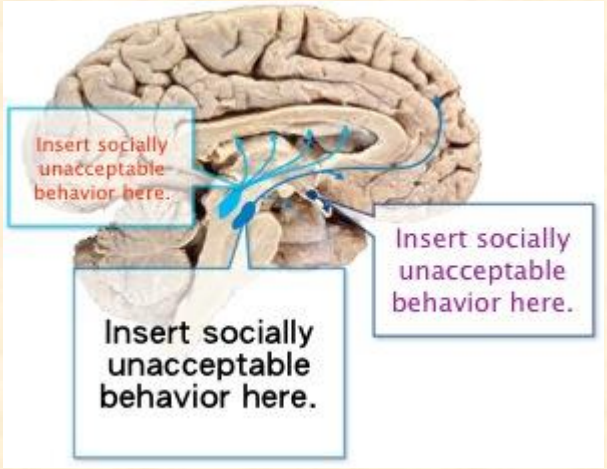
There is a point we will hit where by following the logic of the brain disease model of addiction, it will begin to appear that literally everything we do is a brain disease – and thus it will become painfully obvious to most people that none of it should be considered a disease. The reason for this is that it will be seen that both "brain changes" are an everyday part of human life, and dopamine is involved in so many things, that to point at either one of them and say "see, addiction is a disease because the brain changes", or "addiction is a disease because it involves the neurotransmitter dopamine", will instantly register as irrelevant. I've stumbled across some info recently that makes me think we're getting close to that point where we can stop being swept away by the normal processes of the brain, and get back to being focused on real world solutions to "addiction." But before we get into that, let's just lay the groundwork about dopamine and addiction.

In a piece called *The Addicted Brain: Beyond Willpower*, Nora Volkow of the NIDA writes (1):

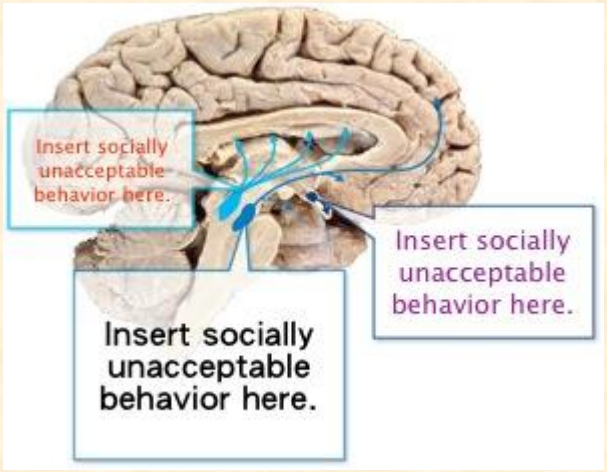
Often, a drug is taken the first time by choice – to feel pleasure or to relieve depression or stress. But this notion of choice is short-lived. Why? Because repeated drug use disrupts well balanced systems in the brain in ways that persist, eventually replacing a person's normal needs and desires with a one-track mission to seek and use drugs. At this point, normal desires and motives will have a hard time competing with the desire for the drug.

She goes on to answer the question "How does the brain become addicted?" (which is a philosophically asinine question to begin with) by stating:

The drug causes a surge in levels of a brain chemical called dopamine, which results in feelings of pleasure. The brain remembers this pleasure, and wants it repeated.
Drugs of abuse produce very large and rapid dopamine surges and the brain responds by reducing normal dopamine activity.
So that's it – dopamine is the key, right? Except for the fact that it's involved in so many things. Food, sex, gambling, and as a reader recently pointed out to me – hugs – all trigger the release of dopamine. It is claimed that the chemical properties of drugs are what makes them so powerful, yet even those activities (listed above) that don't introduce any chemicals into your body are considered to be equally addictive (except hugs!). That is, people get just as carried away with pursuing sex or gambling as they do with drugs and alcohol. So really, there's nothing too special about drugs, or their activity on the brain.



Plenty of other things are apparently capable of producing the same releases of dopamine as drugs – and do I mean plenty! Here's where things get loony, and I think we start approaching the point where this dopamine talk becomes transparent. A website called "The Dopamine Project" is full of articles pushing the idea of a general "dopamine addiction" that affects 99% of the world! I have to say, I almost can't argue with their logic. Take a look at some excerpts from their primer on dopamine:
Want to know what a dopamine rush feels like? Close your eyes, take a few deep breaths, relax. Now think about someone you love, a tasty food, your celebrity crush, the day you won that prize, or anything else that leaves you feeling warm and fuzzy. Get lost in the details. If you started smiling, it's because your recollection triggered a dopamine rush in your brain!
…
Dopamine gives us a feeling of euphoria, like a high, when released.
….
We want fresh breath, sexier underwear, wrinkle-free pants, and so on because those things make us feel better. We feel better because dopamine is released in our brains when we think about how these things will boost our self-image, attract a playmate, etc. In fact, when we say that we like a certain food, song, book, idea, fantasy, video game, movie, hobby, or person, what we really like are the dopamine hits they provide.
On their page explicitly outlining dopamine addiction, the authors state that:



Street drugs are physical dopamine triggers that are hard to deny because they require the ingesting, inhaling, or injecting of addictive substances. Physical dopamine addictions destroy lives and wreak societal damage, but the most dangerous dopamine triggers include a short list of easy to deny psychological addictions.
Psychological dopamine addictions are more insidious because the dopamine is triggered by addictive emotions, memories, thoughts, fantasies, ideologies, rhetoric, and deceptions. Researchers have recently added video games and texting to the list while continuing to ignore the most dangerous triggers that have come to be considered "normal" behaviors.
…

To keep the dopamine flowing, heroin addicts use needles, safety addicts swallow lies, peer-approval addicts join groups, and esteem addicts chase status. One important distinction between addictions is that heroin addicts have to hide their needles whereas safety addicts get to wear their weapons, peer-approval addicts are free to flock to groups, and esteem addicts get away with flaunting their status symbols every chance they get.

Yes, you read correctly – esteem, peer approval, safety, memories, rhetoric, movies, hobbies, etc, are all potential providers of dopamine rushes and thus "addictive". Although I have a hard time figuring out whether the main author of that site is serious or not (the idea is just too absurd), I'm sure he'll be proven correct (in a sense). I see the news about different behaviors being linked to dopamine all the time – for example, a study out of Vanderbilt University says aggression involves dopamine, and then manages to conclude that our love of violent sports must be driven by dopamine releases as well. I have a hard time arguing with the claims of The Dopamine Project, except for the fact that it ultimately means EVERYTHING IS ADDICTIVE – and thus, nothing really is addictive – it's just a normal part of life, we choose what to pursue, and when we get it, we get pleasure which is facilitated by the release of dopamine. It may be seen that whatever we attach meaning to will become pleasurable and thus a provider of dopamine. For example, I don't care about comic books. I won't feel any surge of pleasure when in the presence of a mint condition Batman #1 – but the guy who's attached meaning and value to it will get drunk off that comic book!

More and more, dopamine will be discovered to be involved in every activity, and we will be forced to wonder whether it has the significance it once did. To mention that an activity involves dopamine, becomes a meaningless statement and gives us no insight into any changes we'd like to make. In a sense, studying a human behavior by focusing on the mechanics of the brain is like trying to learn the proper use of a word by studying each letter used to spell it. It completely misses the point!

People are starting to catch on to the fact that reciting the neural correlates of a behavior or psychological phenomenon isn't really much of a helpful or meaningful explanation at all. This recent article by Steven Poole in New Statesman, Your Brain on Pseudoscience, is a good example:

The idea that a neurological explanation could exhaust the meaning of experience was already being mocked as "medical materialism" by the psychologist William James a century ago. And today's ubiquitous rhetorical confidence about how the brain works papers over a still-enormous scientific uncertainty. Paul Fletcher, professor of health neuroscience at the University of Cambridge, says that he gets "exasperated" by much popular coverage of neuroimaging research, which assumes that "activity in a brain region is the answer to some profound question about psychological processes. This is very hard to justify given how little we currently know about what different regions of the brain actually do."

…

The human brain, it is said, is the most complex object in the known universe. That a part of it "lights up" on an fMRI scan does not mean the rest is inactive; nor is it obvious what any such lighting-up indicates; nor is it straightforward to infer general lessons about life from experiments conducted under highly artificial conditions.

Poole then gives a scathing breakdown of the formulaic approach of pop psychology authors, and specifically refers to dopamine as an example of the madness:

But these writers tend to reach for just one functional story about a brain subsystem – the story that fits with their Big Idea – while ignoring other roles the same system might play. This can lead to a comical inconsistency across different books, and even within the oeuvre of a single author.

Is dopamine "the molecule of intuition", as Jonah Lehrer risibly suggested in *The Decisive Moment* (2009), or is it the basis of "the neural highway that's responsible for generating the pleasurable emotions", as he wrote in *Imagine*? (Meanwhile, Susan Cain's *Quiet: the Power of Introverts in a World That Can't Stop Talking* calls dopamine the "reward chemical" and postulates that extroverts are more responsive to it.)

…

Distortion of what and how much we know is bound to occur, Paul Fletcher points out, if the literature is cherry-picked.

"Having outlined your theory," he says, "you can then cite a finding from a neuroimaging study identifying, for example, activity in a brain region such as the insula . . . You then select from among the many theories of insula function, choosing the one that best fits with your overall hypothesis, but

neglecting to mention that nobody really knows what the insula does or that there are many ideas about its possible function."
I think we're almost at the point where people will see through all of this nonsense, and the harmful self-limiting idea of a brain "highjacked" by addiction will finally crumble.

(1) Hoffman, John, and Susan Froemke, eds. *Addiction: Why Can't They Just Stop?* 1st ed. Rodale Books, 2007.

Extreme risk taker who wants to continue taking part in high risk sports after serious injury

Br J Sports Med 2004;38:337-339
Source: http://bjsm.bmj.com/content/38/3/337.full

Abstract
The case is reported of a 40 year old male high risk sport athlete who had seriously injured himself several times and as a result was partially physically disabled and had trouble with mental tasks requiring concentration such as spelling, reading numbers, and writing. The athlete was referred to a sports psychologist. In consultations, it became clear that he was having difficulty reconciling the difference between his life as it used to be and as it would be in the future. Part of his difficulty was dealing with the frustration and anger "outbursts" which resulted from not being able to perform straightforward everyday motor skills. In spite of his injuries and disability, the patient badly wanted to continue participating in extreme sports. Reversal theory is used in the discussion to provide theoretical explanations of the motivation for his extreme risk taking behaviour.
Arousal or sensation seeking behaviour, through participation in sports with a high risk of injury or even death, has been recognised in psychology for some time. The case reported here concerns an extreme risk taker who in spite of severe injuries and partial disability was strongly motivated to continue participating in these types of sport. His consultations with a sport psychologist are described, and theoretical explanations are provided from reversal theory for his extreme arousal seeking behaviour.[1]

CASE REPORT
A 40 year old man presented for two consultations with a sport psychologist. The athlete had been referred by his psychologist in the Acquired Brain Injury Unit at the local hospital. The client had a long history of participation in dangerous or high risk sports, such as sky diving, rock climbing, jet skiing, and driving fast cars. He had skied since he was a young child and stated that he had been part of a group of skiers involved with the national Olympic ski team. Two years previously he had incurred a compound fracture of his left tibia and fibula while sky diving. Before the accident, he had completed 708 sky dives. After medical treatment, he was warned by his doctor that if he broke the titanium plate screwed into his lower leg, it would have to be amputated. In addition, the athlete had recently suffered severe and life threatening injuries during a go-karting accident. He had decided to take up go-karting, reasoning that

his leg would be protected by the kart's bodywork. The accident occurred in his third ever race. He avoided a collision, but in doing so, the kart somersaulted vertically (end to end) twice, and finished up resting on its right side. The client broke his back, broke and dislocated his right shoulder, broke four ribs which punctured both lungs, and incurred serious brain damage. He was taken to hospital, where

he spent two months in intensive care and high dependency units. He spent five weeks in a coma, with brain damage and no movement in his right leg or arm. After intensive rehabilitation, he managed to walk again and gained some strength in his right arm, although it had lost a degree of muscular function, as had his right leg to a lesser extent. The latter caused a limp when walking. His speech appeared to be normal, but he had difficulty spelling, reading numbers, and writing (he is right handed). The client could only work part-time in the family business because of headaches and tiredness and an inability to concentrate for long periods of time. He admitted that this would probably prevent him from working full time again. Even a small amount of reading still produces severe headaches. In the sport psychologist's opinion, these difficulties also precluded asking him to complete any psychological questionnaires and these were administered verbally.

His parents and brother also participate in high risk sports. They have also supported him financially and emotionally in the period since his hospital stay, and his medical expenses, for example, were paid by his father as he could not obtain insurance. From discussions during consultancy, it transpired that he continues to experience frustration, and that he sometimes "lashes out" verbally at his (non-custodial) son, whom he loves very much but does not know very well, as well as his family. Although, not diagnosed as clinically depressed, he said that this accident "destroyed everything". He appeared to understand that, although he had made an almost miraculous recovery, he was at the end point of his medical journey and that there may be little improvement from this point on. He wanted to know how to reconcile his life as it used to be and what it would be in the future. He imagined himself achieving sporting greatness, but now wondered what he could achieve. He still enjoyed life and liked to push himself, but day to day living in his "new body" is proving hard to deal with.

At the second consultation, designed to follow up on the behavioural strategies suggested in the first session, the client turned up on crutches after a jet ski accident in which he had bruised his heel badly and broken a rib. The jet ski accident came about after he saw another person getting "three metres of air" riding the waves on his jet ski by leaning back, which he tried to emulate. Leaning and moving his feet position farther and farther back to get even higher resulted in the accident. In spite of the accident, the client was in good spirits, and during discussion about his risk sports reiterated that he would never want to give these up, adding that he thought he took "controlled risks".

ATTEMPTS AT INTERVENTION

Considering the client's medical history and current disabilities, the sport psychologist explored the possibility of his retirement from participation in elite level high risk sports and the issues arising from this. On the basis of work with athletes who previously have successfully made the transition from an elite athlete to a non-elite athlete, sport psychologists often recommend setting new short term goals and detailed planning in moving from one stage to the next.[2] The idea is that by setting and achieving some short term goals, the client can focus on the present, make small progressive steps, and recognise new achievements, instead of ruminating on past performance level. However, this strategy was not successful with this client, whose preference, even before his accidents, was to do very little planning in his life, tending not to think more than a month (at the most) ahead. Those few plans that he had made were concerned with high risk sports: to go rock climbing soon and travel with his brother to the United States for a ski trip.

The client had not thought of retiring because he was concentrating on getting fit and well in order to return to high risk sports again. This was confirmed by the fact that he had recently taken up sky diving again (the leg had healed and the titanium plates removed so there was no longer the threat of amputation). He said that he still gets a buzz from sky diving, but now avoids going in big competitions, preferring to jump "for the fun of it". From the way that he described his accident and his subsequent rehabilitation, it became clear that he was well on the way to accepting his transition from elite sport to his new limited physical state, albeit with lapses during which he experienced strong feelings of frustration. It also became apparent to the sport psychologist that it was vitally important for the client to be able to continue pursuing his risk sport activities (albeit at a lower level), even though he ran the risk of further injuries. Between the first and second consultations, a check with a colleague identified that a group of injured former elite athletes were using modified sporting equipment to allow themselves to continue their participation. The sport psychologist was confident that he would benefit a great deal from making contact with them, especially in coming to some acceptance of his injuries and his future limitations and expectations, and passed on contact details. He stated that he was not averse to

socialising with "like minded" (and "like bodied") people in the disabled former elite athletes group. Discussion at this consultation also centred on developing psychological strategies for dealing with anger outbursts resulting from not being able to, for example, open a particular door in his girlfriend's house with his right hand, reverse his car, or cope with computer glitches at work. On a practical level, simple strategies, such as changing the door handles, were recommended to reduce the likelihood of frustration occurring, as well as making the client more aware of the warning signals that indicate when frustration levels are building up, thus allowing steps to be taken to reduce frustration and avoid angry outbursts. The recommended psychological strategies for dealing with this type of anger included taking a time out and learning to relax using breathing techniques.[3] In summary, although the goal setting strategy was not successful, the client did manage to make considerable progress in reconciling his past and future lifestyles. This was largely due to the success of the anger management strategies, which made his anger outbursts less frequent and intense. It later transpired that the client did not make contact with the injured former elite athletes group.

DISCUSSION

Clearly this client had an extreme liking for high risk sports. In spite of injuring himself severely and incurring disability, he was determined to continue his participation in these activities. Such paradoxical behaviour, in which people engage in activities that are potentially harmful to their health and wellbeing, are well recognised in reversal theory literature as being associated with the paratelic motivational concept.[1,4,5,6] There are three aspects to the paratelic motivation behind the client's extreme arousal seeking, risk taking behaviour that help to explain why he continues to want to participate in high risk sports. It is important to note that the focus in this case report concentrates on the paratelic concept. There are other metamotivational states and dominances in reversal theory that may also be important in athletes' motivation for participation in high risk sports, but in this case the paratelic state and paratelic dominance plays the predominant role. (Metamotivational states are frames of mind to do with the way a person interprets his or her motives at a given time.)

Firstly, reversal theory recognises that some people with particular personality characteristics deliberately seek out situations where they can experience high arousal in the form of pleasant feelings of excitement. Paratelic dominant athletes spend most of their time in the paratelic mental or motivational state, and telic dominant athletes spend most of the time in the telic state. Paratelic dominant athletes are arousal seekers, and previous research has shown that they enjoy participating in high risk sports.[7,8] By way of contrast, previous research has also shown that athletes who perform relatively safe sports, such as long distance running, cycling, or badminton have personalities of the "telic dominant" personality type.[8,9] Telic dominant athletes tend to be arousal avoiders, they plan well and set themselves goals, and prefer low intensity experiences.

Secondly, reversal theory claims that athletes can only enjoy dangerous or high risk sports, where high arousal is experienced as pleasant, through the development of a psychological or phenomenological "frame" known in reversal theory as a "paratelic protective frame". A paratelic protective frame gives the person a feeling of safety, even when the dangers and threats are part of his or her phenomenological field, and that this produces the paradox of danger that is not danger. The example of skating on a frozen river has been used to illustrate the protective frame concept.[4] Different skaters will have different perceptions of the dangers involved, and this will influence how far away from the bank of the river they will skate over the ice. Some individuals, with the most robust protective frames, may venture out to the middle of the river where the ice is thinnest. The protective frames of others may only allow them to venture out so far, or perhaps stay close to the bank. For some the development of a protective frame does not take place at all, because the activity of skating on a frozen river is perceived as too dangerous. They remain firmly on the bank.

Thirdly, it is likely that the client has become seriously dependent on high arousal experiences, hence his strong motivation to continue participating in high risk sports in spite of further danger to his health and wellbeing.

In addition to his extreme risk taking, the client's liking for intense experience and spontaneous action, lack of planning and absence of goal setting in daily life, his participation in several types of high risk sports, and his reluctance to give them up all point to the client being an extreme "paratelic dominant" personality type. This was confirmed by his score of 7.5 out of a maximum score of 42 on the telic dominance scale (low scores indicate paratelic dominance).[5,6] Also, the fact that he comes from a family

of high risk sport participants is important, because researchers have now isolated a risk taking gene, which suggests that some people are biologically preprogrammed to be risk takers.[10]
From the point of view of reversal theory, it can also be concluded that the client has a very robust protective frame, which is still in place despite all his injuries and disability. Furthermore his current feelings of frustration are probably due to being unable to perform certain motor tasks, but may also have been caused by withdrawal symptoms brought about by restrictions on his thrill seeking by his increasingly injured body. In this case, the client's frequent need for experiencing high levels of arousal through high risk sports is necessary to maintain his personal emotional equilibrium. For the sport psychologist, the question to decide is, does his dependency need to be treated in the same way as, say, alcohol or gambling dependency ? Some dependencies can be seen as "positive" so long as the behaviour does not become too extreme. In this case the client has injured himself so badly so often that his dependency is a threat to his life. Even so, the athlete showed no signs of wanting to retire from his sky diving, rock climbing, jet and snow skiing activities.

Take home message

- Some people have personalities that predispose them to taking physical risks through activities such as dangerous or extreme sports.
- Continued participation may lead to dependence on the high levels of arousal associated with such activities.
- This case study shows the utility of reversal theory as a framework for sport psychology consultancy.
- Psychologists and other medical practitioners have to accept that some clients may ignore medical advice and continue to engage in potentially destructive behaviour.

Finally, how did reversal theory inform the interventions attempted by the sport psychologist with this client? As indicated above, the athlete's metamotivational state balance was extremely biased towards experience in the paratelic state. His infrequent reversals to the telic state were often sudden and accompanied by high levels of arousal, which resulted in outbursts of anger. The suggestion of the goal setting technique therefore had a dual purpose. Not only would it have allowed the client to have a better understanding of his progress in rehabilitation, but because goal setting is essentially a telic oriented activity, it would have required him to spend more time in the telic state. Had it been successful, this strategy may have contributed to a more healthy balance, in terms of emotional health, between telic and paratelic states. The anger management strategies proposed by the sport psychologist were concerned with trying to ensure that, when the athlete suddenly reversed to the telic state, there was no accompanying high arousal. This intervention involved finding ways to reduce levels of frustration that may induce a reversal and the use of calming and relaxing techniques to reduce arousal levels. Generally, as an intervention strategy, reversals to the telic state were to be encouraged, but in the absence of high arousal. This case has illustrated how the systematic structure of reversal theory, on which counselling interventions can be based, works rather like a computer operating system on which many software programs can be managed.[11] In this sense, reversal theory's approach to athlete counselling is a truly eclectic one.

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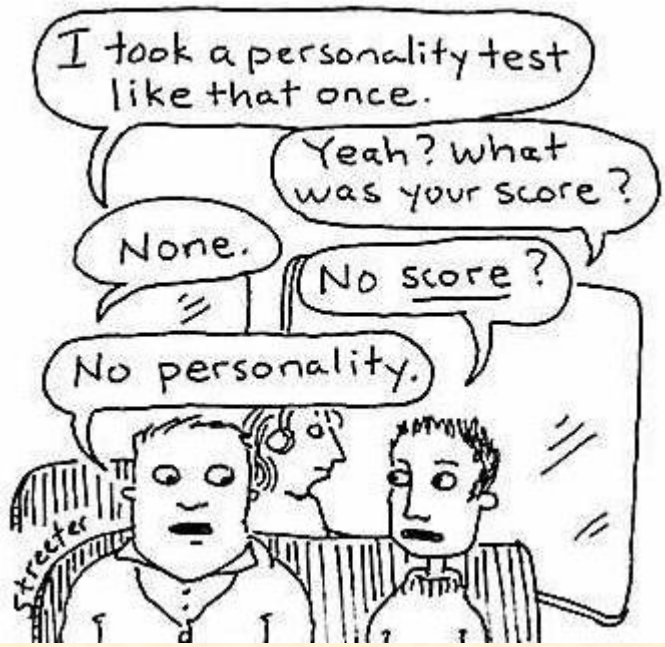
Why personality tests don't work

Dec 9, 2013

Source: http://www.newstatesman.com/martha-gill/2013/12/why-personality-tests-dont-work

There are 63 types of people in the world. Those who like the the Bee Gees but dislike mayonnaise, that's one type. Those who make little colour-coded charts detailing whose turn it is to wash up, that's another. And then there are those who believe in personality tests. That's a third. I'm not going to list the rest here because of space issues. Plus the one I just listed was supposed to be the punchline. Point is, let's not make this too laboured.

Right now the personality testing industry is big business: worth $500m and growing at ten per cent every year. IBM and Oracle have just bought firms with a personality testing arm, and Deloitte is rumoured to be planning a similar move. These tests are popular with recruitment because they're



cheap (at about $30 a candidate) – and a quick way of of procuring a shortlist from a pile of job applications.

You sit down and answer questions and after about half an hour are presented with your "personality" – usually summarised in four or five traits, like "extrovert" or "intuitive". The company can then decide if you'd be a good cultural fit.

That's how it's supposed to go. But the process is a little murkier. First of all, the "right" answers are usually obvious. John Rust, director of Cambridge University's Psychometrics centre, recently told the *Economist* that firms usually just end up "selecting the people who know what the right answers are". Those who know the answers – and those who are willing to bend the truth to give them to you. Perhaps valuable, but not a proper measure of personality.

Get down to the science of personality and it's likewise murky. A large portion of funding is funneled into defining and researching what makes people the way they are, but results are often vague or conflicting. One recent paper on the genetics underlying human personality simply came up empty. A large scale search, in over 5,000 Australian adults for genes associated with persistence, reward dependence and so on, and ... nothing. No associations at all.

There is at least one person this should please – the psychologist Walter Mischel. He spent much of his life persuading other scientists that personality is not a fixed thing – it changes with circumstance. You might be lazy one minute (e.g. when there is work to be done) and full of energy and purpose the next (e.g. when the pizza arrives).

He first came to this conclusion when employed by the Peace Corps as a personality consultant. They were fed up of complaints from people who, enthusiastic do-gooders safe at home, turned out to be impossibly squeamish out in the field. He conducted test after test but found little correlation between behaviour at home and abroad.

He embarked on a large research programme to see if he could find any stable traits at all. One of his studies was on aggression in children. He found that some could take criticism from adults, but not from

other kids. Others lashed out at authority, but got on well with their peers. Eventually he had his answer: personality doesn't really exist. It's entirely dependent on context. And we are not the same person in every situation.

A fixed personality would certainly make life easier – you could find it out early, match yourself to the right job and the right people, and then relax, safe in the knowledge you'll never change. It's a shame it's not that simple.

What makes first responders run toward danger?

Source: http://www.cbc.ca/news/world/what-makes-first-responders-run-toward-danger-1.1324458

When volunteer firefighters were rushing to a blaze at a fertilizer plant in the town of West, Texas, earlier this week, they no doubt knew the dangers they would be facing but carried out their duties anyway, relying heavily on the training they'd received to deal with such situations.

The burning building contained huge quantities of explosive ammonium nitrate, an ingredient in the production of fertilizer.

Within two hours, a blast demolished the factory, levelled nearby buildings, killed at least 14 people and injured many more. According to The Associated Press, West Mayor Tommy Muska said 10 of the dead were first-responders, including five from the West Volunteer Fire Department and four emergency medics.

Robert Ursano, director of the Centre for the Study of Traumatic Stress in Bethesda, Md., said a combination of personal characteristics and preparation would have propelled them into harm's way.

While there's "a high degree of self-sacrifice involved in those kind of jobs," he said by phone Wednesday, emergency workers must undergo rigorous training that can "change our natural response" when a disaster strikes.

Self-sacrifice is a quality often celebrated in the aftermath of disasters. As rescue crews sifted through the rubble of the exploded factory in Texas on Wednesday, U.S. President Barack Obama paid tribute to a different group of emergency workers 3,000 kilometres away, who had helped save lives in the aftermath of the Boston Marathon bombing.

"You displayed grit. You displayed compassion. You displayed civic duty. You displayed courage," Obama said during a memorial service at Cathedral of the Holy Cross in Boston. "And when we see that kind of spirit, there's something about that that's infectious."

"Our thoughts, our prayers are with the people of West, Texas, where so many good people lost their lives, some lost their homes, many were injured, many are still missing," Obama said during a news conference Friday, after he issued an emergency declaration and pledged federal disaster relief aid to help West recover.

Bruce Ramsay, a retired firefighter from North Vancouver and a traumatologist with the Justice Institute of British Columbia, said first responders are often very dedicated people who have "high control needs," meaning they value being in command of a situation.

Through training, emergency workers learn how to better suppress their emotions while at the scene of an emergency, he said, allowing them to operate in face of danger.

Through repetition police, firefighters, soldiers and EMS workers have their training "drilled in" to them "so that it becomes almost automatic," Ramsay says.

So in a moment of crisis, when instinct takes over, they're more likely to react professionally.

Response caught on film

A great example of this was captured in an iconic image taken in the moments after the Boston Marathon attack, Ursano said. It shows an elderly runner on the ground, with three police officers standing above him, a cloud of smoke at their backs.

In such an event, police "want to look to the outside, look to see where the threat is. If you just focus on the event, then you're going to miss what's happening behind and around you," he said.

Police officers react to an explosion at the finish line of the Boston Marathon in Boston on Monday. (The Boston Globe, John Tlumacki/Associated Press)

"Where we would have turned to the bomb, we'd be focused on it … these folks had turned in the other direction."

Both Ursano and Ramsay also emphasized the importance of helping first responders deal with the any psychological after-effects of working through a major emergency like the Texas explosion or the Boston attack and manhunt.

That can mean encouraging them to talk about the experience and stop suppressing their emotions once a dangerous situation has passed and they no longer have to rely so heavily on survival instincts.

"You kind of have to look at this as emotional first aid, just like a Band-Aid is to surgery," Ramsay said.

Emergency Services Stress

Source:http://www.prenhall.com/divisions/ECT/app/bradybooks/newbrady/catalog/content/samplechapters/0130096865.pdf

Key Points

- *Emergency services providers* are those who are employed or volunteer in the emergency services profession and their support staff: firefighters, EMTs, paramedics, law enforcement personnel, dispatchers, hazardous materials specialists, rescue specialists, and others.
- The term *unrealistic optimism* refers to the dichotomy exemplified by emergency services workers rating their job as more stressful compared with other occupations but also reporting their chances of being adversely affected or harmed by this stress as less than average.
- The term *environmental stressor* refers to the aspects of a particular environment that can elicit the stress response. In emergency services, this could include things such as noises at the scene, weather, hazardous materials, crowds, traffic, or violent individuals.
- Certain personality factors or traits can become stressors themselves and add to emergency services stress.
- The unpredictable nature of emergency services work and shiftwork has been identified as stressors for emergency services providers.
- *Burnout* is a syndrome of emotional exhaustion brought about by the interaction of overwork and certain personality characteristics, most frequently among individuals involved in human services occupations.
- Burnout affects organizations, the community, emergency services providers, and their friends and family.

Professor combats Post-Traumatic Stress Disorder

Source: http://ysm.research.yale.edu//article.jsp?articleID=11

Soldiers returning from Iraq may soon help scientists understand more about how we regulate fear and anxiety in our bodies. While studying American soldiers under conditions of high external stress, Associate Professor of Psychiatry Charles Morgan has discovered a positive correlation between elevated levels of Neuropeptide Y (NPY) and lucidity of mind.

Morgan tested NPY levels and cognitive functioning in soldiers before, during, and after exposure to the stress of survival training, where soldiers were confined and interrogated in a mock POW camp at Ft. Bragg, North Carolina.

Special forces soldiers, who had thirty-three percent higher plasma levels of neuropeptide Y than general troop soldiers, were found to possess clearer minds and to have out-performed other soldiers under stress. In a related study, Morgan and colleagues also discovered that soldiers in Combat Dive training who released more NPY during stress excelled in underwater navigation, and that hostage rescue team members with higher NPY levels during stress performed better.

Such findings raise the question as to whether the individual variation in the ability to release NPY is due to differences in the NPY gene or to differences in training and experience.

"Most likely [neuropeptide Y] is just one of many factors that contribute to doing well—in this case, we are witnessing different capacities in the degree to which people can inhibit fear. We have yet to determine whether repeated stressful situations can diminish high response levels of NPY," explained Morgan.

Morgan and colleagues are now seeking investigational drug approval for an IV administration test, designed to boost levels of NPY in order to detect potential anti-anxiety effects.

Although his findings could help the military choose individuals better-suited for dangerous duty, there are civilian applications. Individuals with depression and anxiety disorder also have lower levels of Neuropeptide Y. Future drugs may aim to raise NPY levels.

Neuropeptide Y (**NPY**) is a 36-amino acid neuropeptide that acts as a neurotransmitter in the brain and in the autonomic nervous system of humans; slight variations of the peptide are found in many other animals. In the autonomic system it is mainly produced by neurons of the sympathetic nervous system and serves as a strong vasoconstrictor and also causes growth of fat tissue. In the brain it is produced in various locations including the hypothalamus, and is thought to have several functions, including: increasing food intake and storage of energy as fat, reducing anxiety and stress, reducing pain perception, affecting the circadian rhythm, reducing voluntary alcohol intake, lowering blood pressure and controlling epileptic seizures.

The receptor protein that NPY operates on is a G protein-coupled receptor in the rhodopsin like 7-transmembrane GPCR family. Five subtypes of the NPY receptor have been identified in mammals, four of which are functional in humans. Subtypes Y1 and Y5 have known roles in the stimulation of feeding while Y2 and Y4 seem to have roles in appetite inhibition (satiety). Some of these receptors are among the most highly conserved neuropeptide receptors.

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