SPRING 2022

The Cornell Healthcare Review

Sharing Innovations in Medicine

Dear Readers,

It is with heartfelt gratitude that I write this letter. Throughout the past two years, I have seen CHR grow immensely and am so glad to have been through it all. Our E-board has nearly doubled in size and we have created a new arts team and ongoing monthly speaker series. With the help of our large E-Board, we have also refined our processes, from outreach to publication, to be more efficient than ever.

For both new and returning members, we are grateful that you have recently joined CHR or have chosen to stick around. This issue would not be possible with all of your hard work. To most of us, this semester provided us a glimpse into pre-COVID times. In two years, this is the first time we felt like we were getting back to normalcy.

This issue is extremely special for me because it features a faculty piece from Professor Alaka Basu in the department of global development at Cornell. Last fall, I took her class, *Gender and Health*, which was extremely insightful and thought provoking regarding the distinction between sex and gender, which is often ignored. You can find Professor Basu's article on male risky health behaviors on page 4.

We cannot wait for you to read our Spring 2022 issue of *The Cornell Healthcare Review,* both in-print and online. In the coming months, please keep your eye out on our website for articles featuring our summer writers.

As the healthcare world continues to evolve, we are so appreciative of this platform to share the latest trends and issues with you. You are left in incredible hands and I will miss all of my friends that I have met through CHR dearly. Signing off for now. I cannot wait to see what CHR does in the future!

Cheers!
Grace Wang on behalf of the Cornell Healthcare Review E-Board

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The Gendered Male is an Endangered Male

by Professor Alaka M. Basu, Department of Global Development

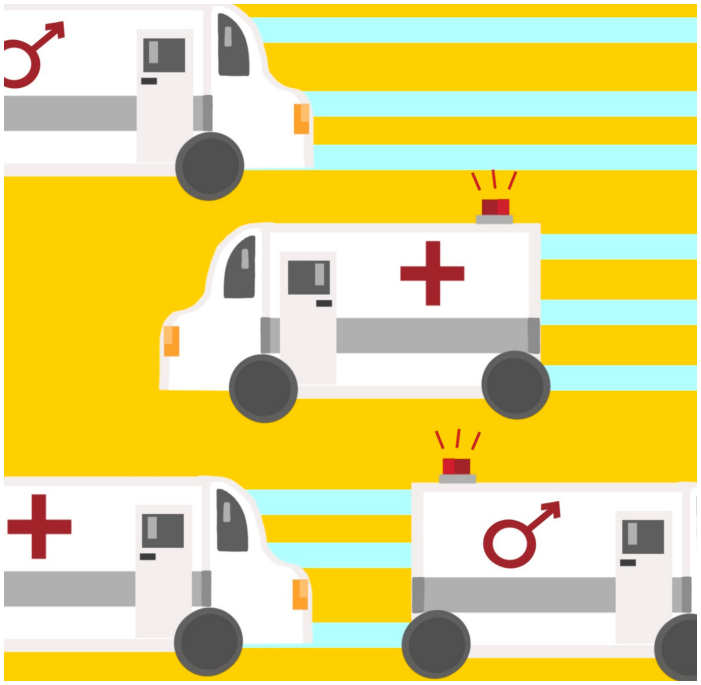
The discipline of *Gender Studies* continues to be frequently synonymous with *Women's Studies*. This is particularly regrettable in the context of Gender and Health, because health is one domain of life in which the otherwise ubiquitous female disadvantage is blunted. Indeed, when it comes to health and (especially) survival, men do worse than women in most parts of the world. Overall life expectancy as well as death rates from the most common causes of death favor women. Moreover, in many places, the gender gap has been widening. In recent times, higher levels of Covid mortality and opioid related mortality in men are good examples of the worsening gaps.

While some part of this male-female difference may reflect biological factors, an important part is attributable to differences in lifestyles, by which we mean the practices of daily life. These practices include the disproportionate male engagement in risky occupations like mining and the military, the disproportionate propensity for men to engage in risky behaviors like fast driving (without seat belts too) and alcohol abuse, and the disproportionate tendency of men to avoid or postpone care for health problems.

All these tendencies may be clubbed under the umbrella of higher levels of risk-taking by men than by women. While such risk taking may be partly inherent to being male, it is also a human response to socially imbibed norms about masculinity and femininity. These norms about what it means to be a man are difficult to challenge; they are especially difficult to challenge by men who are seen to 'fail' in some way in living up to the idealized norms; indeed, these marginalized males may have to work harder to prove their manliness credentials. Thus, for example, gay men are more likely than heterosexual men to practice unprotected sex, prisoners are more likely than free men to get into brawls and to leave untreated the wounds that result, and young rural men are more likely to carelessly use dangerous farm machinery.

Are all such risky behaviors unavoidable? Not when they arise from consciously chosen bad practices like smoking or alcohol abuse or delayed medical care. One can, as many men's health magazines now routinely do, play up the more authentic masculinity of less risky behavior. Better still, one could or should, at least in the longer term, deemphasize the value of masculinity norms. Spreading the word on the usefulness of supposedly effeminate traits like safety, empathy, vulnerability and caution is a worthwhile objective for better gender relations as well as men's health.

On the other hand, men engaging in more risky occupations like mining, fishing and fighting wars are less often driven by conscious choice than by circumstances. Here the policy intervention might be to improve work place safety for jobs that must be done in the current world, and to work globally



Artwork by Flavia Scott '24

towards removing the need for work that serves nobody's interest – I would put warfare at the top of the second list.

Where does one place extreme 'adventure' sports within the category of avoidable risky behaviors? Once again, men tend to dominate this set numerically, although women are beginning to catch up. Should one ban some of these highly dangerous fun activities or to at least reduce the dangers they bring with them?

In many cases that would defeat the very point of engaging in them. The sense of personal control is undoubtedly an important part of the thrill of wingsuit flying and Himalayan mountain climbing. However, so is the sense of unpredictability, the possibility that something can go terribly wrong and that each successful mission is a triumph over that possibility. The thrill of such dangerous unpredictability is even more stark in the Japanese love of the blowfish or *fugu*; until some decades ago, and some would say even now, you were taking the chance of a sudden, rapid and fatal poisoning if you ate it and it was the knowledge of this probability that added to its taste. As a popular Japanese proverb puts it, 'Those who eat *fugu* soup are stupid. Those who don't eat *fugu* soup are also stupid'.

This form of risky behavior, where the pleasure lies in the risk itself, contributes to the male disadvantage in health and survival and it is not clear what kinds of policy handles can be devised for it. Perhaps there is not even a need to address this taste for extreme adventure; to modify another common proverb, 'man does not live for bread alone'!

FOMO: A DSM-5 Worthy Mental Illness?

by Jessica Li, Biological Sciences '24

Imagine that you are alone at home watching a movie on a Friday night, scrolling through Instagram, and you land on a post of some of your friends hanging out. Seeing that your friends are beaming with happiness in the pictures, you will most likely have one of the two drastically different reactions—continue your movie or feel the sudden hit of FOMO.

Known as the fear of missing out, FOMO is a common feeling among individuals, especially college students. Ranging from feeling a "deeper sense of social inferiority" to loneliness and intense range, FOMO, a not-so-simple term, includes two processes: the acknowledgment of missing out on an event and the urge to maintain a social connection through compulsive behaviors [2]. Usually caused by missing a satisfying occasion, the social uneasiness is similar to a myriad of anxiety disorders with symptoms comparable to depression and narcissism [5]. Nonetheless, despite the parallelism to some recognized disorders, FOMO is still not considered a mental illness in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).

According to the DSM-5, a mental disorder is a "syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning" [4]. This disruption is usually directly related to "significant distress or disability in social, occupational, or other important activities," which all align with what FOMO can bring—the constant self-destruction due to the intense desire to remain up-to-date with the activities of others [4]. In fact, studies have shown that FOMO is strikingly similar to separation anxiety and social anxiety disorder, both of which are listed in the DSM-5 [1]. They all share the similarity of an individual worrying about what others are doing, which can lead to "poor mood," "dysregulated sleep," and "decreased sense of life satisfaction" [1]. By consistently comparing and contrasting their lives to others, one will inevitably undergo a reduction in self-esteem, where the risk of experiencing acute symptoms can rapidly increase. Specifically, some may even face depressive symptoms from overthinking and crafting unrealistic expectations based on assumptions, both of which are precursors of breaking one's spirit.

Yet, who is mainly affected by FOMO? Since FOMO relates heavily to the amount of time spent on social media as the outlets are usually used to upload happy moments, then the more serious effects would most likely be faced by those who are usually online. In a Belgian study, 6.5% of the 1000 subjects who were exposed to social media had lower emotional stability, perceived control, and self-esteem [1]. At first glance, the percentage does not seem high, but it means that 65 out of the 1000 people faced a consequence to a certain extent, which is still a notable amount of individuals who could encounter serious affective disorders.

Just like some of the illnesses listed in the DSM-5, FOMO can also bring detrimental effects at varying severities that can exceed a comfortable threshold.

Simply, the act of opening social media and landing on a post of a missed social event can lead to FOMO. But, in addition to the act of browsing through social media, those who spend too much time on any of the social platforms can face a significantly higher risk of suicidal and narcissistic thoughts. An individual may start to go on a mental rollercoaster with distorted perceptions of the lives of others where the continuous awareness of what they are missing is invariably looped. With the expected enjoyment others may have had at an event, the feeling of loneliness and being inadequate may arise, leading to larger issues that can have long-lasting effects [3].

The persistent need for meeting one's social expectations can encourage risky and addictive behaviors that can imminently impact their psychological or developmental processes, which is the core criteria for illnesses in the DSM-5. Even though the usage of online platforms can affect the degree to which FOMO is experienced, the feeling can still leave aftermath significant enough to hurt an individual. Considering the diverse outcomes, FOMO should be further studied and added to the DSM-5, especially when the anxious feeling can lead to a larger domino effect. Only when the big picture is examined, then we can determine which levels of FOMO are suitable to be implemented into the DSM-5 to officially be a mental illness.

Artwork by Angela Yuan '24

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The Rise of Illicit Fentanyl: A Silent Killer

by Synnie Cao, Global and Public Health Sciences '24

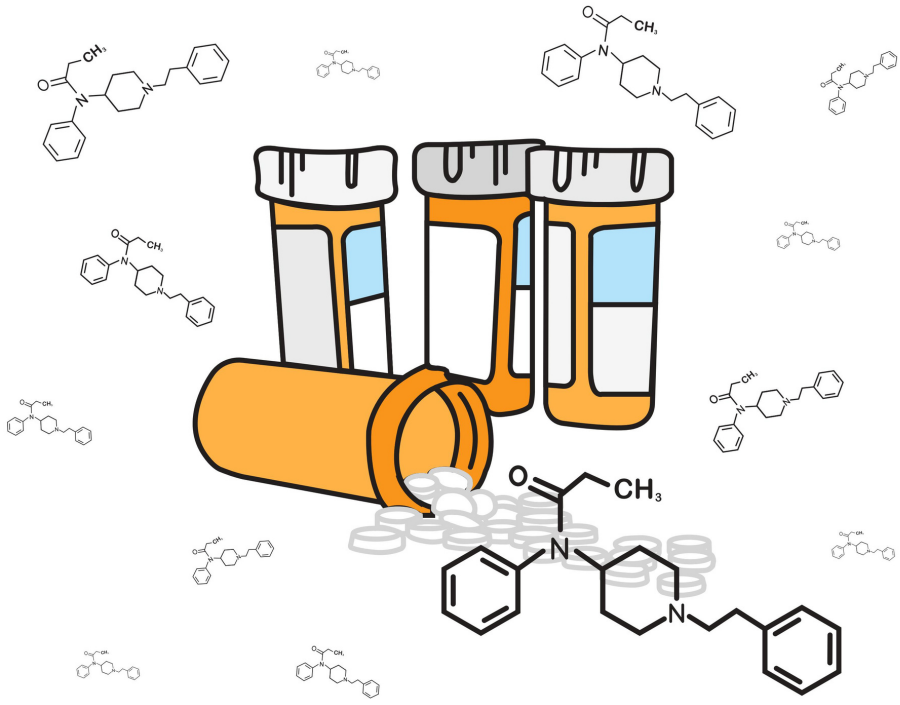
Amid the rising opioid epidemic in the United States, there looms a silent killer ravaging the lives and families of individuals worldwide: fentanyl. This synthetic opioid, disguised as oxycontin when sold, has taken over the illegal drug market and has become a recreational commodity due to its affordability and strength compared to other drugs. The constant import of synthetic opioids from foreign countries, and its large profit, have increased fentanyl flow and sales in the United States in recent years. Laced-fentanyl pills and synthetic opioid use have contributed to the fourth wave of the opioid crisis resulting in the death of many Americans and further strengthening the stigma toward drug abuse. Nowadays, naloxone administration for overdose has been termed an "essential," as fentanyl has become a specter in schools, clubs, and on the streets. Although this drug has been overlooked for several decades, its presence and impact on American society have only been further exacerbated by the social and economic consequences of the COVID-19 pandemic.

Over the past decade, synthetic opioids like fentanyl have become the leading cause of drug deaths in the U.S. as it has contributed to 59% of drug deaths in comparison to just 14.3% in 2010 [1]. Furthermore, the number of overdose deaths has increased to 100,000 over the span of 12 months this past year [2]. This stark change is attributed to the recent introduction of laced-fentanyl pills in the illegal drug market. At a low cost, this synthetic opioid has higher strength and potency compared to other recreational drugs. This makes it extremely deadly, even in small amounts. Oftentimes, drug users consume fentanyl unknowingly as they are mixed with other drugs like cocaine, crack, MDMA, and other pills [3].

Misuse not only puts the individual user at a high risk of mortality but also increases the incidence of neonatal abstinence syndrome, resulting in severe developmental and health complications in children. Additionally, fentanyl injections have also been linked to higher risk of public health-related diseases including HIV and Hepatitis C [4].

The economic and social upheavals of the COVID-19 pandemic have greatly intensified this crisis. Many individuals have turned to synthetic opioids as a result of isolation, poverty, and hopelessness associated with the pandemic provisions. Social and economic disparities put already endangered individuals at a higher risk of developing substance abuse. Poverty, psychiatric disorders, unstable housing, stress, and environmental factors may influence drug use. Individuals in lower socioeconomic neighborhoods are more likely to be introduced to substance use in early life, leading to higher risks of fentanyl exposure [5].

The imports of illicit fentanyl into the United States from Mexico and China are extremely impactful to the current surge in fentanyl use. With Big Pharma enforcing stricter regulations on prescription painkillers, drug users have depended on accessible fentanyl. Cartels and manufacturers profit off of these cheap pills by disguising them as prescription brands and selling them in bulk. After being manufactured in China, they are shipped to Mexican cartels and distributed to dealers who create lethal doses. As the United States lifted its lockdown restrictions and borders, fentanyl was easily transported and accessible in the open market [6]. This influx of imports and increased usage has contributed to the fourth wave of the opioid epidemic [7].



Artwork by Ashley Kim '23

To address these emergent issues, preventative and harm reduction interventions have been researched and tested for efficacy. The distribution of Naloxone kits and overdose prevention programs have been implemented to train community members to reverse an overdose. These interventions have already shown success in lowering overdose rates in many communities [8]. The Biden administration has also recently funded state and local governments to obtain fentanyl test strips used to identify traces of fentanyl in unregulated drugs. The administration also instituted a campaign titled "One Pill Can Kill" spreading awareness of the dangers of fentanyl-laced pills. Finally, efforts have been made to increase resources like clean syringes to prevent infections and transmitted diseases [9]. As more harm reduction strategies continue to be developed and implemented, there is a growing hope of curbing widespread opioid overdose sooner rather than later.

Ultimately, over the past few years, synthetic opioid use has become a public health crisis stripping the livelihoods of millions of Americans. Opioid addiction is an overlooked issue because of the stigma and shame surrounding addicted individuals. Although there is no immediate comprehensive solution to prevent addiction, high rates of overdose need to be controlled by providing individuals with the resources and support. There is a crucial need for a collective effort among drug users, the public, and our administration. Although treatment procedures have been implemented to combat overdose, there is a need for governmental and administrative involvement to tackle this crisis at its root. As the trade of illicit fentanyl has become a major catalyst for overdose and death, there is a dire need to address the stealthy yet deadly rise of this poison.

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Nutrition Decade: The Progress in Nutrition Education

by Esha Shakthy, Nutritional Sciences '25

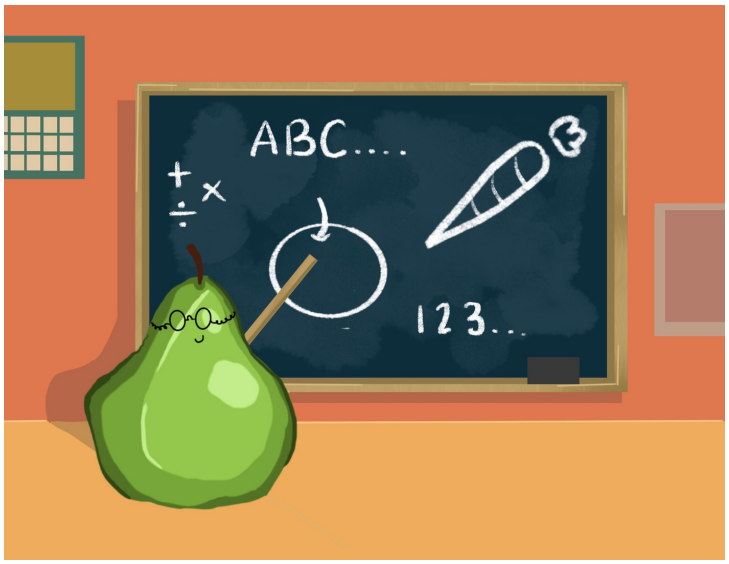
It has been seven years since the United Nations launched the Nutrition Decade, a program that seeks to advance the execution of numerous programs to achieve the targets set for global nutrition and chronic diet-related diseases by 2025. The Nutrition Decade's framework for action aims to increase visibility, promote awareness, improve coordination, bolster collaboration, and track progress towards building sustainable solutions to ensure nutrition security for all. Nutritional education and social protection play a pivotal role in reaching these targets [1].

Nutrition education is crucial for K-12 students, as they need to learn how a healthy diet influences their emotional well-being and how their emotions can affect their eating habits. The Food and Agriculture Organization of the United Nations (FAO) has established a transformative vision with school-based food and nutrition education (SFNE), a key strategy to building long-lasting food outlooks and eating habits that focus on improving the health and overall well-being of children and their families. SFNE encourages school communities to foster healthier and more sustainable food practices and works to promote positive changes [2].

One of SFNE's chief initiatives is integrating nutrition education into the school curriculum, a key area of focus in Africa, where food security is a major social concern. FAO is helping Kenyan school curriculum establish contextualized teaching that focuses on food production, accessibility, food safety, nutrition, and production economics. Through these efforts, they aim to help stabilize food security in the country, as well as increase support for digital learning [3].

Another key initiative taking place in Africa is the design and implementation of sustainable, holistic school-based nutrition programs to combat recurring droughts and socioeconomic vulnerabilities. Cabo Verde's National School Feeding and Health Program serves as a prime example of this initiative. This program has helped CaboVerde transform their basic school-feeding program into a more comprehensive solution including school gardens, local produce, and nutrition education in schools. With this program, more than 86,000 children receive school meals in Cabo Verde, and the school meals program contributes greatly to the 96 percent enrollment rate of its schools [4].

Establishing school gardening programs as an effective learning platform to promote healthy eating habits is another SFNE focus area — especially in Asia and Australia. Australia's Kitchen Garden Program teaches students how to grow, harvest, and prepare fresh food while developing positive habits for life [5]. In China, the Southwest China Childhood Nutrition and Growth study (SCCNG) promotes gardening for children aged 9-12 years, encouraging them to maintain diaries about plant growing and cook new recipes using this produce during their summer break [6].



Artwork by Flavia Scott '24

Before summer vacation, children receive seeds of fast-growing vegetables, and they must plant them at home and record the life cycle of the seeds' growing into vegetables. SCCNG also released a food-related board game — called the Dream Farm — to teach students about recommended dietary guidelines.

In Latin America, FAO partnered with Brazil to establish a school feeding program — the Strengthening of School Feeding Programmes in the framework of the Hunger-Free Latin America and the Caribbean 2025 Initiative — that successfully provides nutritious meals and culturally-appropriate nutrition education to over 26,000 students. The program also includes a learning platform for school nutrition courses to allow stakeholders in the field to share their experiences. The Brazilian sustainable schools model has expanded into over 14 countries in Latin America and the Caribbean [7].

In the U.S., students receive less than eight hours of required nutrition education each school year, far below the 40 to 50 hours that are needed to affect behavior change [8] . The Center for Disease Control and Prevention (CDC) asserts that nutrition education needs to be a vital part of a comprehensive health education program in schools, and launched the Whole School, Whole Community, Whole Child (WSCC) model, which is a student-centered, unified and collaborative approach to learning and health. The WSCC model integrates nutrition across the framework, providing evidence-based strategies and practices to promote access to nutritious food choices and healthy eating behaviors across the school setting. It includes nutrition education as part of a comprehensive health education curriculum, aligned with the Dietary Guidelines for Americans 2015-2020. The model fosters family and community involvement by encouraging schools to provide materials about school nutrition programs and nutrition education in languages that students and parents speak at home and by linking schools with out-of-school programs that promote healthy eating.

Although schools around the world are implementing nutrition education initiatives, school health and nutrition programs have deteriorated in recent years due to the pandemic and the lack of policies to ensure healthy school environments. The mid-term review of the Nutrition Decade, published in 2020, noted that the level of training for health workers on maternal, infant, and young child nutrition is often inadequate. Therefore, the review recommended designing nutrition-sensitive social protection policies, promoting engagement from civil society organizations and research institutions, ensuring adequate financial and human resources, integrating food and nutrition education into national plans, and increasing the number and quality of nutrition professionals [9]. A continued focus on nutrition education and social protection will be essential in meeting the goals of the Nutrition Decade.

Therefore, the review recommended designing nutrition-sensitive social protection policies, promoting engagement from civil society organizations and research institutions, ensuring adequate financial and human resources, integrating food and nutrition education into national plans, and increasing the number and quality of nutrition professionals [9]. A continued focus on nutrition education and social protection will be essential in meeting the goals of the Nutrition Decade.

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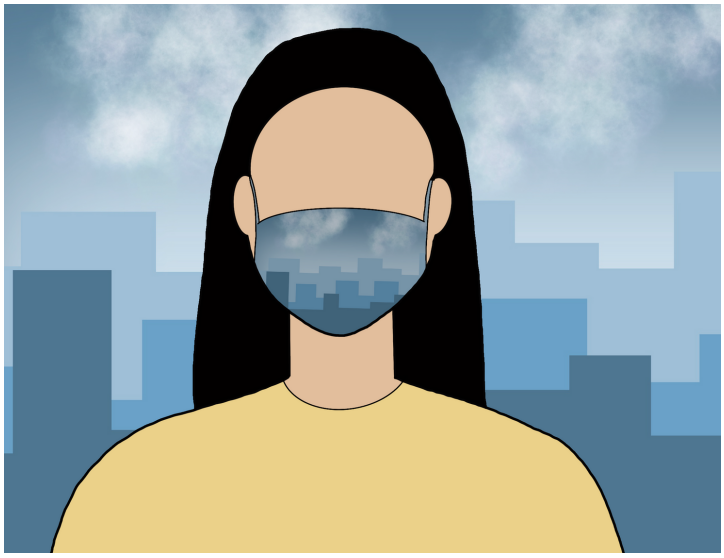
Air Pollution: The Invisible Killer

by Nihan Ercanli, Human Biology, Health and Society '24

The human health consequences of air pollution are often forgotten in conversations surrounding climate change. Yet, research has already shown that air pollution is responsible for millions of deaths worldwide. For example, one study found that in 2012, the fine particulate matter emitted from fossil fuel was responsible for 10.2 million excess deaths globally [9]. Fine particulate matter (PM2.5) is responsible for a plethora of diseases, such as chronic obstructive pulmonary disease (COPD), cardiovascular diseases, lung cancer, atherosclerosis, and more. Highlighting the dangerous effects of air pollution on human mortality will hopefully push policymakers to seriously consider these impacts when creating policy related to infrastructure, transportation, and other areas that intersect with climate change.



Arrtwork by Aleena Li ' 24

PM is broadly defined as the mixture of solid and liquid particles in air, and PM2.5 specifically defines particles that are 2.5 micrometers and smaller, allowing for them to enter the bloodstream and lungs [4]. PM2.5 originates from a variety of sources, such as fossil fuels, automobiles, power plants, and wildfires. Fossil fuels are directly tied to climate change through the production of greenhouse gasses, of which 40% are created by the industrial sectors globally [1]. As forests become drier with less precipitation and warmer air temperatures, the possibility of wildfires increases [2]. Thus, fossil fuels are not only generating their own PM2.5 but are exacerbating wildfires that also produce PM2.5. In addition, smoke from wildfires can travel thousands of miles, settling in areas seemingly unaffected by the fires.

Of note, the concentration of PM2.5 in urban areas has decreased globally since 2000. However, 2.5 billion urban inhabitants still live in urban areas where the PM2.5 concentrations exceed the World Health Organization's standards, highlighting the very real exposure risk that many people, often unknowingly, still have to it [8].

PM2.5 is harmful to a variety of human physiological systems. One of its most detrimental effects is that it has been found to induce oxidative stress in cells, leading to damage of respiratory epithelial cells [6]. Additionally, PM2.5 has been found to stimulate inflammation of the respiratory system, exacerbating conditions such as COPD and asthma [5]. Furthermore, PM2.5 contains carcinogenic agents, triggering mutations and changes in biochemical processes across human cells, ultimately leading to a variety of cancers [6]. The structural and chemical changes caused by PM2.5 subsequently increase the risk of the aforementioned diseases, and many more.

Both small and large scale studies have been conducted to grasp the true effects of PM2.5 on humans. One study in Massachusetts found that, although long-term exposure has a much greater association with mortality, even short-term exposure to toxins like PM2.5, ozone, and nitrogen dioxide were significantly associated with an increase in mortality [10]. Of note, another study conducted with US veterans over a span of 10 years found that 99% of deaths from non-accidental causes were associated with PM2.5 concentrations that were below the Environmental Protection Agency's national standards, bringing up the question as to whether the threshold for danger to human health should be changed [3].

Fossil fuel related emissions have been found to account for 65% of excess deaths globally, and models that estimate the benefits of a phaseout of these fuels have shown that 3.61 million lives per year could be saved [5]. Of note, the avoidable mortality that would result from this phaseout is higher than the avoidable mortality from issues like unsafe water and sanitation. Clean energy sources, which are already being explored with more urgency, would ultimately save the lives of millions. They could also reverse the detrimental effects that fossil fuels have had on the environment, such as the increase in droughts, thus highlighting their importance on a global scale [5]. In return, this would also benefit the fight against unsafe water and food insecurity, creating a positive cycle of environmental regeneration that benefits humans in invaluable ways.

Climate change is a prominent threat but is rarely discussed in the context of human health, which is a great disservice to communities and people worldwide. Numerous studies have concluded that air pollutants are significantly associated with a large portion of deaths worldwide—deaths that could have been avoided in many cases. Further research has shown the link between air pollutants and its damaging effects on bodily processes and pathways. The approach of framing the issue of climate change in a human health perspective has not been widely implemented. However,it is one possible path to incentivizing the need to phase out industries that directly fuel the vicious cycle of climate change, which leads to the death of many innocent lives and crippling even more.

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Truly SMILE(ing) After Eye Surgery?

by Evelyn Kim, Human Biology, Health, and Society '25

LASIK eye surgery is the most common refractive eye surgery used to fix one's vision today. However, the latest surgical procedure, SMILE has increasingly become popularized within the ocular community. SMILE stands for Small Incision Lenticule Extraction, which is where a small incision is made around the cornea of the eye to extract the lenticule for reshaping the cornea and allowing for clearer vision. However, since it is a newer procedure, first performed in Germany in 2007 and more widely performed starting in 2011, there is still a lot of room for error [1,4]. Prospective patients are advised to do thorough research before deciding to get this procedure.

LASIK and SMILE are procedures that improve one's vision so that they no longer have to rely on glasses and contacts. Both are known to have a fast procedural time, taking a maximum of 15 minutes for both eyes in LASIK and 10 minutes total for SMILE [2,3]. The visual recovery time is also very fast, starting even a day after surgery for LASIK and taking up to about 3 days for SMILE [2]. The most common post-operative discomforts include the feeling of scratchiness, the sensitivity to bright lights, and involuntary tears which can last about 4-5 hours after surgery for LASIK and 1-2 hours for SMILE, although actual times may vary between people [2]. Therefore, it is important to wear sunglasses and have a designated driver after the procedure. The pain may feel more severe than ophthalmologists tend to claim, which is something to keep in mind as well.

SMILE has recently been the recommended choice by ophthalmologists for patients that are eligible for either LASIK or SMILE (thick cornea), who have high myopia going up to -10 diopters and astigmatism of up to 3 diopters, and/or play sports because there's less exposure of the eye to the outside environment during the surgery [3]. Instead of requiring two lasers for the procedure as is the case for LASIK, SMILE uses only the femtosecond laser, a more effective alternative because it it internally carves out a lenticule in the corneal stroma instead of creating a flap on the outside surface [1]. Hence, SMILE offers the avoidance of flap complications and severe cases of dry eye, a common postoperative complication [1]. Studies have also shown that SMILE has high efficacy, safety, and predictability like LASIK, but fewer effects of halo vision and night blurriness, which are common in LASIK patients [4].

However, it is crucial to note that both intraoperative and postoperative complications still exist with SMILE. I have experienced some of these complications this past summer after getting the procedure done in South Korea. I had severe myopia with a prescription of -8 and astigmatism in my right eye. I was only 18 years old and usually ophthalmologists recommend it to patients who are older than 22 years old since eye prescriptions have not yet reached a stable point [3]. Despite my age, the eye exams confirmed that I had no eye problems so I agreed to do the procedure blindly without doing my research. My desire to finally be free of glasses and contacts got the better of me.

Artwork by Nabiha Zaman '23

After the surgery, it resulted in much disappointment. Weekly visits to my ophthalmologist always ended with him saying, "don't worry, your vision will get better the following week." But it never did. I returned to the United States at the end of summer needing a glasses prescription of -1.25, which was a lot better than -8, but not the 20/20 vision I had envisioned.

Frustrated with this outcome, I started doing the research I should have done before getting the procedure with the hopes that prospective patients would not make the mistakes that I did. In a clinical study that compared the differences in visual recovery after SMILE eye surgery to patients' preoperative vision, Tay et. al. found that, although after 1-3 months, patients with lower myopia and patients with higher myopia both reached very good visual outcomes, 41.2% (88/214 eyes) did experience undercorrection of their vision [5]. Although not confirmed by my ophthalmologist back in Korea, I believe that my astigmatism could have been undercorrected, which would explain my suboptimal vision. Possible factors that could have caused this undercorrection are imperfect centering of the optical zone in the eye before surgery or a slight movement of the patient during the procedure [4,6]. SMILE does have a steeper learning curve, which also could have had an influence. But it would be unfair to only hold the ophthalmologist responsible when I, the patient, could have better followed my post-surgery instructions by reducing my screen time. I still wonder if that would have actually helped my outcome or if it was a way for the ophthalmologist to justify what happened.

All in all, I should have done my research before going into the procedure. However, on the positive side, a SMILE retreatment in the future could possibly help. I can see much better without any visual metrics and I am planning to get contact lenses prescribed soon for personal convenience. Hopefully in the upcoming years, more will be known about SMILE's visual recovery curve and methods on how to reduce complications or unfavorable outcomes so that prospective patients can form realistic expectations and have a better understanding of SMILE.

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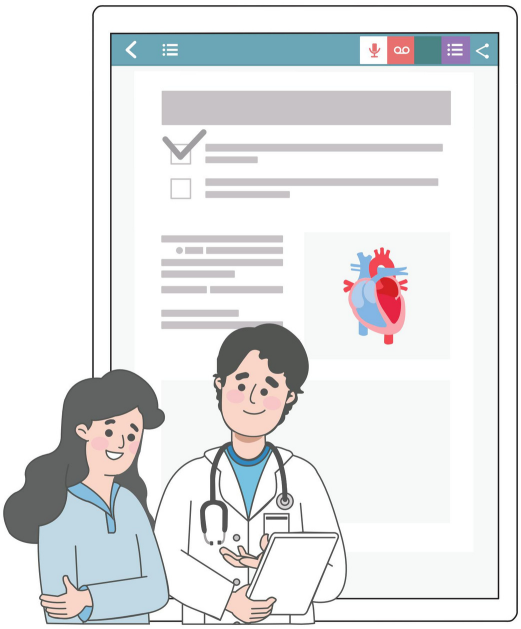
The Hindrance of Healthcare IT

by Gina Lombardo, Health Care Policy '24

Industries are constantly being revolutionized by the implementation of new technologies which aim to improve efficiency and deliver consumer satisfaction—especially within healthcare. As we progress into the digital age, healthcare professionals are beginning to rely more heavily on technology to diagnose a wide range of complex illnesses. Such technologies are constantly being developed and deployed in clinical settings in an effort to better treat and care for the ill. While such innovation has led to great advancements in medicine and improved health outcomes, not every piece of new technology has been a home run. In fact, many providers and experts within the industry have a laundry list of complaints about new technologies and the barriers these technologies produce [4].

There are a lot of fears that surround the notion that technology can replace human providers completely at the cost of patient-doctor relationships. "Patients generally feel more at ease with their situation and have more confidence in the diagnosis if they have a personal relationship with the provider," says Paul Cooper, CIO of consumer data analysis group at NRC Health. "If you are on a first-name basis with a provider and they know who you are, then the news they provide is going to be taken so much better as opposed to situations where the provider knows you from a technical perspective — they know your chart, your lab work, but in the five minutes they're in the room with you they're mostly looking at those data points and not engaging with you as a person. They may have a ton of information about you in the EHR [Electronic Health Record], but if they don't stop and pause to get to know you as a person, I think their impact is going to be less. The patient is going to leave that visit with a less positive perspective" [5]. The main issue with the reliance on electronic health records is not with the data itself, but the time burden that such technologies place on clinicians making it difficult for them to have ample patient interaction.



Artwork by Ashley Kim '23

Studies have shown that for every one hour spent face to face with a patient, a physician spends two hours facing the screen of a computer dealing with EHRs. Ironically, the same technology created to better patient experience is worsening it by distancing patients and providers. This causes concern for burnout among physicians, as they did not go to medical school to deal with technology, but to pursue their passion for healthcare.

Besides the issue of lessened interaction, the safety and security of EHRs come into question. If doctors are reliant on such systems to tell them about their patients, what happens if such technology goes away? EHRs centralize all patient and care data into one platform, which makes them vital to the function of a provider's role. However, we hear of technology failing to perform too often to place our full trust in it, especially within a healthcare setting. "The slightest troubles with completely digital healthcare systems can severely hinder a doctor's ability to provide quality care for their patient," said Dr. Peter Kilbridge in Computer Crash-Lessons from a System Failure [3]. Such service interruptions can not only be stressful for providers, but potentially deadly for patients. An example of a complete system failure occurred in 2002 at Beth Israel Deaconess Medical Center in Boston, where the whole hospital crashed due to an overload of information being inputted into the records system. The hospital operated by pen and paper until the issue was resolved and made providers truly realize how reliant their jobs were on such technology, raising many doubts. "The increasing reliance of hospitals on information technology raises larger questions about the vulnerability of clinical and administrative operations to technological disruption," said CIO John Halamka [2].
Worse than a system failure, a data breach of EHRs can expose some of the most personal and intimate details of a patient's life, and trusting technology to keep it safe is not entirely reasonable. You cannot have a conversation about health informatics without ensuring data security. Hospital executives, boards, and information-systems departments must engage in an ongoing process of assessing the risks, costs, and benefits of information technology, while also structuring investment and management decisions accordingly.

The inefficiencies of healthcare information technology remind us why it is important to always build upon patient and provider relationships and keep healthcare as human as possible.
While the use of these systems can be beneficial, doctors must make an effort to get to know their patients outside of their charts, and patients must advocate for the privacy and security of their information. Health care information technology should not be central to how we provide and receive care, but be a useful tool that aids in the experience.

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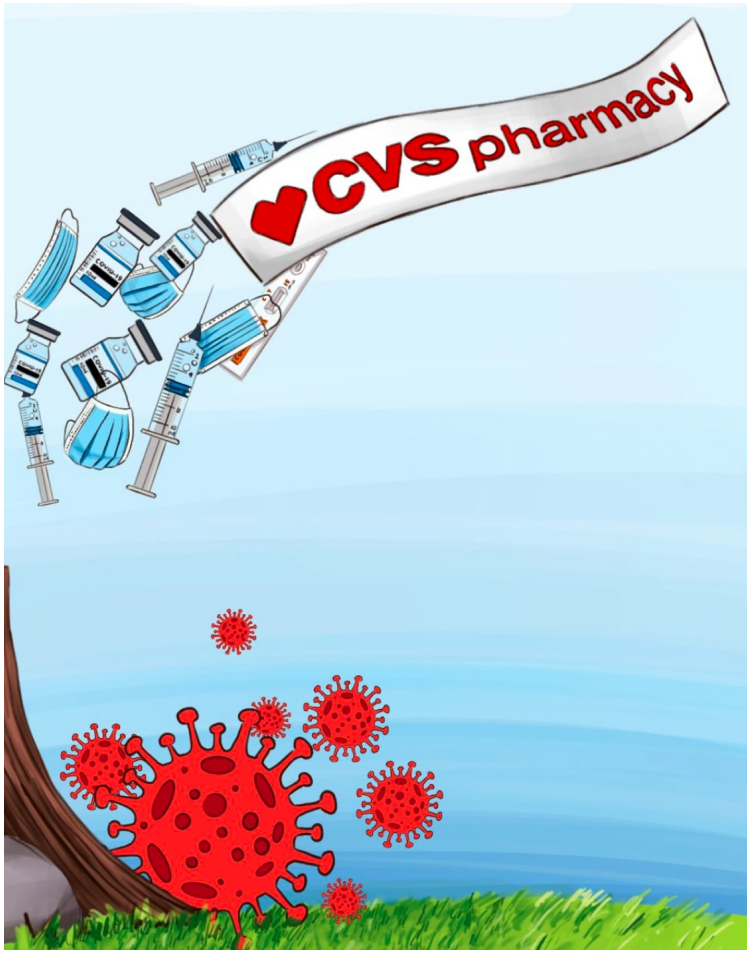
CVS's Strategy to Navigate the Post-Pandemic World

by Odhran King, Applied Economics and Management '23

When we think of CVS, we usually visualize a typical street-corner pharmacy, equipped with every product from makeup to greeting cards to prescription drugs. With more than 9,900 retail locations across the U.S., CVS is a market leader in the healthcare industry, with a strong brand identity that resonates with consumers across the country. Under their guiding principle of "making healthier happen now," CVS strives to service more than 110 million customers with a broad variety of healthcare products and consumer goods. To continue with this mission, CVS follows an overarching strategy of "improving access, lower[ing] costs, and enhanc[ing] health outcomes" by engaging customers "when, where, and how they desire" [1]. However, the COVID-19 pandemic has fundamentally redefined how people interact with the healthcare system, and CVS needed to significantly change its approach to consumer engagement to remain competitive in a rapidly evolving market.

Like many pharmacies across the world, CVS initially grappled with the challenges of the pandemic. Navigating issues such as skyrocketing infection rates, struggling supply chains, and consumer stockpiling, pharmacies struggled to provide healthcare amenities to customers in a safe and secure environment [2].

Despite these challenges, pharmacies soon adapted to provide a critical set of services at a time when the U.S. healthcare system was thoroughly overwhelmed. According to the National Pharmacy Association, 35% of patient respondents claimed to have visited a pharmacy in place of their general practitioner during the pandemic. Of this segment, 42% were related to minor illnesses and 33% were related to medicine access. Starting at the height of the pandemic, pharmacies acted as a primary point of care for many patients looking for flexible, affordable medical care, with the NPA recently categorizing local pharmacies as "integral to a functioning system of primary care" [3].



Artwork by Phoebe Ahn '23

Pharmacies like CVS played a key role in COVID-19 treatment and vaccination. In 2021, CVS administered approximately 32-36 million doses of the COVID-19 vaccine [4].
According to Chief Financial Officer Shawn Guertin, vaccine and testing volume in 2021 generated approximately $3B in revenue. Unlike other pharmaceutical companies, which struggled to adapt to the changing market, CVS presented strong growth in the 3rd and 4th quarters of 2021, with revenues being up 10% annually [5]. However, the national decrease in COVID-19 cases in recent weeks suggests a gradual approach towards a post-pandemic world, and analysts predict that revenue from CVS's vaccinations and testing will decline by 30-40% in 2022 [6]. In order to maintain its current growth trajectory, CVS must adjust its business strategy to evolve with the rapidly growing digitized healthcare space.

Two main areas of growth for pharmaceutical companies during the pandemic included rapid healthcare services and digital healthcare technology. Companies such as UrgentCare demonstrate the value of quick, convenient medical care, and online platforms such as Amazon Pharmacy allow consumers to purchase pharmaceutical treatments from the comforts of their own homes. To avoid redundancy in this industry, CVS is working to develop new sources of value by "expanding into next generation primary care delivery and health services" [1]. With artificial intelligence, digital monitoring, and other technologies breaking into the healthcare space, there are many opportunities for CVS to redefine its approach to rapid and direct care. CVS has correctly realized that healthcare, like many other industries, is unlikely to return to its pre-COVID state, and proactivity in adjusting to our new reality will serve to benefit CVS for years to come.

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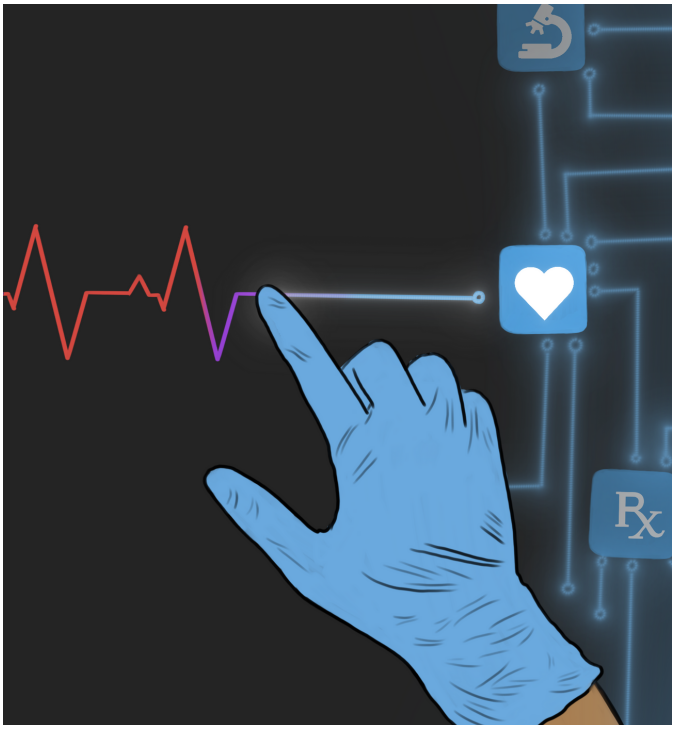
Solving the Physician Shortage Through the Screen

by Eunice Ju, Human Biology, Health, and Society '24

You are sick. You walk to the hospital to see doctors and nurses overwhelmed and overworked. You wait hours for the clinician to finally see you, but they spend more time entering information into a computer than talking to you face to face. This is the reality for Americans living in the healthcare worker crisis. The number of sick patients is increasing faster than the number of newly trained healthcare workers in America. The hospital subsector's workforce has decreased by nearly 90,000 people since March of 2020 [1]. The pandemic amplified how healthcare workers are not being accommodated and rather, are forced to put their personal lives at risk and sacrifice their safety and time with family (which more people are not willing to do). Implications of this shortage include longer wait times, slower diagnosis rates, and less personalized care. Ultimately, the current trend in healthcare workers cannot sustainably address the medical needs of the growing population. But why is there a healthcare shortage? Currently, resident physicians work up to 80 hours a week while being trained in high-stress environments. Furthermore, it is becoming increasingly difficult to delegate the tasks of a hospital effectively. Doctors spend their valuable time entering information into electronic medical records when they could be spending more time building meaningful relationships with their patients. One study found that clinicians spent approximately 5.9 hours of an 11.4-hour workday on electronic health record (EHR) data entry [2]. To combat this, artificial intelligence is able to minimize the damage from the growing health practitioner shortage.

The most pertinent problem that artificial intelligence could address is EHR data entry. There are software solutions that automatically send information from monitors to a patient's chart which could eliminate errors when entering data like blood pressure, temperature, weight, and pulse oximetry [3].
Patients could be triaged (assigned priority of care) by completing a questionnaire that is then run through an algorithm.
One prospective cohort study found that, compared to the traditional triage system's 1.2% mis-triage rate, the mis-triage rate in a machine learning system assisted group was 0.9% [4]. The machine learning systems, along with real-time explanations for triage officers, were able to significantly lower the mis-triage rate of critically ill ED patients. Additionally, software that can read CT or MRI scans could assist radiologists with detecting anomalies on scans. These methods rely on predefined engineered feature algorithms with explicit parameters based on expert knowledge and large amounts of data. These technologies are designed to identify specific radiographic characteristics, such as the 3D shape of a tumor or the intratumoral texture and distribution of pixel intensities (histogram) [5]. These AI technologies could improve patient outcomes by reducing common human errors and lowering the current limitations of human organ supplies.
Current organ transplant lists are long because demand highly outweighs supply. AI technologies can be used to determine the organ transplant priority and even help match donors to patients.
Beyond the hospital, supercomputers can be used to speed up clinical trials for drugs.

This has the potential to decrease the risk of participants in clinical trials and quicken the process of delivering the most effective drugs to consumers. Even pharmacies are shifting to digital sorting methods and online deliveries that reduce the cases of wrong medication deliveries and decrease the time it takes for patients to receive their medication.



Artwork by Ishani Chopra '24

Ultimately, the applications of artificial intelligence in healthcare are nearly endless, and they offer a promising solution to multiple issues in the healthcare industry. However, the most pertinent issue that technology in healthcare is able to address is provider burnout with the end goal of improving patient outcomes and delivering quality care to all patients.

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Insulin Independence: A Stem Cell Cure

by Vikash Sabharwal, Global and Public Health Sciences '25

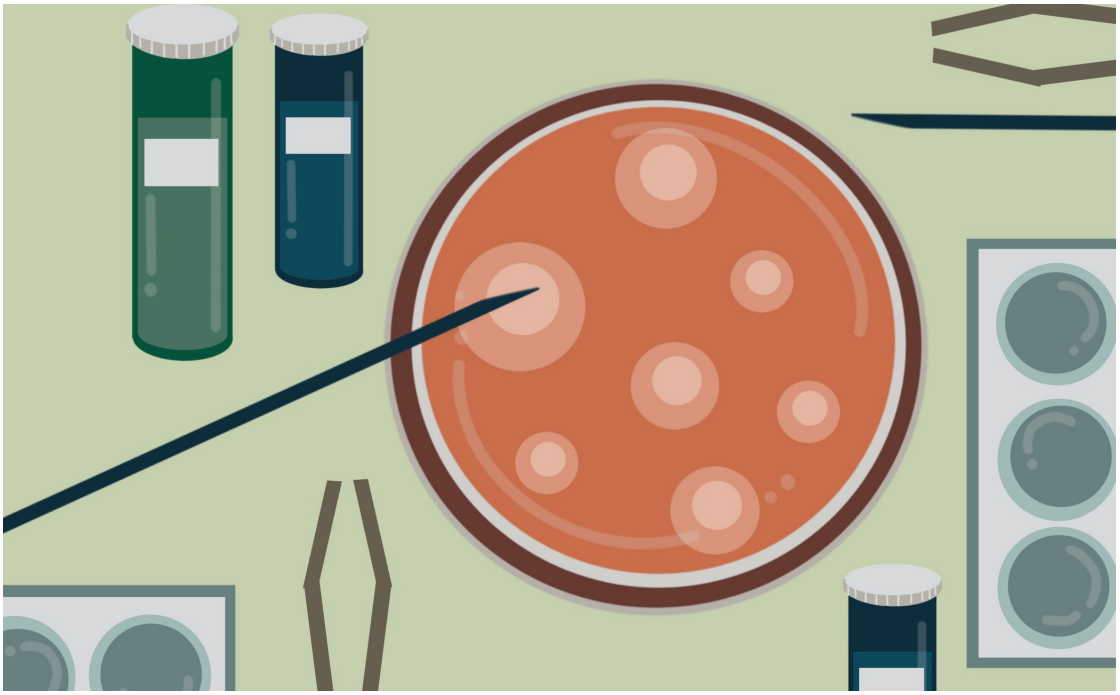
As she scrolled through her annual lab results, she was expecting the usual cascade of results, but her heart skipped a beat and began racing once she came across an usually high number. A couple of phone calls and appointments later, she had to face the harsh truth she was so adamant to avoid. Her kidneys had been permanently damaged, the ultimate connection being made to her type 1 diabetes. She had been diagnosed at nine years old, but did not expect any major repercussions until well into old age. Type 1 diabetes mellitus is an autoimmune disease in which one's body is unable to produce insulin — the hormone needed to process sugar intake. For those who do not get insulin through injections or insulin pump therapy, this disease can be fatal. Even for those with access to medicine, the possibility of death and disability is increased through complications arising from the disease such as stroke and blindness [2]. The possibility of a cure is so enticing because it could prevent the onset of such complications and give millions of people around the world a new experience of life free of constant stress and worry.

Currently, to reverse type 1 diabetes and essentially cure it, a patient would have to receive a pancreas or islet tissue transplant. However, the success of such an intervention is likely to be extremely low. Not only are there not enough donors for this type of transplant, but the likelihood that someone would be able to produce insulin following such a treatment is not high [4]. This outcome does not fit the definition of a cure for the disease, for which the main criteria is the ability of the body to produce insulin independently for a sustained period of time [3]. The reality of a cure seemed like an impossible feat until quite recently, when the use of induced pluripotent stem cells was able to cure one man from Type 1 diabetes permanently in 2021 [6].

While this cure has its drawbacks, such as a required regimen of immunosuppressants with known side effects, the options it provides to diabetics could mean better health outcomes and independence for patients worldwide.

The cure, coming to fruition in 2007, uses induced human pluripotent stem cells. These are stem cells that come from human body cells, such as skin cells, which are then differentiated into cells with specialized functions [4]. With type 1 diabetes, the stem cells are specifically differentiated into "insulin-producing islet β cells" -- cells which are destroyed in individuals who have type 1 diabetes mellitus [6]. The presence of these cells in patients would allow them to produce insulin on their own and forgo the use of injections or needles to manually administer insulin [1]. Although this cure sounds very promising and exciting, it is still too early to celebrate.

For the first person to essentially be cured from diabetes, a serious question to consider is the advantages of being able to produce insulin independently versus the costs of taking immunosuppressants. Immunosuppressants are needed to prevent the body from rejecting the stem cells [2]. However, they may cause side effects that adversely affect a patient's quality of life and health. This would primarily be through increased susceptibility to infections [5]. Thus, the feasibility of a cure must be weighed against the impact on a patient's overall ability to live life with good health. The cost of the cure, especially for patients who are unable to afford it, must be explored as well. This would enter an ongoing conversation about the cost of insulin — a cost which has proven to be fatal to many. Another important factor to consider is the efficiency



Artwork by Flavia Scott '24

with which the pluripotent stem cells would produce insulin in the body of the patient in which they are placed [6].

If insulin production is not high, then the cure would not be feasible and the patient would require other forms of insulin to replace the insulin that is not being produced. However, these factors should not discourage hope that an effective cure may one day become a reality.

Although stories of those facing complications as a result of diabetes cannot be changed, the possibility of independent production of insulin is promising to prevent these stories from continuing and damaging more lives. To ensure an expansion of options for diabetics worldwide, more research should be conducted on the benefits and drawbacks of stem cell therapy as a cure. To create such an option could mean a new life and new possibilities for patients suffering with this difficult and complex disorder.

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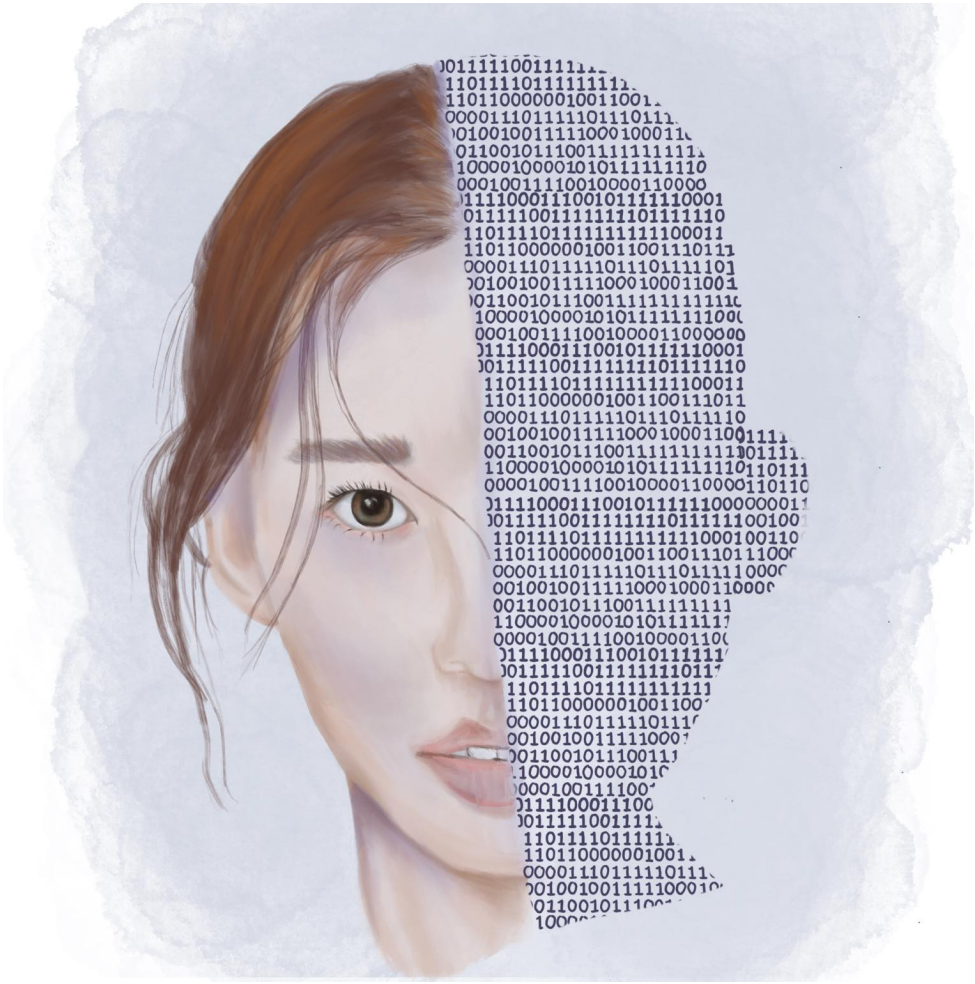
Electronic Health Records: Are they helping or hurting?

by Yoojin Jung, Human Development '23

Technological development has led to both major medical breakthroughs and improvement in quality of life for patients on the receiving-end of new therapeutic interventions. One major medical advancement, though not necessarily the first that comes to mind, includes electronic medical or health records. Electronic medical (EMR) or health records (EHR) not only make the record-keeping itself easier, but also allow for more efficient use of the information stored in these systems. Furthermore, by using EMR or EHR, doctors are able to communicate with both their patients and colleagues more conveniently. Accessibility to patients' past medical histories is a key tool present in EHRs and EMRs, especially as rapid access proves imperative in cases of emergency. Unfortunately, although EMRs have brought convenience to several different processes within the healthcare space, they have also been criticized for their negative effect on several elements of medical practice.

For example, EHRs put a strain on non-verbal communication during consultations, as physicians tend to make less eye contact with their patients. This has been shown to hinder engagement and productive conversation between patient and provider [2,3]. Reduced engagement has the potential to cause further downstream effects, as patients may be discouraged to take initiative when addressing medical concerns.

Moreover, there are issues concerning patient privacy and confidentiality in health records and medical histories. Patients are concerned with the accuracy of this information, as it is not easy to change errors that physicians or other health care providers make [6]. Some individuals have expressed the desire to have more control over their records via the ability to fix incorrect information or remove information they feel uncomfortable sharing with future healthcare professionals in their care network. Other patients are concerned that different health care providers can contribute to shared files, as this often creates discrepancies within their medical information. In this case, patients frequently have to answer the same set of questions when interacting with different health care providers, which further affects the patient-provider interactional experience. Another flaw with EHRs is that they lack a "collection of psychosocial and emotional information" [5]. Without complete access to information on the patients' mental health and social well-being, physicians are not able to provide the individualized attention that their patients need. This disconnect may lower the quality of the time that they spend together, with significant impacts on a patients' desire to continue seeking care and addressing their health concerns.



Artwork by Romya Stromza '22

Furthermore, EHRs are one of the most commonly-cited burdens among physicians. For healthcare providers, documenting in EHRs is one of the leading reasons for burnout at work [4]. This is due to the fact that they often have to document these records after work hours. Such mental and emotional challenges can further increase dissatisfaction and lead to greater difficulties in showing up as authentic care providers.

On a hopeful note, there are many ways in which health care providers can use EMRs or EHRs to their benefit while interacting with their patients. For example, there are specific “gaze patterns" that allow the patients to be more engaged and feel involved in the conversation. These patterns include patients looking at their EHRs, then doctors making eye contact with their patients, and vice versa [1,3]. This type of non-verbal communication is as crucial for the interaction as is verbal communication. The use of scribes can also lessen the burden on physicians and other health care providers when documenting in EHRs or EMRs [4].

In summary, while there are negative elements of EHRs and EMRs, use of these systems as “bridges rather than dividers” may enhance patient-provider interaction while holding on to the efficiency and convenience of common healthcare technologies.

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Organ Printing: Where it is Now

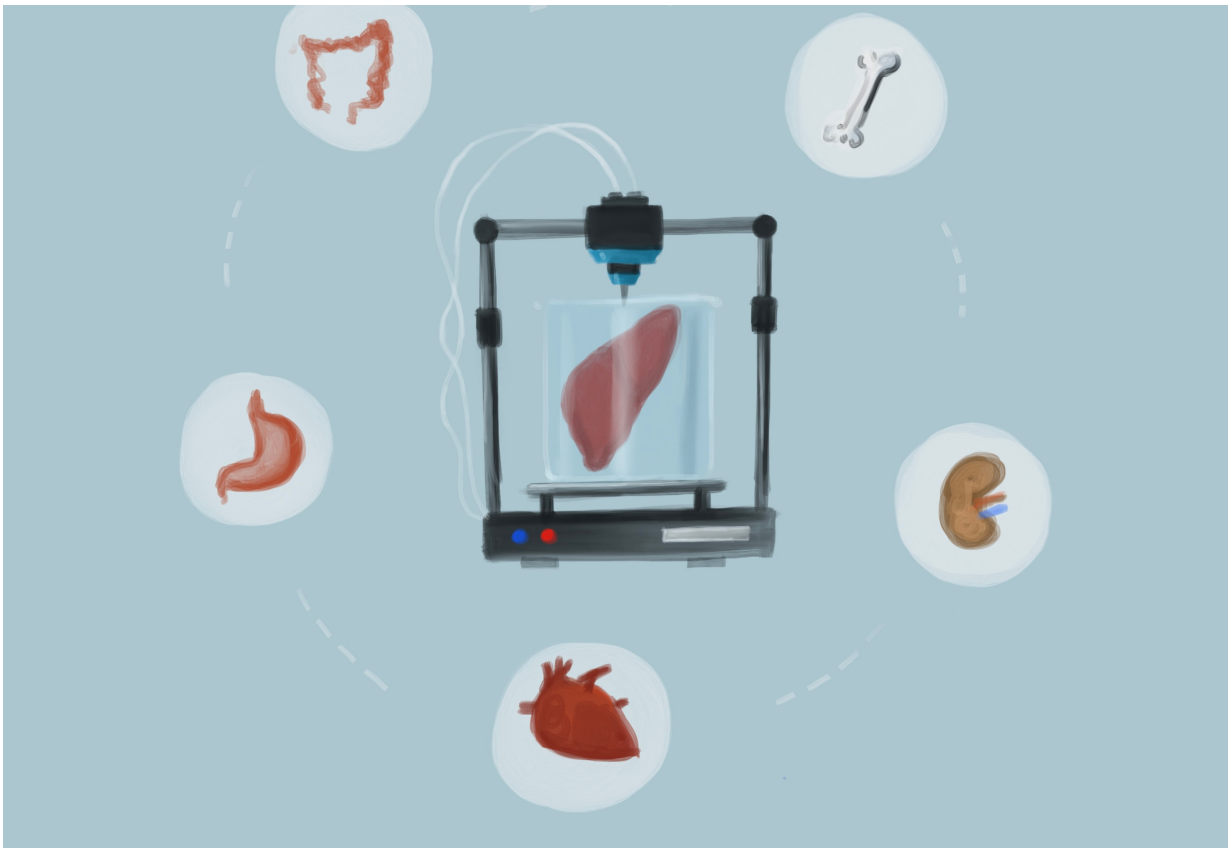
by Vivian Ding, Chemical Engineering '24

As of March 2022, there are approximately 106,309 people waiting for an organ donation in the US [1]. Out of this number, about 75% will fail to receive a transplant. Organ donation is largely hindered by donor consent, ethics, and general lack of understanding [2]. While many efforts aim to overcome the barriers by increasing the number of donors and maximizing the effectiveness of organ donations, some attention has turned towards alternative methodologies. With the advent of 3D printing, the option of artificial organs made with tissue engineering has become an increasingly viable alternative. This article will cover the technology behind the printing process, the current applications, and the future direction of the field.

Before covering what the technology can do, here are some basics about bioprinting. There are three main approaches to bioprinting: 2D biolayers printed on top of each other, porous scaffolding later filled with cells, and cellular self-assembly in cell aggregates. The three approaches are used in conjunction with current biological 3D printing tools. Among the available tools, the inkjet printer that can perform all aforementioned approaches is most utilized, where layers of cells are applied with minute jets of biological ink [3]. Since the inkjet printer has been considered the most likely technology to become the main method used, one of the current focuses for researchers has been finding better bioinks that can support a variety of cell types and structural stability [4]. However, since the different approaches are suited to different tasks, most bioprinting approaches use a combination of these methods [5].

While 3D organ printing has not been used *in vivo* for organs that are typically donated, it has been successfully used in printing multiple different types of grafts and full-size bladders. Although the combination of various cell types in an ordered manner is still slightly beyond the limitations of current technology, several cell types and structures have been independently manufactured and transplanted in the form of grafts. Grafts made from the patient's cells are advantageous for eliminating the risk of organ rejection and building the organ into needed shapes. Some grafts that have already been used are blood vessels, bones, and cartilage [6]. Regarding full organ transplants, Atala *et al.* (2006) demonstrated the transplantations of bladders made with the patients' own cells and the scaffolding method. The patients all showed significant improvements, proving the feasibility of using printed organs [7]. However, bladders are one of the simple organs to 3D print, due to the thinness and lack of cell differentiation and structure [3], so it may be a while before other printed organs are viable.

The target for future research is the assembly of complete organs. The current issue is that the current methods and technology are incapable of effectively creating the structure and precise cell differentiation required before the cells need to be introduced into a metabolically sustainable environment [5]. Therefore, currently tissue engineering is not cost-effective or feasible in a clinical setting. In the future, full organ printing will be needed to ensure long-term cell survivability and control stem cell differentiation [8].



Artwork by Alexandra Jin '23

One of the promising technologies is the use of nanocomposite bioinks, or tissue printing ink with minuscule components. These inks can help promote differentiation and cell growth [4]. Once these barriers are overcome, it is likely that 3D organ printing will begin to resolve the organ shortage.

Although 3D printing of the majority of organs to be transplanted *in vivo* is currently not possible, various manufacturing techniques and ongoing developments show that tissue engineering is a very promising field. Several uses of engineered tissues have already been used in the form of grafts and simple organs, such as bladder implants. In the future, it is likely that complex organs will be able to also be printed. Maybe this technology will be the solution to the organ shortage, and people who need an organ transplant will be able to receive the treatment without helplessly waiting years.

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Is Artificial Intelligence Invading Our Nutrition?

by Ganga Dripaul, Biomedical Engineering '24

Could artificial intelligence (AI) be planning your meals soon? Ongoing research indicates it may be our new reality. AI is a relatively new branch of computer science that uses software to mimic human intelligence to complete human tasks. Despite AI only being around for a little over half a century, it seems to be the way of the future, and researchers are trying to integrate it into the medical field, including nutrition. AI algorithms are generally useful when processing large amounts of data, which makes it ideal for processing nutritional data and "may help better understand and predict the complex and non-linear interactions between nutrition-related data and health outcomes" [1]. This new technology can aid nutritionists and provide patients with personalized meal plans, while factoring in the patient's genetic predisposition for certain diseases and weight management goals [2].

Healthcare is taking advantage of technology through apps such as Apple's Health app and smartwatches. AI seeks to build upon these technologies to reduce the need for human input, which requires lengthy planning and coding of exact steps, while also maintaining accuracy and efficiency. Machine learning is a subset of AI that aims for machines to use past data to understand how to react to and interpret data without having it explicitly programmed like traditional AI requires. Machine learning has already undergone a trial in Israel to determine its efficiency in diet optimization compared to a plan created by a dietician. The study was deemed successful and the technology is already implemented in the Day Two app, which aids users with their nutrition goals by suggesting modifications to the foods they already love [3].

Diet optimization is useful for weight management. An important aspect of weight management tracking intake through a food diary. Wearable technologies, like your smartwatch can replace a physical food diary and digitally track your dietary intake. Research is also being done for smartwatches to use sensors that track images, sound, and motion to recognize food and separate eating wrist movements from other movements [3]. Tracking sound allows the device to detect your chewing and swallowing noises to determine the quality of the food you're eating. For instance, "in a study using a tiny microphone embedded in an ear device, researchers created a sound-based recognition system that was able to distinguish between three test foods (potato chips, lettuce, and apple) with 94% accuracy" [3]. Likewise, image recognition can help devices identify the portion sizes you consume [3]. Given that "obesity is a public health problem that causes various health problems" [2] and the combined effect of AI being able to both track what you eat, as well as provide dietary assessments with that information can make dieting more manageable. Genetic disposition to diseases like cancer and cardiovascular diseases requires individuals to be more cautious of what they consume to avert life-changing illnesses.

Cancer is known to be a difficult illness to treat with unexpected side effects. One critical factor is "proper nutrition [which] is extremely important during treatment to fight cancer" [2] as "chemotherapy directly affects the nutritional status of these patients" [2]. Chemotherapy causes nausea, vomiting, and diarrhea which makes proper nutrition a monumental challenge but nutritional therapy can help the patient recover. The Dana-Farber Cancer Institute published a free nutrition app, Ask the Nutritionist: Recipes for Fighting Cancer, which provides personalized nutritional advice to "find the optimal diet for any type of cancer" [4]. Studies showed that in the app "the use of AI in the nutritional monitoring of people with cancer is still scarce, but some technologies have been used for adequate nutritional management" [2]. Although nutritional monitoring for cancer patients is scarce, a similar concept is being applied to cardiovascular disease patients. MenuGene is an automated menu planner that works to prevent cardiovascular disease [5]. MenuGene creates daily and weekly menu plans that avoid carbohydrates, proteins, and fats to achieve its goal of reducing risk of cardiovascular disease. Flavor compatibility between ingredients is also taken into consideration to increase user satisfaction and make it a practical plan [2]. Overall, advanced algorithms that consider your risk factors and lifestyle can help you manage and prevent chronic illnesses.

As with all new technologies, many mysteries surround the plausibility of AI use. AI relies on large amounts of data which raises a privacy concern on how companies acquire data needed for testing. AI collects a wide range of personal data which are susceptible to data breaches and corporation misuse [6]. In addition, biased data can obscure the effectiveness of AI because "the data collected must be a true representation of the population for which its use is intended" [6].

Artwork by Aleena Li '24

Another major concern is the replacement of human jobs with AI. While the future is uncertain, "one of AI's biggest potential benefits is to help people stay healthy so they don't need a doctor, or at least not as often" [7]. Currently, the goal of AI isn't to replace humans, but to support humans in a job that requires meticulous attention to detail that can be overlooked. AI has certainly begun to enter important aspects of our lives, including what we eat. It still needs at minimum a few more years of research before it can live up to its full potential in the nutritional field. Until then, it will continue to make an impact on our lives bit by bit, even if we take no notice.

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Psychedelic Therapy: Otherworldly Potential

by Ryan Levine, Biological Sciences '25

As strange as it sounds, it might take going out of our minds to feel more comfortable in our own. As the importance of mental health gains more attention within the scientific community and mainstream culture, innovative therapies have been designed and tested. Among these are a variety of psychedelics that have been shown to reduce issues such as depression and substance abuse. Drugs such as LSD or so-called magic mushrooms have been shown in clinical trials to provide lasting relief from depression and PTSD [4]. Moreover, psilocybin, the active hallucinogenic agent in magic mushrooms, was shown by researchers at Johns Hopkins to ease severe anxiety in cancer patients and even enabled life-long smokers to overcome their addiction and quit smoking [1]. While the precise interactions of these psychedelics and the brain are still being uncovered, the amazing potential of psychedelic therapies to combat extreme mental illnesses is inspiring and could even shape the future of healthcare and therapy.

The success of psychedelic therapy has been greatly impaired by legal classification surrounding its administration. In the 1970s, psychedelics including psilocybin were categorized as a schedule I controlled substance, given to drugs with "no currently accepted medical use and high potential for abuse" [3]. This decision heavily restricted research efforts to better understand how psychedelics could be used in medical settings. Any study of psychedelics had to be closely monitored. The studies were expensive, and the accessibility to psychedelics was limited.

Perhaps unsurprisingly, many researchers oppose this strict classification of psychedelics; despite what the schedule I classification claims, psilocybin has a very low risk of addiction or dependence and is generally non-toxic [3]. To many, the risks associated with psychedelics do not match the description of a schedule I classification, and the potential therapeutic benefits of psychedelics incentivize many concerned organizations to change this classification.

However, the limited research that was allowed provided support for the use of psychedelic therapies, which has sparked change in national perceptions of psychedelics. In 2006, a study of psilocybin by researchers at Johns Hopkins demonstrated the safety and positive effects of the drug, which opened the door for psychedelic research worldwide [2]. In the past few decades, Johns Hopkins has led global efforts to better understand psilocybin and even recommended that the psychedelic be reclassified as a schedule IV drug to facilitate its role as a therapeutic option for mental illnesses [5].

With gaining traction for psychedelic therapy, a new study that appears to have replicated the antidepressive effects of psilocybin without the hallucinations could pave the way for the accessibility of this treatment. By closely replicating the chemical structure of compounds such as LSD and psilocybin,

Artwork by Jack Waldman '23

researcher Dr. Shen Wang of the Shanghai Institute of Biochemistry and Cell Biology was able to create a non-hallucinogenic analog of the psychedelics. When injected into mice, the compounds were shown to work against depressive behavior in the mice, without eliciting hallucinations [4].

If this non-hallucinogenic analog could be transferred to human patients, the consequences could be revolutionary. Currently, psychedelic treatments must be closely monitored by healthcare staff due to the hallucinations, which drives up costs and lowers the accessibility of this treatment. Without hallucinations, psychedelic therapy could become the status quo, redefining the way we treat mental health illnesses.

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Music: Natural Therapeutic for Alzheimer's and Dementia?

by Alexandra Yiachos, Health Care Policy '24

Slumped in her chair, Estelle seems more like a statue than a person – eyes closed and breath shallow, flickering between asleep and awake. Then an eruption of trumpets cuts through the air, transporting the room to the 1950s with the jazzy, upbeat harmonies of Sinatra's "Same Old Saturday Night." She is suddenly Estelle again, singing along with the song, even laughing at the line, "coffee at the coffee shop," as if reliving a cherished memory. Estelle is one of the nonagenarian residents of a nursing home suffering from Alzheimer's, a neurodegenerative disease affecting memory and cognitive ability. She has no idea where she is, whom she is talking to, or what occurred just five minutes ago. However, her response to listening to music from her generation shows the power music can have on the brain.

With a continuously aging population, it is becoming increasingly important to find innovative solutions to care for the elderly. As the US population grows, so too will the instance of those suffering from gradual neurodegenerative diseases. In fact, according to a new study found by the Centers for Disease Control and Prevention, the US burden of Alzheimer's disease and related dementias is projected to double by 2050 [1]. Moreover, memory loss is not the only symptom of Alzheimer's. As loved ones' memory begins to fade, their physical capabilities also begin to deteriorate and, as a result, dependence on a caregiver or nursing facility increases. There are seven stages of Alzheimer's disease: normal outward behavior, very mild changes, mild decline, moderate decline, moderately severe decline, severe decline, and very severe decline [7].

Artwork by Angela Yuan '24

Each progressive stage of Alzheimer's requires more care for the patient as they continue to lose sense of themselves and their surroundings. In the severe stages of Alzheimer's disease, the patient begins to physically deteriorate as well. They may become bed-ridden and forget how to eat and drink. Mentally, they may experience delusions, forget their loved ones' names, and lose a sense of self [7].

Currently, there is no cure for Alzheimer's and dementia; the diseases are gradual and irreversible. Therapeutics exist, but they only slow down and temporarily improve symptoms. The question remains, however, whether medications aimed at slowing down the progression of an irreversible disease are really worth it. Patients suffering from Alzheimer's and dementia typically exhibit polypharmacy, meaning they take five or more drugs which may lead to higher prevalence of comorbidities, increased dependency on caregivers, and higher risk of death [2]. Despite taking Alzheimer's and dementia related medications, such as cholinesterase inhibitors, patients may not experience drastic improvements in memory as the diseases progress into later stages. Even in the short term, their memory may get better, but this is not a guarantee [3]. Rather than take medications that can increase instances of polypharmacy, side effects, and may even result in no improvement in conditions, natural therapeutics can potentially offer a better option to alleviate symptoms.

Music is stored in the part of the brain that is associated with long term memory, the limbic system, which is the last part of the brain to be affected by Alzheimer's [4]. Familiar songs from a patient's youth may trigger past memories and emotions. Even in later stages of dementia and Alzheimer's, music can lead to a number of beneficial outcomes: higher occurrence of positive moods, better management of stress-induced agitation, increased interactions with others, improved cognitive function, and movement such as dancing and feeding [4]. Music therapy is purposeful therapy that involves therapists working with patients to invoke memories, emotions, feelings, and sensations [5]. At the Institute for Music and Neurologic Function, researchers are committed to understanding how music therapy affects those suffering from neurological impairments including those suffering from strokes, dementia and Parkinson's. One study from this institute found that music therapy intervention could lower depression and anxiety in patients suffering from both early and middle stage dementia, as well as improve behavior [6]. In the early stages of dementia, it is best for music therapists to identify and compile a list of the patients' favorite songs then encourage them to dance and sing along to the music. In the middle stages of dementia, music can help improve balance or gait, enhance mood, and reduce late day confusion, also referred to as sundowning.

In the late stages of dementia, music therapy is utilized to help patients communicate feelings, stimulate memory, promote exercise, and can serve as a source of comfort [4]. In place of medication, music can act as a natural therapeutic used to soothe the suffering of patients and their families.

The ruthless, irreversible condition of Alzheimer's and dementia cannot be cured as of today. However, non-pharmacological therapies can help improve the burden of these diseases and allow for a greater quality of life for those suffering from them. Memories can be stimulated, exercise can be promoted and communication can be facilitated between the patients and their loved ones or nurses. To further advocate for the benefits of music therapy, the American Music Therapy Association should collaborate with the New York State Department of Health to establish music therapy programs in all nursing homes that will enable these patients to reap the benefits of music on the brain.

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Art Therapy for Parkinson's

by Aindri Patra, Biological Sciences '25

"It just takes you out of the disease," said Andrea Casson. "Parkinson's disease is feeling like you're losing control every day, and this reminds you that you're not" [1]. Andrea Casson is one of many participants in New York University's (NYU) clinical trial to help treat Parkinson's patients with art therapy - a clinical trial with promising primary findings.

Hopefully, Casson will not be the only one to see positive results with this Parkisons's treatment. Currently, about 60,000 Americans are diagnosed with Parkinson's every year, and more than ten million people across the world are living with the disease already [2]. Current drug therapies to help treat Parkinson's target the disease's symptoms by addressing the decrease in dopamine production associated with the condition. However, there are no ways to directly administer dopamine to the brain and, over time, these therapies lose their effectiveness [3].

These days, more people are open to using alternative therapy; one such alternative treatment is art therapy.

Art therapy is the process of using art to connect with people's emotions, body, and environment, and it can include activities such as painting and sculpting clay. Traditionally, this form of therapy has been used for improving mental health, often targeting anxiety or PTSD to promote self-esteem and self-reflection for patients in places like Veterans Affairs hospitals and psychiatric rehabilitation facilities. However, recently, art therapy is being considered not just as a psychological treatment, but also as a therapy that can directly improve the symptoms of neurological disorders such as Parkinson's.

In a study carried out by NYU comparing baseline fMRI data to data collected from Parkinson's patients receiving art therapy treatments, scientists found increased functional connectivity within brain networks responsible for attention and control in the experimental cohort. Additionally, they found higher eye-tracking capabilities and Navon test scores, a test used to identify letters [4]. In general, patients' visual-cognitive skills, visual exploration abilities, and motor skills–all features that are impacted in Parkinson's–saw improvement [4]. Across various studies, researchers have observed similar results showing that Parkinson's patients experience an increase in their pleasure through reward center activation, motor control, increased concentration, as well as an improved sense of self; all represent valuable physical and psychological benefits [5].

But why would this happen?

One suspected reason is that art therapy helps release dopamine, which is the neurotransmitter believed to cause Parkinson's. When a patient has Parkinson's, the neurons in the substantia nigra region of their brain begin to die, which causes a reduction in dopamine production [1]. This leads to a decrease in motor function and can lead to changes in sleep, mood, swallowing, vision problems, and more.

To target this, one major form of Parkinson's treatment is dopamine replacement therapy. However, art therapy is considered to be a way of triggering the same reward pathways of the brain in a natural manner [1].

However, it is far more complicated than just a reward pathway. Not only does art therapy activate the reward centers of the brain, but it also helps to stimulate primary sensory areas like the primary visual cortex, auditory cortex, memory zones, and emotional areas–creating a circuit that involves the whole brain [1]. This is especially important in Parkinson's as it affects all regions of the brain. For instance, one of the challenges faced by patients with Parkinson's involves difficulty distinguishing between colors. These patients also generally struggle to adapt to dark and bright lights, often due to irregular eye movements. Changes like these negatively impact an individual's sense of perception, often leading to freezing gait, in which patients cannot move and feel as though they might fall. Art therapy can help give patients a controlled environment for them to understand depth perception better, and process their surroundings without the stresses of their normal environment [1].

In addition, art therapy is far more affordable than traditional treatment options. Current treatments for Parkison's are extremely expensive, with medications costing an average of $2,500 per year [2]. Surgical interventions can cost up to $100,000 per person [2]. For many of the art therapy studies, professionals were willing to provide supplies, further reducing the burden of cost [6].

Unfortunately, there are concerns with art therapy. While art therapy can help people improve their motor functions, others may find the creative process frustrating and stress-inducing, arguably defeating the purpose of the treatment [7].

Artwork by Jack Waldman '23

On top of that, art therapy, much like other Parkinson's therapies, only focuses on the symptoms of the disease. This is why many support art therapy as a supplemental treatment only, despite its numerous benefits [5]. Regardless, art therapy has been shown to improve quality of life, which should always be the ultimate goal. Ultimately, while art therapy may help Parkinson's patients engage with their sense of creativity and innovation, its benefits are anything but imagined.

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The Power of the Placebo

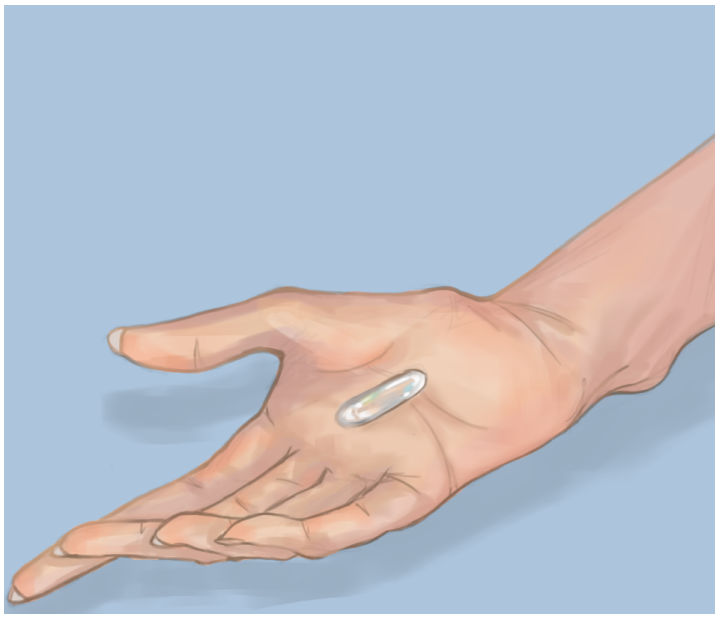
by Yaoyi Xing, Biological Sciences '24

Have you ever taken your mother's sacred herbal tea for a common cold and felt much better only to find out later onward that there was really nothing special in that tea?

Well, you're not alone. The placebo effect — defined as a beneficial effect produced by an inert treatment that occurs due to a patient's expectations — can be powerful.

One extraordinary example, discussed in the Journal of Projective Techniques, describes a patient who was diagnosed with an advanced, terminal cancer called lymphosarcoma [1]. All previous treatments had failed with the patient, Mr. Wright, and he had tumors all over his body. When a new drug called Krebiozen was released, Mr. Wright begged his doctor for the treatment. Despite his doctor concluding that Mr. Wright was too sick to qualify for the treatment, Mr. Wright's persistence finally swayed his doctor. Dr. West injected the drug into Mr. Wright on a Friday. On the following Monday, Dr. West was surprised to find that Mr. Wright's tumors miraculously halved, and within ten days Mr. Wright was discharged. Yet, in the next two months, many clinical trials reported no beneficial results with the new drug. Upon reading this, Mr. Wright lost hope in his treatment, and his cancer subsequently returned. Dr. West, in an attempt to continue what he hypothesized to be the placebo effect, told Mr. Wright that a new batch of Krebiozen was ordered. It was supposedly more concentrated and effective, which gave Mr. Wright some hope. This time, Dr. West injected Mr. Wright with water. His second recovery was even more dramatic.

Within a few days, his tumors disappeared, his chest fluid vanished, and he could move again. Unfortunately, when Mr. Wright found out that the American Medical Association definitively concluded Krebiozen to be ineffective, he lost all faith in the drug.



Artwork by Ashley Chopra '24

His tumors returned, and he died two days later. While this story is one of the more extreme examples of the placebo effect at work, it still raises the important question of whether the placebo effect can be actively implemented in a clinical setting.

There are those who argue no for several reasons. For one, clinical studies that show the potential efficacy of placebo effects may be flawed because they do not consider the fluctuation of symptoms and the effects of natural healing [2]. For example, the February 2007 issue of Prescrire stated that, "it can be estimated that without treatment, 50-70% of cases of simple acute cystitis resolve spontaneously, usually after having been asymptomatic for several months [3]." Those clinical studies may have also neglected to consider the limited sample sizes [3], the patients' subjectivity and honesty in reporting symptoms [2], as some patients may feel obligated to say they feel better, additional minor treatment along with the placebo [4], and scaling bias [4]. Additionally, there could be misrepresentation in the reports, especially if the studies do not cite the full statistical outcome. For instance, a 1941 study claimed that 20% of the patients with angina pectoris were successfully treated with placebos, despite the fact that 72% of the patients also got worse [4].

One may also argue against implementing the placebo effect by highlighting that its effects may be temporary and inconsistent [5]. Using a placebo as treatment may be viewed as unethical because the placebos have not been clearly shown to ameliorate symptoms.

On the other hand, one may also argue that the placebo effect should be implemented more often because actual medicine may not even be effective compared to placebos. A study in the UK actually found that in a survey of 800 physicians, 97% already prescribe impure placebos, defined as real medications that are unlikely to have an impact [6]. If these medications are unlikely to benefit the patients, one may argue that the doctors may as well prescribe placebo pills with no active ingredients instead since they are less costly and would result in less medication side-effects. Additionally, to counter arguments claiming that placebos are deceitful and unethical, some studies show that warning a patient beforehand that they will be receiving a placebo may still be effective in treatments. In one experiment, 74 cancer survivors experiencing fatigue were randomly assigned into either a group with a placebo treatment or a group with actual medication. The patients in the placebo group reported a 29% improvement in fatigue severity and a 39% improvement in the quality of life, despite being told beforehand that they would be taking placebos [7]. If placebos could be useful even when patients are aware of their use, ethical concerns would no longer be a hindrance. It is also important to note that ultimately, the placebo effect does not need to be an isolated treatment, but can be incorporated as part of the healing and treatment process.

In fact, there are actually several ways to evoke the placebo effect, which include strengthening the physician-patient relationship, reassuring the patients, and speaking positively about treatments. By making the clinical environment more soothing and safe, the effectiveness of the placebo effect can actually increase from 42% to 82% [8].

While there are certainly many reasons to carefully examine the placebo effect, its causes and effectiveness, it may also be beneficial to consider integrating it into the treatment process for better outcomes.

After all, that tea did help you, didn't it?

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Save a Life (Before You Graduate)

by Andrew Juan, Health Care Policy '25

If you suddenly underwent cardiac arrest, who would be there to save you? Minutes matter when situations like these occur; your survival odds would drastically increase if someone were to perform CPR. However, only about 2.4% of Americans are trained in CPR [1]. This disappointingly low number does not have to be this way as many states require CPR education. But, why is it not working? Why is CPR education important? And what can we do to go beyond 2.4%?

Thirty-eight states as well as Washington D.C. set CPR training as a high school graduation requirement. One would expect this majority of states to result in a strong foundation of CPR-trained students. Unfortunately, many schools have found it difficult to fulfill these state laws. A study found that only 77% of schools surveyed actually followed through [3]. The problem stems from a lack of resources for schools. CPR training tools are expensive, especially if proper hands-on training is desired. One standard Red Cross CPR mannequin costs $495, which can be a hefty cost for many large public schools that might need ten or more to efficiently train as many students as possible. Many states fail to provide enough funding for this training, leaving schools to their own devices. This lack of resources trickles down to the quality of training; only three out of the thirty-eight states require CPR instructors to be certified, and 11% of schools surveyed had untrained CPR instructors [3].

This clear lack of attention towards CPR education in schools is a massive let-down, especially since it is so important with its many positive effects. Training students in this crucial life-saving skill has been shown to "raise awareness of the responsibility to help others and increase self-confidence to provide bystander cardiopulmonary resuscitation." [4]

In addition, although cardiac arrest events are less likely to happen at schools, self-reported data has shown that on the off chance that a cardiac arrest event does happen in a school, the death rate is significantly lower [5]. Increasing the number of young people trained can also help reduce general incidences outside of school, such as at airports, gyms, and malls, which are some of the public locations with the highest occurrences of cardiac arrest [6]. CPR education in schools also transcends socioeconomic barriers, allowing for students of diverse backgrounds – especially students of color who often have lower access to lifesaving care – to have an equal opportunity to save lives [7].

While increasing CPR education is certainly of importance, actions must be taken to properly execute these mandates as well as feasibly expand mandatory CPR training to all 50 states. First, access to funding is crucial; schools need to be supported in order to train their staff to be qualified instructors and successfully train all students to be CPR certified.

Without the ability to fund schools and instructors, CPR training would be ineffective and conceptual at best without physical experience with a mannequin. Second, general awareness of the importance of CPR needs to be emphasized. Students need to understand that their training could save their friends' lives. By creating an emotional motivation, rather than "just another academic requirement," a more impactful learning experience will be gained. If all else fails, we must turn to parents to educate their children; any training is better than no training, and knowing the basics can still be effective [2].

The importance of CPR training should not be underestimated. Our current policies do not adequately reflect the value of such an education and do not promote proper training. By making simple changes to funding and recognizing the potential to save lives, mandatory CPR training in schools can be an effective tool to make the difference between life and death for the thousands of people that annually fall into cardiac arrest. You could even save a life before you graduate high school.

Artwork by Alexandra Jin '23

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Who Lives and Dies: Breast Cancer's Social Determinants

by Kaitlyn Lee, Biology and Society '25

Breast cancer is the most common cancer amongst women—making up 30% of cancer that women are diagnosed with [1, 2]. It is very likely you know someone afflicted with it. Fortunately, advancement in treatment, early detection, and prevention has led to a 42% decrease in breast cancer deaths through the decades [3]. However, there are evident racial and socioeconomic disparities demonstrated through breast cancer incidences and mortality rates in the US.

While breast cancer statistics shared with patients typically address the general population of breast cancer patients, these numbers tend to vary amongst racial groups. Compared to White women, minority women under 50 years old have a 72% higher chance of diagnosis of an invasive breast cancer and a 127% higher chance of death [4]. In addition, when comparing women under 50 years old, Black women were twice as likely to die due to breast cancer [1]. One of the reasons behind these differences is the presence of systemic racist practices and policies that still lie within our system. For example, redlining and allocation of healthcare resources and food options allow segregation to persist and create health inequities against Black people [1]. As a result, Black women were more likely to be diagnosed with risk factors of breast cancer)diabetes, heart disease, and/or obesity [3]. Not only does this raise the prevalence of breast cancer in Black women, but also the level of danger of breast cancer.

HR-positive/HER2 negative breast cancers, a subtype of breast cancer yielding the least dangerous prognosis, were found to be 23% higher amongst White women and 45% higher for Hispanic and American Indian/Alaska Native women over 20 years old than Black women of the same age range [1]. On the other hand, triple-negative breast cancer subtypes were more prevalent in Black women under 50 years of age [1]. As these statistics have demonstrated, it is necessary to raise awareness of these issues to decrease health inequalities and make significant improvements for breast cancer treatments amongst disadvantaged racial groups.

Increased rates of breast cancer in Asians (especially those under 50) have also been observed [2]. In addition, Asians were observed to have lower rates of mammography testing, which impacts incidence and survival [5]. Compared to White women with a mammography testing rate of 68.06%, Asian women had an overall rate of 65.79% [6]. There are a number of reasons for this difference. For example, Asian women can experience language barriers that create conflicts in communication and education, leaving them uninformed or misinformed about the importance of mammograms [5]. Age also plays a role; older women are more reluctant to undergo mammography testing [5]. Additionally, Asian culture holds a principle of "modesty" that may dissuade them from mammography testing despite its importance in detecting breast cancer [5].

Artwork by Ashley Kim '23

These barriers between racial groups demonstrate the need for healthcare interventions and policies to address them and promote health equity for breast cancer.

Other aspects regarding socioeconomic status are also responsible for the health inequalities of breast cancer. A key disadvantage of US healthcare is the lack of universal health insurance, leaving US citizens responsible for health costs. As a result, women with lower socioeconomic statuses are more likely to lack access to quality health insurance and be subjected to a higher risk of breast cancer due to the decreased incentive to partake in mammography tests to detect breast cancer [1, 5]. Education provides individuals with health literacy, communication skills with health providers, and access to higher income opportunities [1]. Income and employment are also important in that they determine if individuals can maintain needs such as food, housing and other services. Additionally, higher employment status comes with benefits like healthcare insurance, sick days, and schedule flexibility [1]. However, because women of low socioeconomic status often have poor education, income, and/or employment status, they may lack these benefits and therefore, carry much higher risk of breast cancer than women of higher status. A study regarding socioeconomic inequalities of premature breast cancer mortality demonstrated that US counties of lower income and educational attainment levels and higher unemployment rates had a higher mortality rate of breast cancer [7]. Both before and after the Affordable Care Act of 2010—a policy allowing expansion of Medicaid amongst states—was passed, higher mammography screening rates and lower breast cancer incidence were more present in states with Medicaid expansion than states without [1]. Therefore, it is evident that these disparities have significant impacts on marginalized groups regarding breast cancer, and more needs to be done to close the gaps between groups of different socioeconomic statuses.

As aforementioned, mortality rates of breast cancer have overall diminished greatly, but that does not lessen the effects of breast cancer on minorities and low-income populations.
The US healthcare system must recognize these inequalities and take proper action in hopes of providing the best treatment for breast cancer that it can for them.

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Decentralization: The Future of Clinical Trials

by Rachel Peverly, Biological Sciences '24

Clinical trials provide a safe and effective means for testing a treatment's efficacy in a real-world setting. However, when the "real world" turns into a virtual bubble, adaptation is the only solution. Along with the chaos and uncertainty of the COVID-19 pandemic came innovation and systematic changes to the pharmaceutical and biomedical industries that could prove to be long-lasting and profound in impact. Among these changes is the decentralization, or virtualization, of clinical trials. A multitude of enablers — such as technological innovation, patient convenience, and the desire to diversify trial participation — bolstered the efficiency and pace at which these industries pivoted their trial procedures in response to pandemic restrictions. That said, any potential long-lasting effects this virtual shift may have strongly depend on how companies address key hurdles, including data quality concerns, principal investigator liability, and a regulatory transformation within the industry.

When the COVID-19 pandemic began, it significantly impacted clinical trials studying potentially life-saving treatments all over the world. In the past, patients participating in clinical trials were expected to routinely visit clinics or doctors' offices, potentially hours away from their residence, in order to monitor their health and receive their treatment [1]. Although highly disruptive to the patient's everyday life, this routine was standard operating procedure within the business. With federal and local social distancing guidelines being enacted and altered daily, research and development teams in the pharmaceutical industry were forced to either cancel their trials or adapt to a changing world. Many opted for the latter; one illuminating study reported that, in 2020, 76% of patient monitoring was conducted through remote platforms, which was up from just 18% in 2019. This statistic has only increased as the pandemic has progressed [2]. The overwhelming influx of interest and investment in the remote communications industry propelled the rapid rise in decentralized trails. Various software platforms were developed that allowed patients to easily enroll in clinical trials using electronic consent forms [4]; these apps guide patients through clinical trial expectations and procedures, help schedule telemedical appointments, and serve as a personal log for data collection [1].

These programs allowed clinicians and researchers to maintain communication with the participant as they moved through the trial, without requiring in-person visits. If the trial included some aspect that required professional assistance, such as blood tests, a specialist would be sent to the patient's residence [2]. These adjustments greatly improved patient convenience and safety, which led to high compliance amongst participants. In fact, some clinical trial sponsors have reported a near 100% compliance rate amongst their participants, a feat rarely achieved prior to these remote changes [2]. In addition to high compliance rates, daily remote reporting of participants' vital signs and symptoms helped researchers flag concerns in real-time, allowing medical intervention to occur sooner, if necessary [5].

With these aspects in mind, it is unsurprising that one study found that 98% of participants and 72% of physicians were satisfied with their overall telemedicine experience when compared to in-person visits [1]. Remote trials also allow for the expansion and diversification of the patient pool. Any successful clinical trial should display both safety and efficiency in a diverse sample of the population it aims to treat. All too often, clinical trials fall short of this ideal, in part due to geographic restrictions, cultural skepticism, and socioeconomic limitations [2]. Decentralized trials have allowed clinicians and researchers to reach broader patient populations by operating through a remote format, which also increases patient convenience and safety.

Given the multitude of stakeholders in medical research and their varying priorities, resistance to changing the well-established and widely agreed-upon centralized model comes as no surprise. Many of these stakeholders have identified areas of concern that must be addressed to enable broader adoption of decentralized trial methodology. Some critics cite concerns over whether patients are equipped to provide sufficient, high-quality data while maintaining procedures [1]. Indeed, deviation from the provided protocol could result in the entire study being terminated and present serious consequences for the company at large. While this attitude aligns with general conservative hesitancy, it also raises an intriguing point about principal investigator liability. The individuals involved in overseeing clinical trial operations may not feel comfortable taking responsibility for results obtained from participants or clinicians that do not fall under their direct supervision [3].

Artwork by Flavia Scott ' 24

A complete and permanent shift from in-person to remote trial operations in a post-pandemic setting would require a concrete, decentralized operating model as well as increased synchronicity amongst clinical teams and supporting departments that can only be achieved through a sustained effort from the organization's leadership [1]. Anyone hoping to overcome these technological and managerial hurdles faces a long, bureaucratic nightmare that would discourage even the biggest proponent for decentralization.

The decentralization of clinical trial operations within the pharmaceutical and biomedical fields aims to increase the accessibility, convenience, and equitability of drug development at the trial stage. Even with this lofty goal, a number of regulatory hurdles must be addressed before virtual trials become the industry standard. With this in mind, future clinical trials will likely be conducted in a hybrid fashion. Daily patient responsibilities might remain virtual and telemedical support will continue to be provided, but the patient may be required to maintain routine, in-person visits to sponsored clinics. Even in the wake of the unforeseen chaos and continued uncertainty that characterizes the COVID-19 pandemic, it can be reassuring to know that large industries have gained wisdom that is particularly poignant to our future health by taking this opportunity to push the diversification and modernization of healthcare practices.

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Weapons of War and Health

by Grace Wang, Policy Analysis and Management '22

Not only is a war devastating for civilians and can rip apart their entire life, but war also has both mental and physical repercussions on the well-being of children. As modern warfare is typically fought in one country, children suffer the most as they represent the cohort with the highest number of casualties in wars [7]. In 2019, one in six children residing in a conflict-stricken zone have also been a target which leads to lower educational retention and higher dropout rates [5]. There are several types of trauma, which can be grouped into direct effects (psychological damage and displacement), and indirect effects (larger-scale destruction of infrastructure, disrupting children's food and shelter needs) [1]. Because the consequences of the indirect effects have a lasting legacy, this will be my focus today.

Contrary to popular belief, it is not the physical injury that harms children the most, but rather the lack of care in the healthcare system to treat children. Specifically, in the ongoing conflict between Russia and Ukraine, the children are also fighting off a polio outbreak as the war has halted vaccination efforts and destroyed hospitals that provide life-saving treatment for infectious diseases. Given all of the time and funding it took to build the existing healthcare infrastructure, the war has set Ukraine back by at least a decade or more [3]. This is not an isolated incident. The decade-long war in Syria resulted in not one, but two measles epidemics in 2017 and 2018 [2].

Artwork by Joan Rong '25

Rape is a weapon of war, and this is an indirect effect that has serious repercussions on the well-being of children and women. In genocides and war-stricken zones, sexual assault was used to extinguish populations who did not fit the ideal image of the human race [6]. Rape was viewed as a mechanism for ethnic cleansing, because young girls would come in contact with someone who was "perfect". Children are already vulnerable as is, and the war exacerbates this, particularly for young females. Perpetrators will manipulate girls to trade rape in return for basic necessities, such as food, shelter and water. Because these necessities are needed to survive, young girls will sacrifice their bodies to stay alive for one more day. As some of these victims are merely children, these traumatic events not only affect their psychological development, but also their approach to future relationships. In the long run, these events adversely affect brain chemistry, causing children to suffer from mental health issues [4].

Often, children are the forgotten group during times of war. Since we cannot revert the past, we can only focus on the present and future moving forward. The focus should be placed on how to overcome childhood trauma, with a strong support system in place. Since this can be difficult to find in a war zone, humanitarian organizations should also place an emphasis on non-profit therapists and psychologists to help children work through their trauma. To move on from trauma, one may need closure which takes time for the child to embrace. Since they are still young, this may not occur until they mature to adulthood. In the meantime, social workers can help children develop healthy coping mechanisms to deal with trauma, such as newfound hobbies or exercise. Because children are our future, we need to save them as much as we will need to rely on them years down the road.

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The Caregiver-Provider Relationship

by Priya Mukhi, Global and Public Health Sciences '23

Family and other informal caregivers play a significant role in ensuring the health and well-being of loved ones requiring assistance in managing various aspects of their daily lives. As of 2020, there were an estimated 53 million caregivers in the U.S. . The caregiver population is rapidly growing and shows no signs of stopping. From 2015 to 2020, the caregiver population grew by 9.5 million, a remarkable 21% increase [1]. With an increased need for caregivers throughout the U.S. , it is imperative that the vital roles and responsibilities of caregivers be recognized and supported.

It is estimated that the total value of long-term services and supports (LTSS) that caregivers provided in 2011 was over $200 billion [1]. This is more than half of the LTSS for older adults in 2011. Caregivers are indispensable, as they are accountable for assisting their loved ones with the instrumental activities of daily living– these include helping with bills and paperwork, transportation, medications, personal care, and coordinating with providers. These tasks can vary in complexity depending on a patient's needs and responses [2]. For instance, administering medication is not always a straightforward and simple task: patients may resist administration, caregivers may have difficulty keeping up with the sheer amount of medications, or caregivers may have trouble understanding the dosages and methods of administration. Most family and other informal caregivers do not expect to become caregivers in the future. Few have any formal training in providing patient care, and must learn all relevant skills, terminology, and much more as their care recipient's situation progresses.

Caregivers can benefit from sources who will provide them with accurate medical knowledge, refer them to services and support groups, and other resources that will help them best care for their loved ones all the while maintaining their personal health. Providers (physicians, nurses, PAs, etc.) have great potential to reduce the gap between caregiving and the ambiguity of illness. However, fostering a relationship between caregivers and providers can be challenging due to a number of limitations on both ends.

One major barrier to establishing a caregiver-provider relationship is the difficulty providers and care teams can face in working with and identifying caregivers. More than half (54%) of providers reported that the presence of multiple caregivers can prevent them from interacting with family caregivers [3]. Each caregiver may be responsible for certain aspects of their loved one's life, and it can be difficult for providers to keep up with informing multiple individuals. In addition, 44% reported that they are not aware of who the caregiver is [3]. Sometimes, patients may not think of their loved one as a caregiver. Other times, caregivers themselves are detached from the title– they are performing the responsibilities of a caregiver, but do not self-identify [4]. This could be due to the fact that some patients and caregivers alike view the care provided as what is simply done for a loved one. Furthermore, using the title "caregiver" may result in a changed dynamic between the caregiver and patient, so it is avoided. The caregiver may also not be providing regular support for their loved one– 44% of providers reported that fluctuations in caregiver involvement have prevented them from interacting with family caregivers, resulting in a missed opportunity for a strong caregiver-provider relationship [3].

Artwork by Waverly Shi '25

Conflicting responsibilities and limitations on time are both obstacles caregivers and providers may face, hindering effective communication between both parties. For caregivers, obligations to their own employment, other family members (including children), and their own health issues may prevent them from attending appointments for their loved one regularly [1]. The burden of these obligations can cause caregivers to feel overwhelmed and unable to commit the time necessary to form a relationship with their loved one's provider. Additional obstacles for caregivers include unreliable transportation to appointments, language barriers, and a lack of compensation for engaging [5]. Providers most commonly face the burden of time. This has been a long-standing issue, especially prevalent in the U.S. healthcare system– time and cost are often interlinked, and shorter visits are incentivized. In fact, 39% of providers reported that interacting with a family caregiver was too time consuming. Beyond providers, 61% of health professionals including RNs, LPNs, and receptionists cited time as a deterrent to interacting with family caregivers [3]. The lack of time is an issue found at all levels of the healthcare team.

With an aging population and a heightened need for family and informal caregivers, it is essential that both policies and practices aimed to enhance the caregiver-provider relationship be implemented. Providers must be trained and incentivized to form relationships with caregivers, as they can serve as invaluable resources and help mitigate some of the burdens caregivers are currently facing.

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The Forgotten Girls of Globalization

by Shruti Nagpal, Global and Public Health Sciences '25

Globalization is a phenomenon that dominates our world today, especially in the clothing industry. Large fashion companies, such as Forever 21 and Shein, localize in a number of countries around the world and produce low-cost, "trendy" clothing for consumers. While consumers happily purchase these clothes, those who produce the clothes– women and children– suffer the consequences.

Globally, women are forced to work in sweatshops. These are working factories that have "poor working conditions, unfair wages, unreasonable hours, child labor, and a lack of benefits for workers" [1]. The reasons for this unfair reality are economics, cheap labor, and fast fashion. Fast fashion is defined as "a design, manufacturing, and marketing method focused on rapidly producing high volumes of clothing" [2]. In order to keep up with the demands of the market and produce as many items as possible, fast fashion companies must employ as many workers as possible. Because so many items need to be produced, these companies employ cheap laborers, primarily women, and children. Women and children have a history of being underpaid, making them economical for large corporations to hire. Gender stereotypes also make women and young girls "ideal" to hire; they are seen as "passive and flexible" by large corporations [3], meaning that they are obedient, easy-going workers.

While working in these sweatshops, women, and girls are forced to endure horrific conditions that negatively impact their physical health. One example of these conditions is described in a Bangladeshi factory, where "dust is thick in the air, bathrooms are left unmaintained, rats can be seen scurrying across some factory floors…" [4]. These conditions make it hard for workers to simply live; 60% of women in a study conducted by the UCLA Labor Occupational Safety and Health noted that "dust accumulation and excessive heat from poor ventilation made it difficult to work and even breathe" [4]. Female workers have also reported that overall, "their work has led to back and joint pain, continuous headache, eye pain, and difficulty in breathing associated with inhaling fabric dust" [5]. These negative effects were motivated by poor lighting, constant sitting without a backrest, and loud, painful noises in the factories [5].

Women and girls working in the fast fashion labor industry also must endure sexual harassment and gender-based violence. They often experience unwanted touching and grabbing by men in power at sweatshops, and they are unable to maintain their autonomy without fear of retaliation [2]. This has an immediate effect on their emotional health and well-being, as well as their physical health, depending on the kind of unwanted sexual interaction that occurs. Women and girls may need to obtain STD testing following instances of sexual assault, which can be very difficult if testing is not economically or geographically accessible.

In addition, "some employers force [women] to take birth control and routine pregnancy tests to avoid supporting maternity leave or providing appropriate health benefits" [1]. Women's health is impacted greatly by this cycle of abuse and forced birth control use.

These conditions, which physically and emotionally impact female workers in sweatshops, have a concerning effect on the mental health of the workers. A study conducted among female factory workers in Fiji found that "the major psychological problems are stress and depression… [which] are caused by 'intensification of work' to meet daily targets, strict factory rules and regulations, poor pay, poor working conditions, in-human abuse, and fear of job loss" [7]. Additionally, the stress and anxiety developed in sweatshop manufacturing factories "leads to depression, violence, and suicide" [6].

The women and girls that we depend on for our clothes are experiencing unjust and unacceptable conditions in the workplace. As a society, it is imperative that we do our part to help alleviate these conditions.

A nation's government can play an essential role in improving the working conditions in sweatshops for women. More specifically, "the government needs to work with factory owners, international organizations, trade agencies, and donors to develop a good monitoring system to analyze and address the key factors of occupational health problems in order to address the health and safety issues identified" [5].

Artwork by Ashley Chopra '24

Many governments in developing countries currently do not enforce safety regulations in sweatshops; political leaders know about the injustice in sweatshops, but they tend to look in the other direction because of the overall positive impact that sweatshops have on the national and global economy [8].

As a society, we can advocate for governmental change through lobbying and by bringing attention to it over social media. We can also use these methods to encourage national governments to cooperate with other nations and set an international standard for the requirements of labor. Finally, we can boycott some of the biggest names in fast fashion, such as Shein and Forever 21. Let's stand up against the unacceptable working conditions in sweatshops around the world and remember the forgotten girls of globalization.

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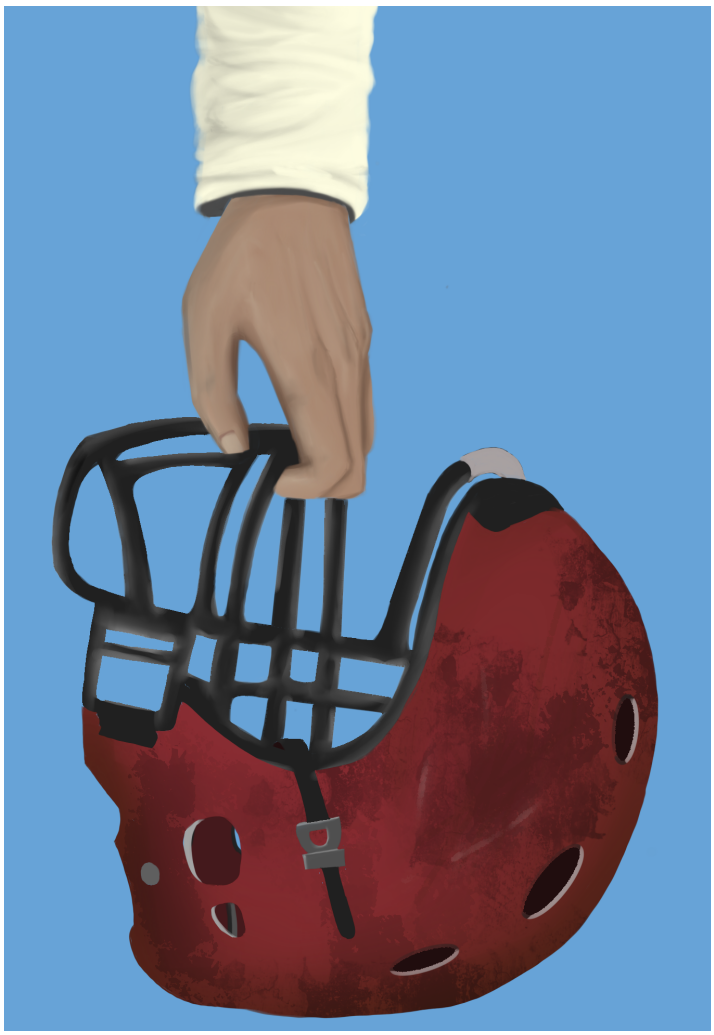
Broken Minds: Combatting America's Pediatric Brain Injury Crisis

by Dylan Keusch, Industrial and Labor Relations '24

High school and college athletes in the United States are in the grip of a silent pandemic. According to the University of Pittsburgh Medical Center's Concussion Center (UPMC), between 1.7 and 3 million sports and recreation-related concussions happen annually in the United States [1]. To put this number into perspective, it is estimated by UPMC that two in every ten high school athletes who play contact sports will suffer a concussion (mild traumatic brain injury) this year. While the sheer number of young athletes that suffer head injuries is quite sobering, it may not be the most insidious aspect of this silent pandemic. The vast underreporting of sports-related concussions and the impact that undertreatment has on neurological health may lead to incredible disease burden, the overall impact of the — the extent and magnitude of which is difficult to appreciate.

According to Mark S. Greenberg's *Handbook of Neurosurgery* and the American Medical Society for Sports Medicine, concussions are "a traumatically induced transient disturbance of brain function that involves a complex pathophysiological process" [2].



Artwork by Ishani Chopra '24

Essentially, a concussion is the alteration of normal brain function that is created by nonpenetrating mechanical forces, such as falls, rapid changes in direction, impacts, etc. Greenberg's *Handbook of Neurosurgery* notes that the true pathophysiology of concussion is poorly understood. Some symptoms of concussion begin rapidly and resolve within a few days. However, other symptoms, especially after multiple injuries, may persist for months, years, or a lifetime [2]. These long-term effects include "deficits in balance, coordination, memory/cognition, strength, or alertness" [2]. Concussions are extremely serious injuries. The symptoms, both short and long-term, can seriously impact a child or young adult's normal development.

While it may seem intuitive for coaches and athletes alike to report any head injuries or symptoms for further medical evaluation, the polar opposite ensues in reality. Coaches and athletes (especially those in football and ice hockey) do not self-report symptoms associated with head trauma. In McCrea et al.'s 2004 study of 1,532 football players, only 47.3% of athletes reported their concussion symptoms [6]. When asked why they did not report their symptoms to appropriate personnel, the players had three main responses: they did not feel as though the injury was serious enough to warrant medical attention, they did not want to be withheld from competition, or they did not understand the risks and symptoms of possible concussion. Furthermore, work by Dr. William P. Meehan and Dr. Rebekah C. Mannix, top concussion experts at Boston Children's Hospital, revealed that nearly one third of athletes seen in the clinic had previously undiagnosed and unreported concussions [7].

The effects of underreporting can be disastrous. As Drs. Meehan and Mannix note, "failure to diagnose concussions in athletes can lead to further insults to the brain prior to full recovery, exposing these athletes to the cumulative effects of injuries and an increased risk of second impact syndrome" [7]. The effects of multiple head injuries in a short period of time is clearly documented in Iverson et al.'s 2003 study: "cumulative effects of concussion in amateur athletes." At the conclusion of the study, the authors had two primary findings: 1) athletes with multiple concussions reported more symptoms than athletes with no history of concussion, and 2) athletes with multiple concussions scored significantly lower on memory testing than athletes with a single concussion two days post-injury [4]. The impact of repeated head injuries is therefore significant on the young brain. High school and college athletes, who should have no major neurological deficit at their age, are suffering from cognitive, behavioral, and emotional issues as a result of repeated blows to the head.

"The silent epidemic," as coined by the Brain Injury Association of America, is a dire public health issue — not only because of the sheer number of injuries but also because of the significant neurological consequences of underreporting. Countless lives have been changed forever due to head injury, and now is the time to develop policy to stop this tragic trend. How is it done?

Top brain injury experts are in agreement that the solution is not to stop young athletes from competing in amateur sports [5]. Children should not be encouraged to stop playing football or hockey if it is what they love to do; rather, the key is creating a way to keep athletes in the game safely. The critical facet for further concussion prevention is education.

Comprehensive education plans for coaches, parents, and athletes must be implemented at all levels of sports. One solution may be a mandated training program for all participants prior to beginning practice or competing each season. Extensive work by Dr. Charles H. Tator at the University of Toronto has shown that various methods of information dissemination, including mandatory education meetings, have been shown to increase concussion awareness and, as a result, reporting of symptoms [8].

By demonstrating to athletes and coaches alike that it is acceptable to speak up when injured, adequate and timely treatment can occur that minimizes risk for further head injury. Too many lives have been drastically changed, and it is imperative we ensure that our next generation of young athletes does not find themselves in poor neurological health due to repeated head injuries. We can create an environment where head injuries are given the importance they deserve. Together, we can begin to fix the broken minds of America's young athletes.

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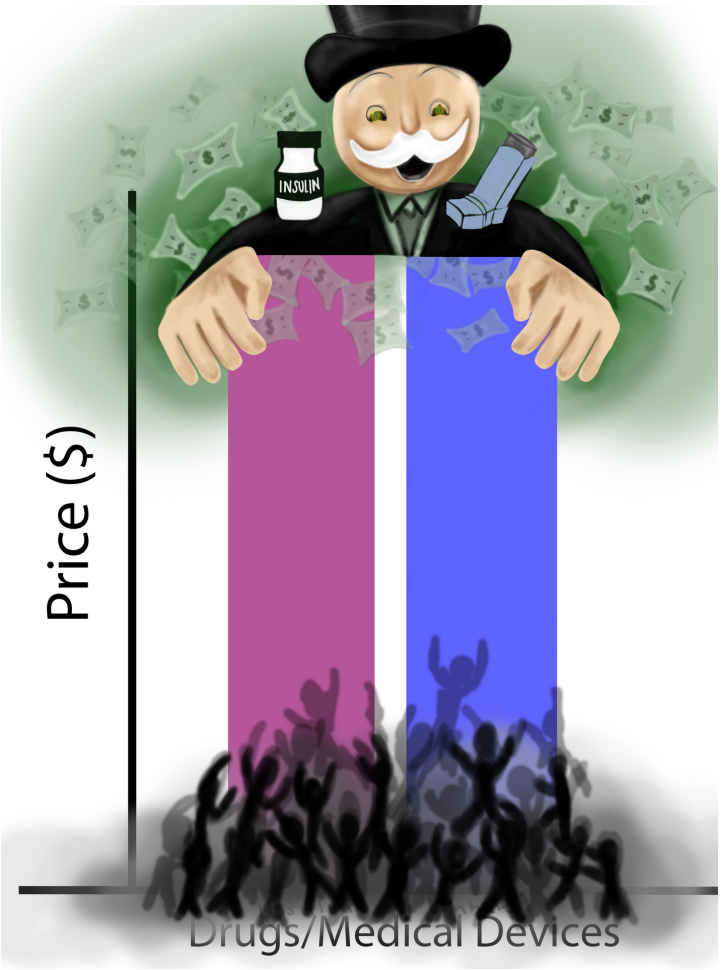
Monopolistic Prescription Drug Price Practices

by Chris Cizmeciyan, Biological Sciences '24

The perverse increased cost of prescription drugs in the United States by drug manufacturers harms people, especially when they are most vulnerable. Three parties influence prescription drug pricing and spending: the public, the healthcare insurers, and the government. Insurance companies are unique because they have pharmacy benefit managers (PBMs), who negotiate the list prices – the full prices before insurance discounts – of drugs from drug manufacturers to make prescriptions cheaper for insurance holders. Since PBMs can keep these rebates, the Department of Health and Human Services predicted that there would be a substantial increase in list prices over time. However, the 159% increase from 2007 to 2018 was unprecedented. These increased costs for customers disproportionately affect those without insurance, who primarily consist of minority populations and low-income Americans, who must pay exorbitant list prices out of pocket.[1]

Though inflation contributes to price changes, the costs of half of all retail prescription drugs and nearly half of all drugs administered by physicians covered by Medicare have surpassed the national 1% rate of inflation.



Artwork by Caroline Mendoza '22

The list prices of 23 of the 25 Top-Spending drugs outpaced inflation in 2020. Notably, some of these medications treat chronic illnesses and are often used in multiple rounds of treatment intervention. Insurers and drug companies exploit this need by having medication costs cover only a certain dosage. This multiplies the small price hike, causing substantial expenditures for the patients. Among these medications are Eliquis, a blood thinner used by 2.6 million people; Revlimid, a multiple myeloma treatment used by 44,000 people; and Keytruda, a cancer treatment utilized by 59,000 people. In the case of Keyrtruda, a 3.3% increase per dosage led to an additional expenditure of nearly $750 per claim and an average spending increase of $6000 per patient.[2]

In the case of cancer, patients do not have the liberty to choose whether to take a certain drug, and since most cancer patients undergo similar treatments, drug manufacturers raise prices because demand will always be high. Moreover, although innovative therapies and improved standards of care for patients are imperative, drugs that have gone out of patent are neglected despite the opportunity for generic competitors to mass produce them.[3]

Disparities experienced by minorities with medication accessibility and healthcare quality are consequences of upstream and downstream neglect. For example, an upstream influence such as health care policy could influence medication accessibility and purchasing power, which are downstream results. Chronic illness like asthma, obesity, HIV/AIDS, and hypertension disproportionately affect people of color due to an array of factors such as education, discriminatory redlining, and affordability of nutritious diets. The combination of poor upstream and downstream factors, such as insufficient quality of care, is exacerbated by how minorities are more likely to be uninsured and therefore are the most affected by increasing list prices.[4] While out-of-pocket costs for Americans has halved in the last 30 years, respectively nearly 14.4% and 24.9% of the Black and Hispanic/Latinx populations without health insurance today must pay list price for the same medications that White populations buy for lower prices as insurance holders.[5] As a result, Black and Hispanic/Latinx patients used 10-40% fewer medications than White patients for the same illnesses.[4] Both historical and modern exploitation of minorities in the medical sector – such as the Tuskegee Syphilis Experiments performed on Black men – and modern implicit biases against racial and ethnic minorities severely decrease quality and reception of care, respectively, by medical practitioners and patients.[6]

Unregulated monopolies that control the supply and costs of drugs that threaten people's lives with no consequence are disastrous. Nonetheless, diverse regulations can make prescription drug accessibility equal and equitable. Currently, corporations utilize their lobbying power to oppose nationwide price caps on drugs, such as insulin and asthma medication to maintain profits; increase rebates for PBMs;

and still have their products covered by a majority of insurance plans.[3] Despite lobbying attempts, one entity in the United States can control the pricing and spending on drug development and change the landscape of the healthcare industry for good – the government. By enacting nationwide price caps that expand current statewide ones, such as the $35 monthly cap on insulin in Minnesota, medications can be increasingly more accessible, especially for those without insurance.[4] Investing in National Institute of Health (NIH) sponsored research can spur innovation while continuing to support drug manufacturer research and development spending.

Historically, NIH contributions have had a significant impact on modern cancer and HIV treatments. Continued funding of research on these diseases and stimulating cardiovascular disease and asthma research could increasingly help minority populations.[7] By improving cultural competency and rebuilding trust through advocacy by members of these communities, the United States can begin to eliminate implicit biases in the medical field. This systemic change could significantly ameliorate the care that people of color in the United States receive while beginning to amend historical strains.

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The Two Percents: Disparities in Medical Malpractice Trials

by Nathaniel Salgado, Government & Philosophy '24

Heart-warming stories of miracle babies' triumphs over sickle cell disease, nephritis being magically cured overnight, or patients miraculously waking from decade-long comas flood the news. But what about those who aren't so lucky? Pushed aside from the limelight we find the victims of the healthcare industry. $55.6 billion is awarded to claimants of medical malpractice as a corrective measure for the inevitable shortcomings of the healthcare industry, amounting to two percent of overall spending– its effects, however, are much greater than this [1]. As we will later see, this imbursement does not fall equally upon victims, nor does the fault. In the current tort-based framework of compensation, only two percent of victims file for compensation. On the other side of the bill, only two percent of practicing physicians are responsible for over forty percent of medical malpractice lawsuits. From this, we may gather the U.S. method of medical malpractice reimbursement is a failure as a reliable tool of compensation and an effective deterrent in preventing further malpractice. To correct this, we must look to countries who spend less on their medical malpractice compensation systems, yet turn out higher compensation rates and lower medical malpractice rates over time.

Black Americans, middle-aged women, and infants disproportionately make up medical malpractice victims in the U.S [2]. How does this translate in the courtroom? As mentioned, only two percent of victims of medical negligence– the most prolific form of medical malpractice– file malpractice claims. The vast majority of claims are filed by those who are not victims of negligence [3]. Notably, the number of those not victims of negligence and filing malpractice claims– approximately 98 percent of claimants– has decreased over recent decades [4]. This consistent decrease has helped lower the aggregate spending of the healthcare industry, taking into account the severity of this problem in prior years. In 1984, for example, the number of malpractice claims filed by patients who did not experience negligence outnumbered legitimate claims of negligence ten to one [3, 4]. Even within the small percentage of legitimate claims, however, we find an immediate imbalance. The poor and elderly comprise the lowest number of legitimate claimants, though they are often the most in need of medical care and the most vulnerable to the effects of medical malpractice [5]. Thus, even before stepping foot in the courtroom, victims of the healthcare industry are at odds with the system intended to compensate them. The situation does not get much better once the trial commences. Regardless of whether the evidence presented in favor of the claimant is strong, weak, or unclear, the health provider will win the majority of medical malpractice trials [6]. Interestingly, evidence for an injury in favor of the victims will, on average, work against them, as such evidence often warrants lower compensation for injuries with scarce evidence, even if malpractice did cause the injury in question; in a number of cases, it may be strategic not to present evidence at all [7].

Artwork by Caroline Mendoza '22

Concerning physicians, these disparities have remained within a small population. Over ninety percent of physicians practice medicine for years without being accused of medical malpractice claims [8]. This is largely due to defensive medicine, which similarly raises the aggregate spending of the healthcare industry [8]. While nearly all physicians engage in some sort of defensive medicine, only a small percentage of them are to blame for the growing malpractice premium rates: two percent of all physicians in the U.S. are responsible for forty percent of all malpractice lawsuits [9]. Additionally, most malpractice insurance does not experience-rate physicians within their respective specialties, so when malpractice premiums increase for those two percent of physicians, they increase for every other physician in the specialty– even those who have never before been accused of medical malpractice [4, 9].

How do we fix a system with as many shortcomings as that of the malpractice compensation system? The short answer: we don't. Instead, we choose from a myriad of alternative systems to replace it with, some adopted in countries with significantly better healthcare than ours. Sweden, Finland, New Zealand, Quebec Canada, and Australia all use the famous no-fault malpractice compensation scheme to compensate victims of negligence, and all spend less to produce greater health outcomes for their citizens [10]. More recently, the U.S. has begun to implement a new sort of tool to compensate for medical malpractice to correct these differences, called the Communication-And-Resolution Program [9]. The results have been less than satisfactory.

While costs of defensive medicine decreased in the hospitals where the system was implemented, its effect on the rate of paid claims, compensation costs, and total liability costs were minimal [10, 11]. To ensure victims of the healthcare industry are properly compensated, we must revamp the system that grants such compensation and follow in the footsteps of Canada, Australia, and others in taking up a new system from the ground up.

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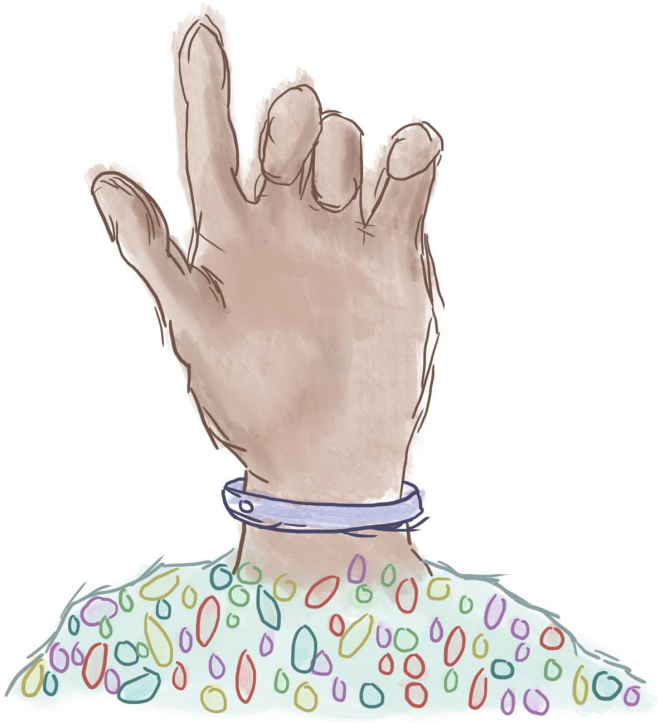
Polypharmacy: a growing issue facing elderly patients

by Jerome Dovan, Human Biology, Health, and Society '23

In the world of healthcare, less can be more. Following increasing investments and progress in pharmaceutical drug development, patients and medical professionals currently face an abundance of medications available to them. This phenomenon has led to a growing issue in healthcare called polypharmacy, which is when patients take five or more medications. This is a problem that disproportionately impacts the elderly who are likely to have multimorbidities (two or more chronic health conditions) [1]. Multimorbidities can lead physicians to prescribe one or more drugs to target each condition, potentially resulting in unforeseen drug-drug interactions or drug-disease interactions consequential to the patient. Clinical studies and guidelines for medications are often developed under the assumption that patients face a single medical condition, disregarding the study of alternate interactions [2].

In light of this health care challenge, many advocates have promoted the idea of deprescribing or simply lowering the number of drugs prescribed to patients. Preliminary research using randomized trials suggests that simply deprescribing has no significant impact on patient mortality [3], and can even improve the quality of life for patients with less than a year to live [4]. However, simply lowering the number of drugs a patient is prescribed may not be feasible or appropriate. For example, it is critical to consider drug withdrawal symptoms on the patient's behalf and closely monitor how they are responding to new changes in their treatment [5]. Another crucial, but often overlooked, aspect of deprescribing is patient-centered decision-making and patient education.



Artwork by Ronya Strom '22

Prescribed medications affect patients not only medically, but also financially and behaviorally. Because of this, the decision to deprescribe must be a collaboration between the clinician and the patient, ensuring that both parties are aware of existing options and the patient's goals or preferences [5].

Another leading cause of polypharmacy is the lack of coordinated care in healthcare. Patients facing multimorbidities will often seek care through multiple medical specialists who may each prescribe medications independently. Without clear and consistent communication between medical providers, and even the different pharmacies where patients choose to fill prescriptions, there is a possibility of duplicating drug therapy [6]. As a result, implementing more cohesive coordinated care teams can improve the exchange of information about a patient's care plan [7]. Additionally, it is important to target specific moments during the course of a patient's care to address polypharmacy. These moments include care transitions (e.g. going from home to assisted living facility, hospitalizations discharge, etc.) as research suggests a high rate of medication errors during these periods [8]. A primary care physician also plays a key role in managing polypharmacy for patients. Because the patient-doctor relationship is the most developed with one's primary care physician, these providers have an important responsibility to work alongside the patient in making sense of a patient's care plan across different providers and medication regimens.

To address the challenges that come with the growing prevalence of polypharmacy, many institutions and organizations have begun to redirect their efforts to combat this issue. The Lown Institute is one such healthcare think tank that has put forth a national action plan to counter the consequences of polypharmacy [9]. Solutions put forth within this action plan include using prescription checkups, raising awareness for the general public and policymakers, and educating healthcare professionals on medication overload. The institute has also used its platform to regularly highlight promising research. One such clinical trial, labeled D-PRESCRIBE, found that when pharmacists simply gave older patients an educational brochure on deprescribing along with evidence-based pharmaceutical opinions to their primary care physicians, there was a 31% decrease in filled prescriptions for inappropriate medications after 6 months [10]. Clearly, the ability to address polypharmacy isn't restricted to any single entity or individual. It should be a collaborative effort, characterized by accountability and increased access to information.

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The Insane Buildup to Medicare and Medicaid

by Canyon Cross, Biology and Society '25

In today's highly publicized debate around the notion of universal healthcare in America, one could think that it is a relatively new idea. Sure, Great Britain's NHS and Japan's Social Health Insurance have been around for decades, but in the hyper-individualistic United States, "Socialized Medicine" can't have been a historically popular idea, can it? In 2020, the Pew Research Center randomly selected 11,001 Americans and found that 63% of them felt it was the responsibility of the federal government to make sure that all U.S. citizens have healthcare coverage (up 4% from the previous year)[1]. This begs the question, if so many Americans want a national health plan, why don't we have one? What does the history of Medicare in the United States tell us about the idea of universal insurance as a whole, and more importantly, why did it take so long to establish this kind of system? If the definition of insanity is doing the same thing over and over while expecting different results, then the buildup to Medicare and Medicaid truly was insane.

The first main involvement that the federal government had in national medical care occurred immediately after the Civil War with the construction of 40 new hospitals in the recently defeated South [2]. For the years that followed, health insurance as a concept was relatively niche. But as the Progressive Era began and the second Industrial Revolution took over the United States, the need for some kind of health-related worker protection became more apparent. In 1912, a man named John B. Andrews and his colleagues at the American Association for Labor Legislation (AALL) began to campaign for health insurance. According to a study by I.S. Falk, "Health insurance, patterned largely on British National Health Insurance of 1911, was to provide corresponding protection against non-work-related risks, services, and costs" [3]. This campaign ultimately failed during the years of World War I as the American Medical Association (AMA), business groups, insurance companies, and labor organizations retracted their original support for the legislation.

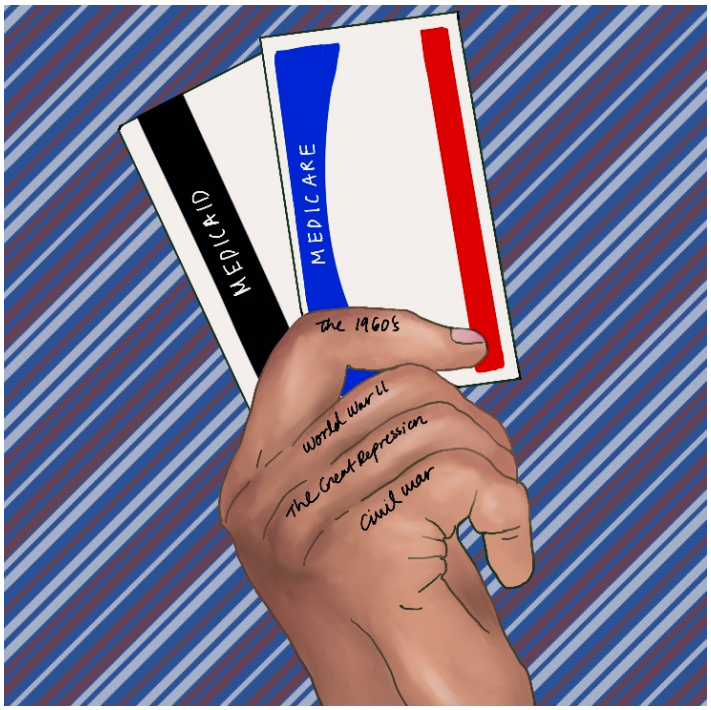
As the Great Depression raged in the 1930s, President Franklin Delano Roosevelt (FDR) completely overhauled the United States' welfare system through the use of an electoral mandate labeled the "New Deal." Many saw this as an opportune time to establish and implement a national health program. An arrangement was therefore made in the Social Securities Act of 1935 to create such a system. But after pushback from lobbyists and insurance companies, the plan was ultimately removed over fear that the bill wouldn't pass at all if it were to be introduced with the provision included [3].

The Great Depression was almost immediately followed by World War II, lasting from 1939-1945. After the passing of FDR in 1945, his second in command, Harry Truman, rose to the Presidency. That same year, Truman introduced a comprehensive medical insurance plan that would guarantee coverage for all Americans. According to a study done by Sandra Carr Hayes, "This bill called for national health insurance that would be subsidized by a federal payroll tax" [4].

It was also during this time that anti-communist sentiment began to rise exponentially in the United States due to the post-war conflict with the USSR.

Anti-communists in Congress quickly took hold of Truman's proposal and labeled it as "Socialized Medicine" despite his insistence to the contrary. (Interestingly enough, single payer healthcare systems were being implemented in democracies across Europe after the war. But frequently, this was done by the anti-communist parties. Britain's NHS, for example, was brought into existence by Conservative Party Prime Minister, Winston Churchill, not by the more left leaning Labour Party [5]). Ultimately, the bill never passed, facing opposition from nearly every sector it would impact. So instead of a universal, compulsory system for all, America would have a public welfare state for the very poor, and private sector health insurance for those who could afford it.

But then came the 1960s. Lyndon B. Johnson's landslide victory in the 1964 Presidential election gave him an electoral mandate to implement his "Great Society" policies. After the introduction of a piece of elder care legislation in 1958 which focused on covering hospital costs for the aged, the debate around universal health insurance began to change. What if it were possible to insure certain segments of the population in policy intervals, rather than apply a large system overhaul with broad stroke legislation? Despite the lack of the AMA's endorsement, this policy was ultimately taken up by Congress to address care needs for older Americans and was passed with bipartisan support. So, after years of deliberation, on July 30th 1965, Medicare and Medicaid were signed into law. One plan (Medicare) would provide universal healthcare for the elderly, while the other (Medicaid) would be used by the very poor.



Artwork by Nabiha Zaman '23

The leadup to Medicare's implementation was a long and arduous process, and in that process, a pattern emerged. Policy recommendations would be added into proposals, major associations and sectors would oppose those recommendations, and the plans to create a national healthcare system would be scrapped. But ultimately, that insane buildup was worth it. Even though the United States still lacks a universal healthcare system, Medicare and Medicaid remain popular. According to a 2015 poll conducted by the Kaiser Family Foundation, 77% of Americans view Medicare as an important government program [6]. Showing that sometimes, even insanity can yield good results.

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Impact of Medical Illustrations Disparities on Patient Outcomes

by Danielle Smith, Government & Sociology '24

In considering medical discrimination, researchers typically take a micro-level approach that focuses on the biases of individual healthcare providers. Yet, individual biases alone cannot clarify the noticeable racial gaps in affirmative healthcare. Instead, careful analysis of resources in medical training may reveal the consequences of white-centric approaches to medical education. For instance, a google search of any common disease results in very few illustrations without light-skinned patients. Even worse, most ordinary medical journals or textbooks contain mostly illustrations of white patients. By investigating the lack of visual diversity in medical textbooks, researchers can minimize the effects of macro-level influences on medical discrimination.

Medical journals and textbooks remain the primary form of medical education, yet medical imagery and medical language both fall behind in ensuring diverse representation. Medical illustration was not a professional industry until the late nineteenth century; currently, there are less than 2,000 trained medical illustrators, with nearly 8% being people of color[5]. This lack of diversity within the medical illustration industry plays a large role in disproportionate representation in textbooks provided for medical training. A leading study of over 4,000 images in four of the most common medical textbooks in American medical schools found that less than 5% of illustrations in all of the textbooks depict darker skin[5]. Notably, in one of the four textbooks, less than 1% of images represent dark skin[4]. A similar analysis by Jules Lipoff, an assistant professor of clinical dermatology at the University of Pennsylvania, found that the portion of illustrations portraying dark skin in medical textbooks can be as low as 4%[3].

Artwork by Flavia Scott '24

Within the small quantity of images that do depict dark skin, they typically represent infectious diseases, primarily sexually transmitted diseases[3]. Jenna Lester, an assistant professor of dermatology at the University of California San Francisco, found that less than 30% of illustrations for infectious diseases use images of darker skin while over 50% of illustrations for sexually transmitted infections use images of darker skin[3]. This pattern of unequal representation is also present in professional medical language. The National Health Service (NHS) website, as a common source for public health information, frequently uses white-centric descriptions regarding the symptoms of various medical conditions. For instance, terms like “blue lips” describing pneumonia, or “pink rashes” describing excema, make it challenging to identify both conditions in non-white patients[2].

While textbooks provide the essentials for medical training, racial underrepresentation can lead to a lack of diagnoses and serious misdiagnoses within the healthcare field that promote unequal health consequences by race[2]. For example, there is an absence of imagery depicting skin cancer types on Black skin. To diagnose skin cancer, doctors search for pigmentation on the nails, hands, and feet. However, in a previous study of American medical textbooks, researchers found no images of skin cancer pigmentation on darker-skinned patients[4]. In relation to this phenomenon, there is a gap in skin cancer diagnosis between Black and White patients. Data indicates that over 50% of skin cancer patients who are Black receive their diagnosis at an advanced stage while only 16% of skin cancer patients who are White receive their diagnosis at an advanced stage[2]. Accordingly, researchers contend that mortality rates for certain cancers, including skin cancer, are higher for Black patients due to the gap in early-stage cancer diagnoses[4]. For doctors to appropriately assess diseases, in patients of color, they need access to textbooks and journals that have diverse imagery of various medical conditions. Furthermore, if medical imagery expands to be more reflective of darker skin tones, this may inspire more diversity within medical schools and institutions[1].

The dearth of diverse medical imagery also has negative implications within the context of the COVID-19 pandemic. While rashes are cited as a COVID-19 symptom, medical literature fails to illustrate rashes related to COVID-19 on Black skin[3]. Online resources fare no better, with articles on COVID-19 nearly always displaying rashes on lighter-skinned patients[5]. Failure to provide diverse COVID-19 medical imagery may play a substantial role in Black patients' higher COVID-19 mortality rates.

Although studies indicate that medical imagery in today's textbooks has had little transformation within the past 15 years, notable steps are being taken to improve this lack of visual diversity[3]. For instance, the Association of Medical Illustrators introduced a diversity committee in 2018, promoting more racial representation in the medical illustration industry[5]. Additionally, there have been instances of dermatology clinics aimed at treating patients with darker skin. In the late 1990s, dermatologist Susan Taylor founded America's earliest "Skin of Color" dermatology clinic[3]. By 2004, Taylor established the Skin of Color Society to support the dermatology industry in treating darker-skinned patients[3]. Moreover, younger medical students have also joined the initiative for diverse medical imagery. Malone Mukwende, a St George's medical student, created a handbook titled Mind the Gap, showing medical symptoms on a variety of skin tones[2]. Following the success of his handbook, Mukwende created a public database for people to submit images of various conditions on different skin tones[2]. With new steps being taken to increase the presence of diverse skin tones in medical illustration, it remains imperative that medical institutions continue to modify their curriculum and training to appropriately incorporate these changes. As we shift away from a white-centric mode of medical training, healthcare workers will be better equipped to diagnose and treat patients of color.

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Injustices in the Justice System

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500%. That is the increase of prisoners in the US prison system over the last 40 years, totaling two million people (The Sentencing Project). The US prison system has a sordid history of prejudice since the founding of the nation. The war on drugs, prison labor, and systemic injustice all contribute to the unfair punishment and treatment of prisoners today. This article specifically focuses on the injustices within the healthcare system provided for prisoners and how they parallel the U.S. healthcare system.

Illness is more prevalent in the prison population than illness in the average population, thus requiring more medical attention than the average population. 40% of prisoners have a chronic illness (Ahebee) and a significant portion suffer from mental illness. In addition to these illnesses, many inmates suffer with past or current alcohol and substance abuse, thus further worsening their conditions. According to the Prison Policy Initiative, prison healthcare is "low-quality and difficult to access" to the point that mass incarceration has decreased an inmate's lifespan by 5 years (PPI).

The systemic injustices and medical biases of the healthcare field also manage to permeate through. This is seen by all women who interact with the prison healthcare system. A study by the Office of Justice Department found that male inmates were four times as likely to be seen by a physician and twice as likely to receive treatment than their female counterparts.

Artwork by Ishani Chopra '24

The most stark issue that women face in prison in regards to healthcare is quality reproductive healthcare. A recent report by the Correctional Association of New York stated that "reproductive health care for women in New York State prisons is woefully substandard, with women routinely facing poor-quality care and assaults on their basic human dignity and reproductive rights." The studies mentioned only pertain to New York, however there are many other claims and accounts from across the country that corroborate this finding. An extreme example of this miscare can be found in California, where hundreds of women were tricked into some form of sterilization from 2006 to 2010 (Law). While this is a particularly egregious example, it parallels what we see in the US healthcare system. In many cases, women will present the same cases as men yet receive different or less comprehensive care, thus leading to poorer outcomes. One of the largest contributors to this bias, aside from disbelief of symptoms, is a lack of research.

Even outside of the prison system, there is a clear racial bias in medicine. 20% of Black adults and 35% of Latinx adults can't access healthcare, while that statistic is only 10% for their white counterparts (MNT). This inequity stretches further than access as 73% of all white medical students held a false belief about the biological differences between races- specifically white and black patients. Race inequality and the prison system itself are heavily intertwined and this permeated into the healthcare system. This lack of information and understanding of a certain race or sex creates a harmful environment for women of color.

Women of color make-up approximately 50% of the female prison population yet they still do not have adequate access to healthcare. This is an account of a female inmate of color's first experience with prison medical care,

"We were brought down three or five at a time," she told Truthout. "It's like an assembly line. They rush you in and rush you out. That in itself is degrading."

To add to that feeling, the gynecologist did not explain what he was doing or why. ... 'however, he commented, "You have a very nice aroma.'"

Not only do these women not have access to basic healthcare, they often have to face sexual harrassment or worse to get it. Moving on the final intersectionality, we must discuss LBGTQ+ women and their access to healthcare. Nine out of ten transgender women face sexual extortion in prison and out of the 54% who contacted the police, 22% were harassed by officers with 6% being physically assaulted, and 2% being sexually assaulted (Brock). The numbers are even worse for women of color as out of the ones who contacted the police, 29%-38% were harassed by officers, 15% being physically assaulted, and 7% were sexually assaulted (Brock).

There has always been a hostility towards LGBTQ+ inmates and that hostility is amplified for those who are also women of color.

Once again, this hostility parallels that of the current healthcare system.An article by American Progress details the discrimination LGBTQ+ face in the medical setting. 8% are refused service on the basis of sexual orientation and 29% on the basis of gender orientation (CAP). These statistics are startling as they don't even go into the quality of care these individuals receive, which is generally inadequate. Given the 'newness' of extensive procedures for the LGBTQ+ community, there is not much data about the healthcare they receive aside from the fact they simply don't get any.

Overall, although these discrepancies are not surprising, they are unfair and undeserved. Every issue seen in the medical field has been amplified in prison, and inmates cannot choose to remove themselves from that situation or see a different physician. Inmates deserve respect and quality care and it is ironic that the source of these blatant injustices come from the justice system itself.

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