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CHOATE PUBLIC HEALTH

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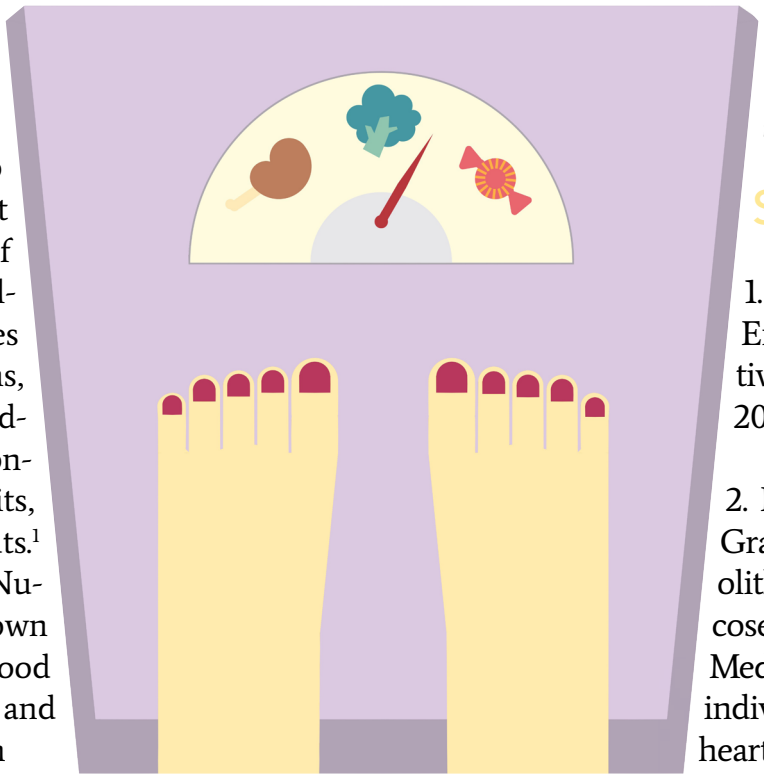
THE PALEO DIET: A HEALTHY WEIGHT LOSS OPTION

By Jayden Khuu '21

Over the last few years, more people have become increasingly aware of the food choices they make daily. With long-term health benefits and a better physique in mind, it is not surprising to hear that more members of the community are opting into special diets like the Paleo Diet.

What is the Paleo diet? It is simply a diet that mimics the meals of cavemen from ten millennia ago. It eliminates processed foods, grains, sweets, and dairy products. Instead, the diet consists of lean meat, fruits, vegetables, eggs, and nuts.[1] Does this diet work? Numerous studies have shown that this diet reduces blood sugar, blood pressure, and low-density lipoprotein (bad cholesterol).[2,3]



Ultimately, "losing weight" is maintaining a caloric deficit. This happens when one burns more calories than one consumes. Most weight loss diets revolve around this concept and make one consume less calories through portion control or food restrictions. The Paleo Diet encourages people to eat until they are full. It is a healthy diet because the consumed protein is filling, the fruits and vegetables have low caloric values, and the supplement of nuts ensures that nutrient absorption is ideal. This diet is a sustainable way to lose weight without starving.

Graphic by Jacqueline Zou '20

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THE E-CIGARETTE EPIDEMIC

By Allison Kleinstein '21

Electronic cigarettes are small, cigarette-shaped devices that allow users to inhale nicotine-based vapors, marijuana, and even vaporized alcohol.[1] E-cigarettes were first developed for adults as a way to quit smoking by weaning themselves off of regular cigarettes. This succeeded in that respect, with the number of cigarette smokers dropping significantly since e-cigarettes were first put on the market in 2004. However, as e-cigarettes become more and more popular, various organizations have begun to worry about their health effects, especially because many teenagers feel that vaping products (like e-cigarettes) are harmless.[2] Studies show that 66% of teens believe that the only ingredient contained in their vapes is flavoring, while 13.7% have no idea whatsoever as to what is in their vaporizers.[3] Vaporizers contain large amounts of nicotine (the same addictive chemical found in traditional cigarettes), and the Food and Drug Administration (FDA) confirms that "the developing adolescent brain is particularly vulnerable to addiction," affirming that vaping is even more destructive to young children and teens.

As the popularity of vaping products skyrockets, more and more teens are using and becoming addicted to nicotine, which recent studies have concluded damages the brains of adolescents.

Meanwhile, Harvard University has found that flavoring chemical diacetyl was present in many of the e-cigarettes and e-liquids they sampled. Diacetyl is linked to a respiratory disease commonly known as "popcorn lung."[4] In addition to diacetyl, other toxic chemicals have also been found in e-cigarettes such as formaldehyde which is linked to lung and nasopharyngeal cancer.[1] E-cigarettes can also serve to irritate the lungs and exacerbate asthma.

With the increasing usage of vaporizers among teens, Scott Gottlieb, commissioner of the FDA, declared that teenage use of e-cigarettes has attained "epidemic" proportions. He added that "e-cigs have become an almost ubiquitous — and dangerous — trend among teens."[5]

In response to these statistics, the FDA has taken multiple steps to stop the climbing popularity of vapes. They are expanding their four year-old campaign, "The Real Cost," in order to educate 10.7 million people aged 12-17 who are currently using e-cigarettes or are willing to try one. In addition, the FDA is putting up warning posters listing the harmful properties of e-cigarettes in school bathrooms. FDA-sponsored posts will appear on social media platforms such as Pandora, Youtube, and Instagram.[6] Additionally, over 1,300 warning letters were sent to convenience stores like 7-Eleven and Walgreens making it clear that it is illegal to sell e-cigarettes

to minors, while also issuing 131 fines for violations of this.

The FDA issued a warning saying that they were prepared to ban all e-cigarettes containing flavor if the five major producer companies could not prove that they can keep their devices away from minors within sixty days. These companies, Juul, Vuse, MarkTen, blu e-cigs, and Logic, must submit their proposals to discourage and address the widespread use of their products by teenagers to the FDA by November 11.[7] Gottlieb remarks that the "industry must step up to this challenge. They say they've changed... But look at what's happening right now, on our watch and on their watch. They must demonstrate that they're truly committed to keeping these new products out of the hands of kids and they must find a way to reverse this trend."[5]

The FDA's stance has been met with praise from anti-tobacco supporters and the companies seem willing to cooperate with the FDA. Whether or not the companies rise to the challenge and work effectively with the FDA is yet to be determined, but this campaign marks the start of a serious crackdown on the rapidly growing problem of teenage usage of e-cigarettes.

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Graphic by Elaine Zhang '21

Choate is regarded as one of the most prestigious boarding schools in the United States: our academics, arts, and athletic programs are some of the best in the country. Sometimes, new students may feel intimidated by the current student body, as we seem superhuman. How are we able to do everything that we do, do it well, and meet our basic needs at the same time? Frankly, we don't. Sleep deprivation is one of the most pressing issues facing the student body at Choate, and it is something that has a real impact on each of our lives. Sleep deprivation has been proven to impair both the health and focus of students — which is why it's vital we take steps to combat it.

Lack of sleep is an issue which, although most commonly associated with sleepiness and lack of focus, has the potential to have devastating medical consequences. Research suggests that a lack of REM sleep (the deepest type of sleep) is contributing to the national obesity crisis, and that it can even act as a precursor to cardiovascular disease.[1] In addition, there is growing evidence supporting that poor sleep quality may affect the body's ability to fight cancer, since our bodies release hormones such as cortisol during sleep, which help regulate our immune system.[2]

Sleep deprivation is one of the most pressing issues facing the student body at Choate, and it is something that has a real impact on each of our lives.

However, the effects of sleep deprivation aren't limited only to physical health. Other studies have shown that 65 to 90% of adults and 90% of children with major depression grapple with some kind of sleep problem.[3] Although the studies regarding mental health don't prove causation, the correlation is irrefutable: sleep is a critical pillar of mental health. Through getting a reasonable amount of sleep each night, we take a crucial step in safeguarding our health — a step that should not be overlooked. In addition to the dramatic health concerns that arise as symptoms of sleep deprivation, those who are deprived of REM sleep often have difficulties trying to focus — an action demanded of students.

Here at Choate, we come from all over the world to study together, but sleep deprivation often leaves us unable to work to our full potential. It's not just Choate: numerous studies have found that the average adolescent in the United States is chronically sleep deprived and pathologically sleepy.[4] As a result, many high school students suffer the consequences of insufficient sleep, including impairment in mood, attention, memory, behavior control, executive function, and impulse control.[4] Studies have demonstrated an association between less sleep and lower academic achievement in middle school, high school, and college, as

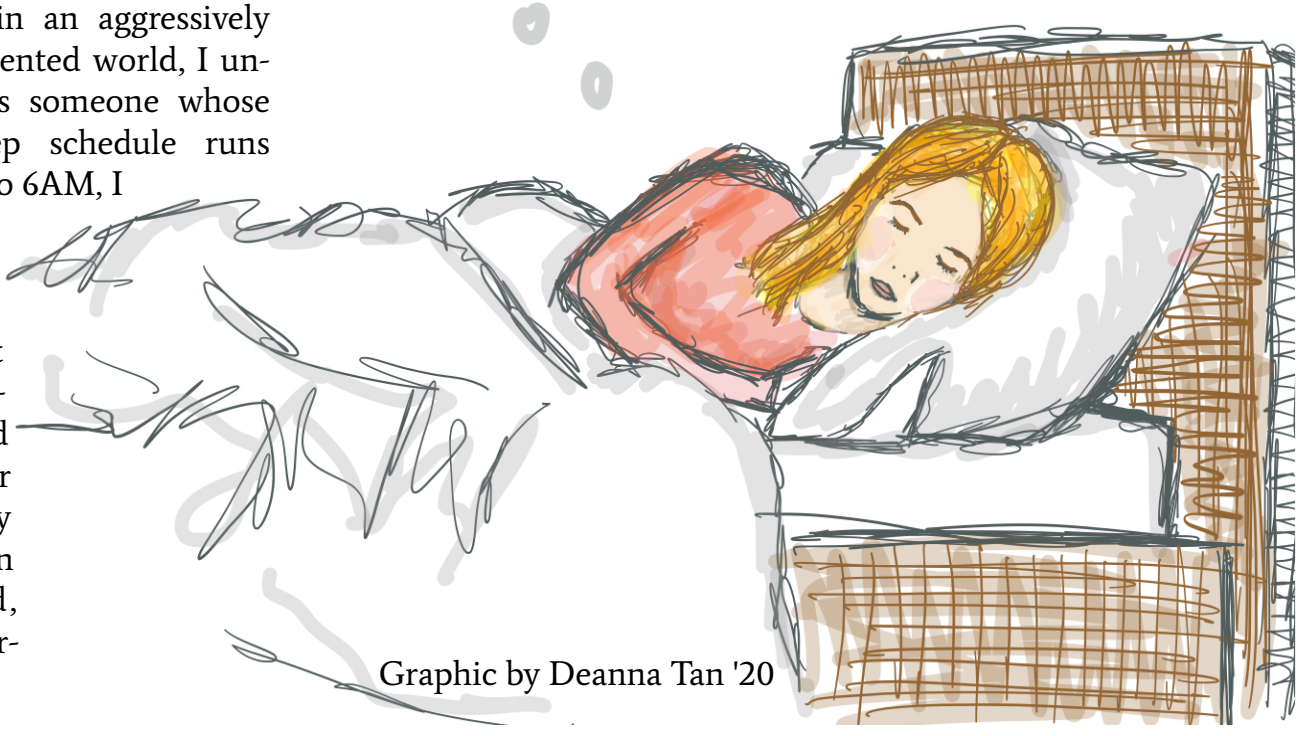
ROBBED OF REM: THE SLEEP CRISIS

By William Robertson '20

well as more frequent rates of absenteeism, tardiness, and a decreased motivation to learn.[4]

Having learned the potential consequences of sleep deprivation, one question resounds: why do we subject ourselves to this? I can hear cynical readers scoffing at me from through the paper, but please trust me when I say that — as someone who has bitterly laughed at the eight to ten hour sleep recommendation for teenagers many a time myself — I understand.[5] As a night owl living in an aggressively morning-oriented world, I understand. As someone whose typical sleep schedule runs from 2AM to 6AM, I understand. I know as well as anybody that Choate students would much rather be peacefully dozing than glassy-eyed, typing an article about the effects of sleep deprivation, but here we are. Please, for your health, studies, and overall wellness, keep sleep in mind. Sometimes it's okay not to finish your homework — the cost of an extension pales in comparison to your wellbeing. Take care not to operate at 110% all of the time, or you might just find yourself ground by the grind.

On this note, I wish you all happy sleep, and goodnight: it's time for me to go to bed.



Graphic by Deanna Tan '20

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VIRTUAL

AN ALTERNATIVE TO TRADITI

By Anya M

In recent years, as virtual reality (VR) technology advanced, its application has been explored in a variety of fields, from video games to journalism. The field which will perhaps be most drastically impacted by VR is medicine. There are already multiple incredible ways that doctors are using this transformative and cutting-edge technology in practice.

In hospitals, VR has already proven its use in reducing stress and anxiety in patients. Patients may simply put on a VR headset and explore interactive landscapes in a foreign world — this may act as a distraction from the physical and mental stress of uncomfortable procedures. Alleviating the pain of burn victims, for example, is one of the most promising areas in VR relief. While modern painkillers may ease a majority of suffering, these methods are not always entirely effective. Burn victims must endure "some of the most painful procedures in medicine," according to Dr. Hunter Hoffman, a scientist at the University of Washington interested in expanding the uses of VR. Dr. Hoffman created "SnowWorld," a VR game which leads patients through an icy landscape featuring "cold" imagery such as snowflakes and snowmen. Wandering through this winter wonderland, patients report feeling 50% less pain.[1]

These patients are no longer confined to their hospital bed, but can "travel" to locations all over the globe: a street in Paris or the Great Barrier Reef

VR's applications can also be extended to patients suffering a variety of milder afflictions. For people recovering from surgeries, for instance, VR interactive activities offer alternatives to just sitting around and resting in bed. Recovery can be a stressful time, and aside from family and friend visits, patients on bedrest often find themselves with little to distract themselves. While using a VR headset, however, these patients are no longer confined to their hospital bed, but can "travel" to locations all over the globe: a street in Paris or the Great Barrier Reef.

Not only is VR improving the lives of many patients, but it is also beneficial for surgeons. Medical students traditionally train by watching over the shoulders of more experienced surgeons, but due to physical capacity, the number of students that can learn at the same time is limited. Furthermore, from this perspective, it can be challenging for students to fully visualize and internalize what is happening in front of them.

VR can change all this. Re-

 Graphic by Elaine Zhang '21

REALITY:
ONAL HEALTHCARE METHODS

iksovsky '20

cently in London, a complicated operation removing cancerous tissue was filmed using 360-cameras and live-streamed to a medical website. Medical students could then put on a VR headset and watch the surgery taking place in real time.[2] This method allows any number of students to view and study the same surgery as if they are standing right next to the operating table. Indeed, if a live-stream is made public, colleagues, researchers, and even journalists from all over the globe are permitted to watch. Training doctors well will benefit us all. The next generation of doctors may be ever better equipped and prepared, and our own public knowledge more and more extensive.

Additionally, VR has implications for veteran doctors: surgeons preparing for complicated operations can now train in advance, making use of 3D visualizing technology. Some types of operations are fairly common; a surgeon might perform a cesarean section dozens of times in their career. Yet unique situations may arise, and even an experienced surgeon may have to execute an operation never done before. Previously, in planning out these surgeries, doctors have had to rely on projections juxtaposing 3D scans onto 2D surfaces like computer screens. Now they can fully visualize the operation ahead without being confined to two dimensions.[3]

VR is already being embraced: at a hospital in Minneapolis, a recent case of separating conjoined 3-month old twins relied heavily on VR technology. Because the twins' bodies were extensively connected, the team prepared by taking thorough MRI scans of their bodies, which could then be uploaded into a virtual space. Doctors could then examine the twins in advance, finding particular vulnerabilities to be aware of during the actual surgery.[1]

In time, preparation through VR may become routine, minimizing surgical errors and maximizing efficiency. Although VR has a long way to go, we are already reaping the benefits of these technologies. In palliative care to operation planning, VR is affecting — and upending — the field of medicine; its uses may be extended ever further into the future of medicine.

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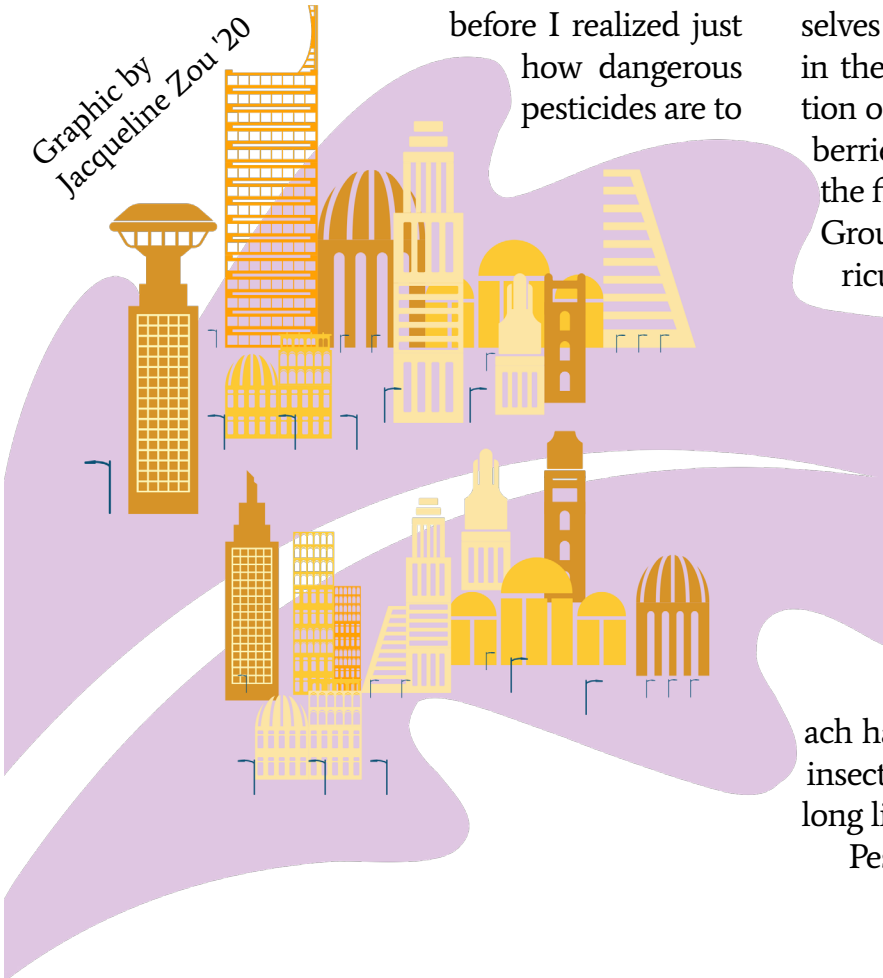
AGRICULTURAL PESTICIDES: WHY YOU SHOULD CARE

By Laryssa Gazda '20

When biting into a piece of fresh fruit, do you suspect that it is covered in chemicals that could have serious, even lethal, effects on your body? Maybe not — unless you happened to grow up in a household like mine. For as long as I can remember, my mom has only bought produce grown with little to no pesticides. I always wondered why she worried about something that seemed to me to be so trivial. That was before I realized just how dangerous pesticides are to our health.



Graphic by Jacqueline Zou '20

The term "pesticide" is a broad one, but essentially pesticides are substances or mixtures of substances used to protect plants from insects and animals, weeds, and disease.[1] Pesticides can help crops yield more produce by reducing the number of crops lost by insect infestation. They are sprayed on the food that we eat in concentrations that are deemed "safe," even though the chemicals themselves are poisonous.[2] Some fruits and vegetables in the produce section have a greater concentration of pesticides than others. For example, strawberries, spinach, nectarines, apples, and grapes are the first five of what the Environmental Working Group (a non-profit organization focused on agricultural subsidies, corporate accountability, and public lands) calls "The Dirty Dozen" — twelve fruits and vegetables that have been found to have the highest concentrations of pesticides.[3] Strawberries alone contain 22 different pesticide residues (pesticides that remain in or on the food after being applied on the crop), while spinach has high concentrations of the neurotoxin or insecticide permethrin.[3] This is just a few from the long list of foods containing harmful pesticides.

Pesticide exposure has been linked to numer-

ous short- and long-term health issues, including irritation of the respiratory tract, nausea, vomiting, loss of consciousness, seizures, and even death.[3] Pesticides sprayed on our food like sulfoxaflor, chlorpyrifos, and methyl iodide are amongst the most harmful to humans as well as other animals. Sulfoxaflor is highly toxic to honey bees and other pollinators and has been linked to the collapse of major bee colonies. If use of this pesticide is continued, fresh produce is expected to begin disappearing from shelves as pollinators are killed off.[4] Meanwhile, chlorpyrifos is a toxic agricultural pesticide linked to headaches, seizures, low birth weights, and developmental delays; methyl iodide is a known carcinogenic pesticide that can pollute groundwater.[4] In addition to these specific chemicals and their impacts, agricultural pesticides in general have been linked to depression, anxiety, Parkinson's disease, asthma, ADHD, and several cancers such as leukemia and Hodgkin's lymphoma.[2] Direct pesticide exposure is a major concern for most conventional farm workers, as they are given little in ways of protection from these poisons and frequently come into direct contact them. Even the everyday consumer is not in the clear as repeated exposure to pesticides at low levels over time may cause adverse effects.

Knowing this, what have the government and non-governmental organizations done to keep harmful pesticides out of our food? In 1996, the Food Quality Protection Act was passed by Congress and signed into law. This act forced the Environmental Protection Agency (EPA) to completely reassess how they regarded pesticide residue on food. The EPA was to "consider cumulative exposure to pesticides that have common mechanisms of toxicity" in addition to taking into account the increased susceptibility of children and infants to pesticides.[5] From 1996 to 2006, the EPA, in partnership with the Natural Resources Defense Council, restricted and banned the use of 270 pesticides for both household and food uses due the to increased risk to children and infants.[6] From 2009 to 2013, the EPA made strides to eliminate some of the more dangerous pesticides from conventional farming.[6]

Though consumers in the US are not exposed to as many lethal pesticides as they were before 1996, there is still a lot of work to be done. Knowing this, you should do your research, steer clear of produce that contains the highest pesticide residue concentrations, and try to live a safe, healthy, and pesticide-free life.

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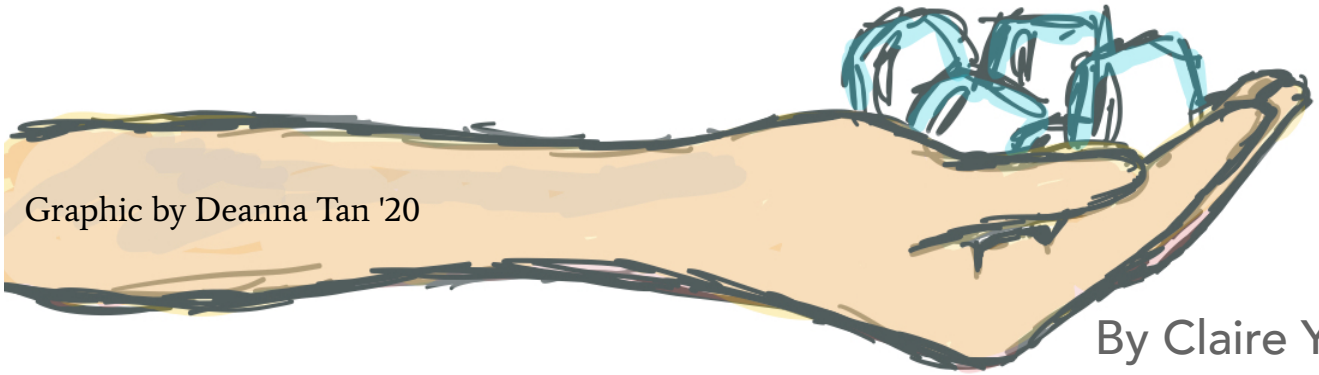

Graphic by Deanna Tan '20

By Claire Yuan '21

THE STRANGE CASE OF THE COLD ALLERGY

As temperatures drop moving into the late fall and winter seasons, people begin bundling up in layers and grumbling about the harshness of the cold. In addition to unpleasant coughs and obnoxious runny noses, though, low temperatures can have potentially severe health implications for a small percentage of the population.

Cold urticaria, or cold contact urticaria, is a subtype of physical urticaria, a condition referring to hives caused by direct physical stimulation of the skin.[1] This rare medical condition is typically triggered by exposure to cold air, cold liquid, or cold objects; even everyday activities such as walking in cold weather or swimming can cause mild to severe reactions.

Patients with cold urticaria typically begin to develop hives two to five minutes after cold exposure; these hives can last up to two hours.[2] Other common reactions include the swelling of areas in direct contact with the cold object and the worsening of the reactions as the skin is warmed.[3] The cold stimulus activates mast cells, which then cause the release of histamine (a compound released during inflammatory and allergic reactions) and other inflammatory mediators; it is unknown, however, why this is the case. For the most part, cold urticaria is idiopathic, or has an unknown cause.[4]

Although most cases of cold urticaria exhibit minor reactions, extensive contact with the cold, such as swimming in cold water, may lead to more serious and systemic reactions. These reactions relate to the parts of the circulatory system responsible for transporting oxygen to and carbon dioxide from the body. Severe reactions can range from general urticaria to anaphylaxis, including symptoms involving the respiratory, cardiovascular, and gastrointestinal systems.[5]

Patients with cold urticaria who are involved in aquatic activities are at direct risk of death because the anaphylactic reactions mentioned above can easily trigger anaphylactic shock, a condition highly likely to cause death. In addition, patients are indirectly at risk of drowning during systemic reactions in cases of extensive contact with cold. In some full-body reactions, the tongue and throat may swell, causing the sufferer to have difficulty breathing.[3] Severe systemic reactions are more frequent in cases of patients of greater than thirty years at the time of the initial onset of cold urticaria.[5]

Not unlike most allergies, cold urticaria can be treated with a variety of medica-

tions and therapies. For patients prone to anaphylactic reactions, epinephrine is one of the best options.[5] These patients, especially if they have unavoidable exposure to low temperatures, are recommended to carry an epinephrine auto-injector (such as an EpiPen) and be trained on how and when to make use of it. As for treatment of milder symptoms, H1 antihistamines (drugs used to treat a variety of allergies) are a viable choice.[5] Patients can also undergo cold desensitization. The goal of this therapy is to build up a tolerance to the cold by repeated exposure. This type of treatment, however, carries a high risk of inducing systemic reactions and should be supervised by a clinician.[4]

Despite 50% of patients reporting remission or improvement of symptoms within five to six years, people with this condition must take precautions in regards to cold exposure.[5] Before being exposed to cold, patients should take over-the-counter antihistamines or other medicines as prescribed by a clinician. Also, they should test out cold swimming pools by dipping in a hand before getting in, and avoid cold foods and drinks to prevent swelling of the throat and tongue. People with this condition should keep an epinephrine auto-injector on hand, if applicable.[3] Finally, in the case of surgery, the operating surgeon should be notified prior to the procedure of the disorder so that they may make the proper adjustments to the operating room's temperature and perhaps make adjustments to the medicine; this includes avoiding histamine-releasing medicines and injecting antihistamines prior to or during the procedure instead.[2]

Cold urticaria may be a rare disease, but it can have fatal consequences if left undiagnosed. If you experience hives or difficulty breathing after cold exposure, seek medical attention immediately.[3]

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David Sipress

RESEARCH DOMAIN CRITERIA: DIAGNOSING THROUGH BIOLOGICAL MODELS

By Lizzie Quinn '20

Mental disorders were first accepted in the medical community around 1949 when they were added to the International Classification of Diseases (ICD), a publication by the World Health Organization (WHO). In 1952, the American Psychiatric Association (APA) developed a variant of the ICD-6 (the sixth revision of the original ICD) and named it the Diagnostic and Statistical Manual of Mental Disorders (DSM).[1] Currently, both the DSM-V and the ICD-11 focus more on symptoms expressed in the form of behaviors than underlying neurobiological causes for mental illnesses, which leads to a high risk of misdiagnosis.[2]

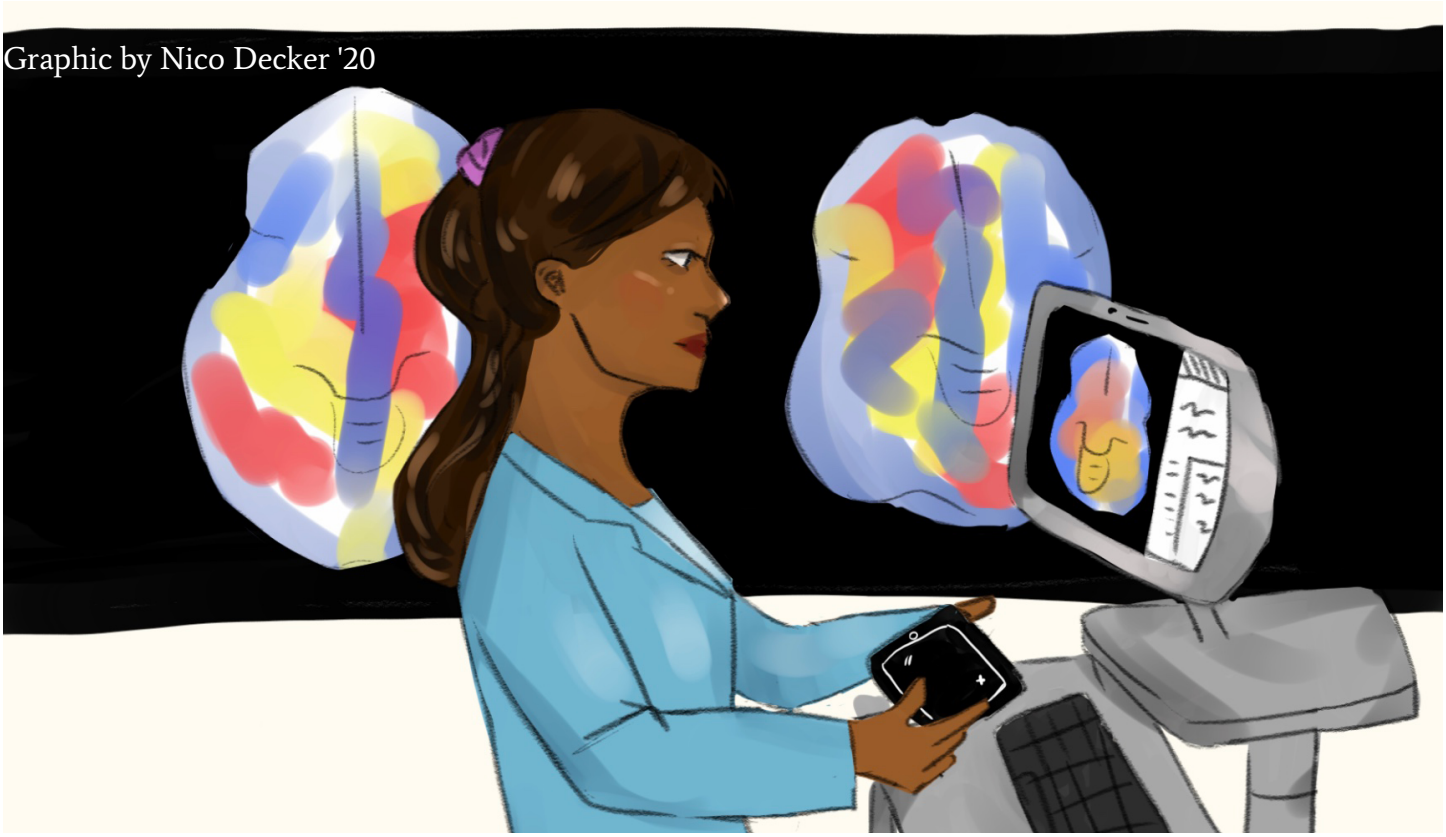
The RDoC: What Is It and How Does It Differ from the DSM and ICD?

To tackle the behavioral symptom-based diagnosis methods of the DSM and ICD, the US National Institute of Mental Health (NIMH) established the Research Domain Criteria (RDoC), which linchpins on biological models for diagnosis. The DSM-V and the ICD-11 diagnose by examining symptomatic behaviors rather than the central causes of a mental illness. These manuals also disregard comorbidity, the possibility of two chronic conditions of a patient.

> Methods used in the DSM and ICD, however consistent and replicative, fail to inform the true validity of a classified illness.[1]

The DSM is used for clinical diagnosis worldwide and has been revised many times to resolve controversies on the nature of mental disorders. The ICD is the official diagnostic standard of the world and is intended mainly for use by mental health professionals — it differs from the DSM which isn't exclusive to medical experts. These two classification models make it difficult for psychiatric professionals to focus on a specific treatment, as the only aspect of a patient's mental illness that a psychiatric professional can diagnose for is his or her physiological indications of a categorized mental illness. Additionally, the standards of the DSM and ICD are atheoretical because they focus on reliability, specifically in the form of test-retest variance, rather than individualized treatments. These methods used in the DSM and ICD, however consistent and replicative, fail to inform the true validity of a classified illness.[1]

The RDoC, on the other hand, seeks to become the main body of work centered around advances in genetics, neuroscience, and cognitive science. The RDoC classifies mental disorders on the basis of two key facets: neurobiological traits (which the DSM and ICD fail to address) and observable behaviors.[1] The RDoC establishes a range from normal to abnormal of fundamental behavioral com-


Graphic by Nico Decker '20

ponents and standardizes valid measures of these elements to remain reliable, using genetic makeup, cell structure, molecules, circuits, physiology, behavior, self-report, and paradigms.[3]

What's Wrong with Diagnosing a Mental Illness only by a Patient's Manifestation of its Symptoms?

By introducing an agreed-upon classification system, researchers and psychiatric professionals alike can communicate about diagnoses in a uniform way.[1] Although the transition will be messy and time-consuming, adding the RDoC as an additional classification system for mental illnesses would greatly improve a patient's treatment. The RDoC additionally focuses on the etiology, or latent causes, of an illness and could, if implemented effectively, strengthen the understanding of mental symptoms worldwide.[2]

Medical diagnoses arise from symptoms or clear signs that indicate an underlying somatic disorder, so diagnosing from more than visible symptoms would give psychiatrists and patients greater knowledge about what is happening to them.[1] After all, if a person were to show signs (i.e. symptoms of pain and visible bruising) of a broken leg, would a doctor not then confirm the diagnosis with an x-ray? The x-ray might show a sprain or a compound fracture of his or her tibia. The overall diagnosis would not be complete, however, without confirming what the patient has, not merely taking the symptoms as a full diagnosis.[2] The same can be applied to diagnosing mental illness. Mental illnesses should not be classified in a "you have it, but you do not" type of way, but rather arranged along a spectrum of sorts, the scale of which can be determined by the RDoC.[2]

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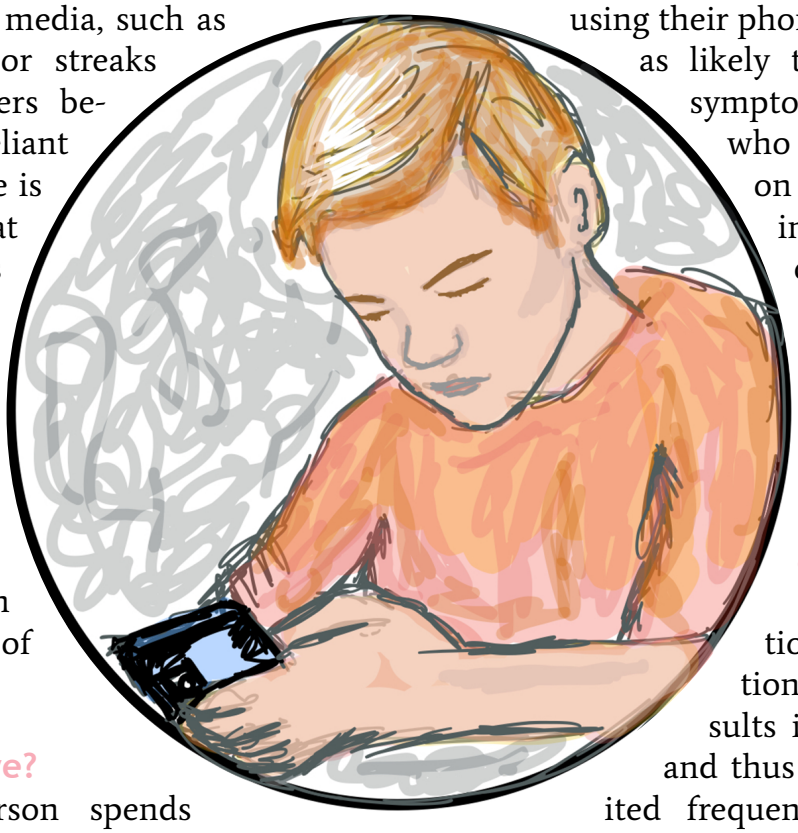
WE ARE THE VICTIMS OF ONLINE ADDICTION

Raine Williams '20, Meghan Musto '19

With the rise of social media addiction in younger generations, teens are seemingly more and more bound to base their self-worth on the rewards of social media, such as likes on Instagram or streaks on Snapchat. As users become increasingly reliant on social media, there is a stronger grasp that the addiction holds on the user. The basis of concern on this issue is the severity of social media addiction, and what makes us so captivated to waste time scrolling through miles upon miles of trivial online posts.



How addicted are we?

The average person spends about two hours a day using social media, which can amount to about five years and four months in an entire lifetime. Not only are there more than 3.1 billion social media users worldwide, but 210 million of them are expected to develop eventual social media addiction. A 2018 study found that as a result of technology dependency, "teens who spend 5 hours per day using their phones were almost twice as likely to exhibit depressive symptoms than counterparts who dedicated only 1 hour on their phones."[1] This information confronts our true behaviors and allows us to comprehend the amount of time we waste on social media.

What is behavioral addiction?

Behavioral addiction is a form of addiction where a behavior results in a "natural" reward and thus that behavior is elicited frequently despite negative consequences.[2] Applying this overarching term of behavioral addiction to social media addiction specifically, the natural reward is presented in the forms of likes on a post, the number of followers, or repostings on a tweet. The

behavior is the continued repetition of using social media to reach this natural reward despite negative consequences such as losing sleep to continue to use social media or prioritizing social media over other responsibilities of higher importance.

How do these habits turn into addiction?

A habit can often be chalked up to conditioning. Making the jump from behavior to addiction is relatively simple; with every exposure to a behavior that creates an increase in dopamine in the brain's hedonic hotspots, you are at increased risk for incentive sensitization.[3] Incentive

However, the key difference between a habit/conditioned behavior and addiction is that when negative consequences occur for an addicted individual, the behavior will persist.[2]

sensitization comes from sensitization of the unconscious wanting (incentive salience) that drives your actions and behavior, and when sensitized your brain craves more dopamine. In this way, any action that creates an increase in dopamine puts you at risk for behavioral addiction.

Focusing on health and happiness over social media is the path to take when steering away from addiction.

How dangerous is behavioral addiction?

Addictive levels of any activity are dangerous. For example, gambling, exercising, and eating can all turn into bad addictions with possibly life-threatening consequences. Presenting addictive behaviors for social media may predispose a person to develop more serious addictions in the future, especially if the addict becomes reliant on this "natural reward" for his/her happiness. In order to increase awareness of social media addiction, users must be conscious of the choices they make in prioritizing social media. Focusing on health and happiness over social media is the path to take when steering away from addiction. The best way to avoid addiction is to remain educated about its dangers and to keep all social media-related behaviors at a healthy level.

Ultimately, there is no drastic need to terminate completely the usage of all social media. However, it is becoming progressively crucial that we all stay aware of the time we spend expecting happiness to emanate from a machine instead of our physical day-to-day experiences.

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CRISPR-CAS9:

A TRAILBLAZING DISCOVERY IN THE WORLD OF GENETICS

By Faris Alharthy '20

Over the past decade, groundbreaking discoveries in gene-coding have allowed scientists to manufacture a gene-editing technique called CRISPR-Cas9. An acronym for "clustered regularly interspaced short palindromic repeats," the CRISPR-Cas9 gives scientists the ability to cheaply and efficiently manipulate genes in any living organism.[1] The machine utilizes an enzyme called Cas9 to move the genes around. The CRISPR-Cas9 has the capacity to delete undesirable traits and add favorable traits to humans, animals, and even plants. This revolutionary machine has the potential to further develop solutions to some of the biggest problems in medicine and healthcare.[2] Researchers have already adopted the technology to reverse mutations that cause blindness, to slow the spread of cancerous cells, and to protect cells from HIV, the virus that causes AIDS. In terms of agriculture, bioengineers have manipulated CRISPR to change the DNA coding in yeast allowing it to excrete ethanol. This can reduce dependence on petrochemicals, a political and environmental issue.[3] CRISPR technology holds the key to the future of genetics.

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