### **1AC---Adv---Disease**

#### **Contention 1 is DISEASE.**

#### **New pandemics are coming in 2025---a host of factors prove.**

Smith ’25 [Cecelia Smith-Schoenwalder; January 2nd; Senior Writer covering space, science and the environment for U.S. News & World Report; citing Dr. Perry N. Halkitis; Dean, Hunterdon Professor of Public Health & Health Equity, and Distinguished Professor of Biostatistics and Epidemiology at the Rutgers School of Public Health, Ph.D. in Quantitative Methods in Educational and Psychological Research from the City University of New York, M.S. in Education/Human Development and Learning from City University of New York, MPH in Epidemiology from the City University of New York; “5 Infectious Diseases to Keep an Eye On in 2025”; US News & World Report; https://www.usnews.com/news/health-news/articles/2025-01-02/5-infectious-diseases-to-keep-an-eye-on-in-2025] cameron

The new year is *certain* to bring the spread of infectious *diseases* – both *new* and *old*. And *several factors* make *2025* *ripe* for *transmission* in the U.S., including *declining* childhood *vaccination rates* and a potential *new leader* of the *H*ealth and *H*uman *S*ervices Department who appears ready to sow fresh doubt on vaccines in the next Trump administration.

U.S. health policy is likely to face close scrutiny over the next four years, particularly if Robert F. Kennedy Jr. gains Senate confirmation to lead HHS.

Kennedy, who denies being “anti-vaccine,” has long promoted *false conspiracy theories* about *vaccines*. He said in July that “there’s no vaccine that is, you know, safe and effective.”

While Kennedy has said he won’t ban vaccines – he likely wouldn’t have the authority, and any effort in that direction would prompt immediate legal challenges – he can still use his potential platform to *discredit* and *plant suspicions* about the *shots*, which can *affect* vaccine *uptake*. If confirmed, he would take over HHS at a time when childhood vaccination rates are declining and school vaccination requirement exemptions are on the rise. And at the same time, these pools of unvaccinated and undervaccinated children *create conditions* that *allow* infectious diseases to *spread*.

“The *outlook* for infectious diseases over the course of the next four years is a little *dismal*,” says Dr. Perry N. Halkitis, the dean of the Rutgers School of Public Health, breaking it down into three categories to watch: Reemerging, currently spreading and new infectious diseases.

#### **But, GenAI in medical education will enable doctors to contain them.**

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**Generative artificial intelligence (GenAI) is rapidly transforming various sectors, including healthcare and education**. This paper explores the potential opportunities and risks of GenAI in graduate medical education (GME). **We review the existing literature and provide commentary on how GenAI could impact GME, including five key areas of opportunity: electronic health record (EHR) workload reduction, clinical simulation, individualized education, research and analytics support, and clinical decision support.** We then discuss significant risks, including inaccuracy and overreliance on AI-generated content, challenges to authenticity and academic integrity, potential biases in AI outputs, and privacy concerns. As GenAI technology matures, it will likely come to have an important role in the future of GME, but its integration should be guided by a thorough understanding of both its benefits and limitations. Introduction: Generative artificial intelligence (GenAI) is a relatively new technology that uses advanced machine learning models to generate human-like expression. Large language models (LLMs) like ChatGPT (OpenAI, San Francisco, United States) rely on a machine learning architecture called a “transformer.” A key feature of transformers is their self-attention mechanism, which allows the model to assess the importance of words in a sequence relative to one another, enhancing its ability to understand context and, when trained on vast amounts of data, resulting in a remarkable ability to understand and generate humanlike text (1). **Such models excel at tasks like document summarization, sentiment analysis, question answering, text classification, translation, text generation, and as conversational chatbots**. Related models called large vision models (LVMs), Vision-Language Models (VLMs), large multimodal models (LMMs), diffusion models, and generative adversarial networks (GANs) provide similar or overlapping functionality for image, audio, and video processing and generation. It is widely believed that GenAI will have far-reaching societal impact and will be incorporated into multiple aspects of our daily lives (2, 3). GenAI has the potential to revolutionize multiple industries, with healthcare and education among the likely targets. **In healthcare, GenAI has shown promise in a broad range of applications such as clinical decision support, medical education, clinical documentation, research support, and as a communication tool (4).** GenAI models like ChatGPT, even without special fine-tuning for medical knowledge, achieve performance at or near the passing threshold on all three United States Medical Licensing Examination (USMLE) Step exams (5). Studies evaluating performance on medical specialty board examination-or in-service examination-level questions have shown mixed results, but in some cases LLM performance has approached that of senior medical trainees (6–9). GenAI-powered tools are deployed in production clinical environments today, most notably in the patient care-adjacent domains of clinical documentation (10) and provider-patient communication, where they have shown promise in improving EHR-related provider inefficiency and burnout (11, 12). **In the medical educational setting, GenAI potentially offers multiple benefits such as easy personalization of learning experiences, simulation of real-world scenarios and patient interactions, and practicing communication skills (13).** These potential gains are balanced by meaningful risks, such as the trustworthiness of AI-generated content, the deepening of socioeconomic inequalities, and challenges to academic integrity (14, 15). Graduate medical education (GME) shares many characteristics with undergraduate medical education and with other types of healthcare education. As adult learners, medical trainees are theorized to learn best when self-motivated, self-directed, and engaged with task-centered, practical topics (16). Historically, medical education used time spent in the training environment as a proxy for learning success. More recently, there has been renewed interest in competency-based medical education (CBME), a paradigm that uses achievement of specific competencies rather that time spent (or other structural measures) as the key measure of learning success (17, 18). CBME serves as the foundation of the Accreditation Council for Graduate Medical Education (ACGME)’s accreditation model, and is the key theory underpinning the formative “Milestones” used by ACGME-accredited programs to assess trainee development and to improve education (19). Having built a foundation in medical sciences and basic clinical skills in medical school, GME trainees spend little time in the classroom, with most of their learning occurring with real patients as they function as members of the healthcare team. A core tenet of GME is “graded authority and responsibility,” where trainees progressively gain autonomy until they achieve the skills to practice independently. Additionally, trainees are expected to become “physician scholars”; participants in ACGME-accredited GME programs participate in scholarly pursuits like research, academic writing, quality improvement, and creation of educational curricula (20). In this paper, we present concise summary of the existing literature (Table 1) and commentary on the potential opportunities and risks of GenAI in the GME setting. 2.1 EHR workload reduction: Given their long work hours and stressful work environment, GME trainees are particularly susceptible to burnout, with rates higher than their age-matched peers in non-medical careers and higher than early-career attending physicians (21). Burnout among the academic physicians who comprise most GME faculty also occurs, and may impact the quality of training they are able to deliver (22, 23). Thus, innovations that prevent overwork and burnout have the potential to benefit GME trainees and faculty. One unintended consequence of the adoption of electronic health records (EHRs) has been a dramatic increase in time spent in documenting clinical encounters. Many physicians now spend as much time documenting in the EHR as they do in patient-facing activities (24). This documentation burden can result in medical errors, threats to patient safety, poor quality documentation, and attrition, and is a major cause of physician burnout (25). **Various strategies have been tried to reduce physician documentation burden, including medical scribes and various educational interventions, workflow improvements, and other strategies (26).** Given its ability to summarize, translate and generate text, GenAI demonstrates clear potential as a technological aid to alleviate the burden of clinical documentation. **The most notable current application is ambient listening tools that use GenAI to transcribe and analyze patient-doctor conversations, converting them into structured draft clinical notes that the physician would theoretically only then need to review for accuracy.** Numerous organizations are piloting such technology as of the time of this writing (27), though the few results published so far about real-world performance have been mixed (10, 28, 29). Examples of other less commercially mature concepts for how GenAI could reduce clinical documentation burden include tools to improve medical coding accuracy (30), to generate clinical summary documentation like discharge summaries (31), and to draft GME faculty supervisory notes (32). In addition to documenting clinical encounters, physicians (including GME trainees) spend large amounts of time in the EHR managing inbox messages, including patient messages, information about tests results, requests for refills, requests to sign clinical orders, and various administrative messages (33). As another major contributor to workload, EHR inbox management is also a cause of burnout (34, 35). This problem came to be of particular importance during the COVID-19 pandemic, where patient messaging increased by 157% compared to pre-pandemic levels (35). LLMs have shown the ability to draft high-quality, “empathetic” responses to patient questions (36). Early efforts to use LLMs for drafting replies to patient inbox messages have shown promising results, with multiple studies showing that LLMs can draft responses of good quality (37, 38) and at least one study showing good provider adoption with significant reductions in provider assessment of multiple burnout-related metrics (11). Multiple health information technology companies, including the largest United States EHR vendor, have already brought GenAI functionality for EHR inbox management to market (39–41). 2.2 Clinical Simulation: Simulation-based medical education (SBME) has evolved significantly since the early use of mannequins for basic life support training 60 years ago, and simulation using high-fidelity mannequins and virtual and augmented reality tools are now a vital component of GME. **There is a substantial body of evidence confirming the benefits of simulation-based training and the successful transfer of these skills to real patients (42, 43).** Simulations are used both to educate and to assess performance in GME. For example, the American Board of Anesthesiology incorporates an Objective Structured Clinical Examination (OSCE) meant to assess communication and professionalism, as well as technical skills, into the board examination process for anesthesiology residents (44). Many of the current applications of SBME in GME are targeted at procedural skills like complex surgical techniques, bridging the gap for trainees’ experiential learning on invasive, uncommon, or high-acuity procedures (45). **The integration of artificial intelligence into clinical simulations would theoretically allow for the customization of scenarios based on a trainee’s skill level and performance data, providing a personalized learning experience and potentially opening the door to new types of patient simulation** (43). Accordingly, there has been interest in using conversational GenAI to simulate patient encounters to practice cognitive and communication skills, though this application is more often focused on undergraduate medical education (15, 33, 46–49). **Among the most interesting potential applications of GenAI in GME is the concept of using synthetic data as training material for visual diagnosis**. GANs and diffusion models have shown promise in generating realistic images of pathology findings (50, 51), skin lesions (52–54), chest X-rays (55), genetic syndromes (56), and ophthalmological conditions (57). **The synthetic data approach may ultimately address important limitations in image-based training data sets, such as underrepresentation of certain patient demographics and adequate demonstration of rare findings**.

#### **Simulations, while enhanced by Gen AI, have the potential to solve ALL future pandemics.**

Karen **Reddin 21**, 04-05-2021; BSc Microbiology, PhD Microbiology, MSc Resilience; “Evaluating simulations as preparation for health crises like CoVID-19: Insights on incorporating simulation exercises for effective response” Pubmed, https://pmc.ncbi.nlm.nih.gov/articles/PMC8020603/] shua

**The research concluded that the use of a computer-simulation was effective in providing a facilitated environment for determining the perception of preparedness, evaluating general preparedness concepts and introduced participants to critical decisions involved in handling a regional pandemic influenza surge**. The design and use of simulations like this eliminate geography as a limitation to education delivery and can be applied at operational, tactical and strategic levels across many different sectors in addition to health. **Furthermore, it can also enhance the development of principles and governance tools that can support the development of an effective pandemic preparedness and response strategy [31]. The COVID-19 pandemic has also provided an opportunity to test in situ simulation in a clinical context using virtual application of clinical training for clinical procedures required during the pandemic**. A video-recorded simulation with virtual distribution was used to aid in the development of protocols for personal protective equipment (PPE) and Intensive Care practises. This enabled staff input and education under the constraints and pressures of a global pandemic [32]. Li et al. [33] also looked at the challenges and possible solutions for simulation and technology-enhanced learning during the COVID-19 outbreak in China and argue that after identifying the need for training, **simulation has become a powerful weapon fighting against the virus with respect to providing operational training for front line healthcare staff** as it can not only ensure patient safety but also provide a safe learning and training environment for HCWs to develop practical skills to deal with COVID-19. **They propose the development of simulation curricula to ensure better preparedness of HCWs for this and future pandemics**. This approach could be incorporated into a pandemic preparedness framework such as the WHO's EPPP framework used in this article.

#### **Preventing US spread is key.**

Bar-Yam ’16 [Dr. Yaneer Bar-Yam; July 3rd; Associate Professor of Engineering at Boston University, founding president of the New England Complex Systems Institute, research scientist at the MIT Media Lab, joint postdoctoral fellow at MIT and International Business Machines Corporation, visiting scholar at the Department of Molecular and Cellular Biology at Harvard University and the Federal Reserve Bank of Boston; “Transition to Extinction: Pandemics in a Connected World”; New England Complex Systems Institute; https://necsi.edu/transition-to-extinction; brackets original] cameron

When we introduce *long range transportation* into the model, the *success* of *more aggressive strains changes*. They can use the *long range transportation* to *find new hosts* and *escape local extinction*. Figure 3 shows that the more transportation routes introduced into the model, the more higher aggressive pathogens are able to survive and spread. As we add more long range transportation, there is a *critical point* at which *pathogens become so aggressive* that the *entire host population dies*. The pathogens die at the same time, but that is not exactly a consolation to the hosts. We call this the phase *transition* to *extinction* (Figure 4). With *increasing levels* of *global transportation*, *human civilization* may be *approaching* such a *critical threshold*. Figure 4: The *probability* of *survival* makes a *sharp transition* (red line) from one to zero as we *add more long range transportation* (horizontal axis). The right line (black) holds for different model parameters, so we need to study at what point the transition will take place for our world. In the paper we wrote in 2006 about the dangers of global transportation for pathogen evolution and pandemics [8], we mentioned the risk from Ebola. Ebola is a horrendous disease that was present only in isolated villages in Africa. It was far away from the rest of the world only because of that isolation. Since Africa was developing, it was only a matter of time before it reached population centers and airports. While the model is about evolution, it is really about which pathogens will be found in a system that is highly connected, and Ebola can spread in a highly connected world. The traditional approach to public health uses historical evidence analyzed statistically to assess the potential impacts of a disease. As a result, many were surprised by the spread of Ebola through West Africa in 2014. As the connectivity of the world increases, past experience is not a good guide to future events. A *key point* about the *phase transition* to *extinction* is its *suddenness*. *Even* a *system* that *seems stable*, can be *destabilized* by a *few more long-range connections*, and *connectivity* is *continuing* to *increase*. So how close are we to the tipping point? We don’t know but it would be good to find out before it happens. While Ebola ravaged three countries in West Africa, it only resulted in a handful of cases outside that region. One possible reason is that many of the airlines that fly to west Africa stopped or reduced flights during the epidemic [9]. In the absence of a clear connection, public health authorities who downplayed the dangers of the epidemic spreading to the West might seem to be vindicated. As with the choice of airlines to stop flying to west Africa, our analysis didn’t take into consideration how people respond to epidemics. It does tell us what the outcome will be unless we respond fast enough and well enough to stop the spread of future diseases, which may not be the same as the ones we saw in the past. As the *world* becomes *more connected*, the *dangers increase*. Are people in western countries safe because of higher quality health systems? Countries like the *U.S.* have *highly skewed networks* of *social interactions* with some very highly *connected individuals* that can be “*superspreaders*.” The *chances* of such an *individual* becoming *infected* may be low but events like a mass outbreak *pose* a *much greater risk* if they do happen. If a sick food service worker in an airport infects 100 passengers, or a *contagion event* happens in *mass transportation*, an *outbreak* could *very well* prove *unstoppable*.

#### **Pandemics cause extinction**---the post-Covid landscape sets the scene for worse diseases that evade countermeasures**.**

Diamandis ’22 [Dr. Eleftherios P. Diamandis; January 29th; Professor and Head of Clinical Biochemistry in the Department of Laboratory Medicine and Pathobiology at the University of Toronto, Division Head of Clinical Biochemistry at Mount Sinai Hospital, Biochemist-in-Chief at the University Health Network, Ph.D. in Analytical Chemistry from the University of Athens, B.Sc. in Chemistry from the University of Athens; “The mother of all battles: Viruses vs humans. Can humans avoid extinction in 50–100 years?”; Open Life Sciences; Vol. 17; Issue 1; https://doi.org/10.1515/biol-2022-0005; brackets original] cameron

The recent SARS-CoV-2 pandemic, which is causing COVID-19 disease, has taught us unexpected lessons about the dangers of human suffering through highly contagious and lethal diseases. As the COVID-19 pandemic is now being partially controlled by various isolation measures, therapeutics, and vaccines, it became clear that our current lifestyle and societal functions may not be sustainable in the long term. We now *have* to start thinking and planning on how to face the *next* dangerous pandemic, not just overcoming the one that is upon us now. Is there any evidence that *even worse* pandemics could *strike* us in the *near future* and threaten the *existence* of the *human race*? The answer is unequivocally yes. It is not necessary to get infected by viruses found in bats, pangolins, and other exotic animals that live in remote forests to be in danger. Creditable scientific evidence indicates that the human gut microbiota harbor billions of viruses that are capable of affecting the function of vital human organs such as the immune system, lung, brain, liver, kidney, or heart. It is remotely possible that the development of pathogenic variants in the gut can lead to *contagious viruses*, which can cause *pandemics*, leading to the destruction of vital organs, causing death or various debilitating diseases such as blindness, respiratory, liver, heart, and kidney failures. These diseases could result in the *complete shutdown* of our civilization and probably the gradual *extinction* of the *human race*. This essay will comment on a few independent pieces of scientific facts, and then combine this information to come up with some (but certainly not all) hypothetical scenarios that could cause human race misery, even extinction, in the hope that these hypothetical scenarios will trigger preventative measures that could reverse or delay the projected adverse outcomes.

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Keywords: pandemics; contagious diseases; human race extinction; viruses; microbiome; COVID-19; blindness 1 Introduction Le Chatelier’s Principle: Named after the French chemist, Le Chatelier’s principle posits that “When an external stress (change in pressure, temperature or concentration) is applied to a system in chemical equilibrium, the equilibrium will change in such a way as to reduce the effect of the stress.” In other words, a change in a system will evoke a counter-change, which will bring the equilibrium to a new point. This principle operates with almost every human or other activity. For example, it is known that when fruit production in the Serengeti ecosystem is reduced, the number of elephants, which feed on these fruits, is reduced proportionally. In the context of this essay, I hypothesize that human-made changes in climate, the atmosphere, water, soil, and all other planet-living organisms, will likely evoke counter-changes that may be highly consequential to human life. Due to the complexity of our ecosystem, humans do not know exactly how these changes will affect them in the end. Consequently, they choose to disregard them because lifestyle adjustments may cost money and convenience or loss of well-established pleasures. 1.1 The earth is changing rapidly What is changing on the earth that could induce a potentially catastrophic counter-change? The answer is everything is changing[1], from the living inhabitants (humans, other species, and plants) to the atmosphere, water, soil, climate, among else. The changes caused by human activity are sometimes dramatic. For example, it has been estimated that about 1 million out of 8.5 million species of plants, animals, and other organisms are in imminent danger of extinction [1]. Other estimates show that 50% of the organisms that existed 50 years ago have already gone extinct, not to consider additional species that are gone before we even identify them. Soon, we will likely be losing more than 80% of the world’s species due to human overdevelopment and its associated consequences. The major reasons for species extinction are habitat destruction, pesticide poisoning, and illegal hunting [1]. 2 Global warming Some may choose to believe what the politicians are debating about: that climate change is a fact or fiction, but the data say that the last 6 years were the warmest on record [2]. Overall, the planet was 1.25°C warmer than in preindustrial times (in the 1950s). Warmer oceans are melting ice sheets and rising sea levels by almost 5 mm per year. In Australia, record-setting heat and drought were responsible for the bushfires that destroyed almost 25% of southeastern Australia’s forests and their living inhabitants, such as koalas. If we cannot slow down earth’s heating by reducing emissions, the current increase of about 0.2°C per decade will likely be rapidly surpassed. How will the planet react? Likely with more catastrophic fires, tsunamis, earthquakes, and floods. The human homeostatic changes to increased temperatures are very complex and include many vital organs [3]. Global warming may also cause changes in the biology of our candidate foes, the viruses, bacteria, and parasites that live in our gut and skin (see Section 2.2). 2.1 How much human-made environmental damage has been done already? Humans are now the undisputed masters of the planet and cannot be easily stopped from actively destroying it, consciously or unconsciously. An interesting question is how much damage has been claimed to be done already, and do we have the data to support these claims? Elhacham et al. have recently compared the natural biomass that exists on the earth with the human-made (anthropogenic) mass [4]. They found that each person on the globe produces a mass that is about equal to their body weight every week! Is that too little or too much? Let us first define biomass and anthropogenic mass. The majority of the earth’s biomass is represented by trees and bushes. The majority of the man-made mass is represented by buildings and infrastructure such as roads and consists of concrete, bricks, asphalt, metals, and plastic. Just consider that the total global mass of produced plastic so far is greater than the overall mass of all terrestrial and marine animals combined! So, how do we fare when comparing biomass to anthropogenic mass production? In the 1900s, the latter represented only 3% of global biomass; but now, in the 2020s, the two masses are about equal. The projection is that if we go on with more deforestation, buildings, streets, plastics, cars, and so on, by 2040, it is likely that anthropogenic mass will almost triple the earth’s biomass. Will there be enough resources and clean air and water to sustain the life of the projected 9 billion inhabitants? Anthropogenic mass production is difficult to slow down since this activity is considered part of our evolving civilization and way of living. 2.2 Human microbiome The human body consists of approximately 30 trillion cells, but the microbiota population in the human gut is estimated to be 300 trillion [5]! In addition, there is another microbiota in the skin and other organs. It was initially thought that these microbiota act locally (e.g., only in the gut or skin), but new evidence suggest that the effects of microbiota may be global, reaching every cell in the body. This can be achieved with various mechanisms, one being the transmission of signals mediated by proteins that can travel through anatomically distinct structures such as the vagus nerve. For example, a protein called curli can travel through the vagus nerve and reach the brain, where it can promote abnormal aggregation of proteins such as a-synuclein, one major pathogenetic player in Parkinson’s disease [5,6]. Another and even more likely mechanism includes the diffusion of bacterial or viral proteins (some could be toxins to various organs) or pathogenic viruses into the bloodstream. From there, they can travel around the body. This is reminiscent of cancer cell metastasis by the hematogenous route. One piece of evidence for that happening is that about half of the human metabolome (the collection of all metabolites in the blood) is derived by host bacteria [5]. Bacteria or virus-derived metabolites could also pass through the placenta and reach the fetus, including the fetal brain, possibly causing diseases such as autism. Despite skin not being as hospitable to microorganisms as the gut, a typical person may have about 1,000 species of bacteria on their skin [7]. These microbial communities continue to grow and diversify until puberty when hormonal and developmental changes reach a plateau. The balance between host and bacteria in the skin is determined by the production of skin-derived microbial nutrients, microbiome-derived skin nutrients, skin, and microbiome-derived antimicrobial peptides, and by the interaction of the microbiome with the host’s immune system. Similar as in the gut, there is a delicate balance between beneficial and potentially harmful bacteria and the host immune system. It is remotely possible that our future enemies may derive from the gut, skin, or other organs harboring microorganisms. In addition, the skin is more sensitive to environmental changes such as climate change as it is directly exposed to the environment. In conclusion, bacterial, viral, and parasite-derived proteins or pathogenic viruses thrive locally (e.g., in the gut or skin) but are capable of acting globally. 2.3 Human viruses and how they could cause disease Many strains of gut bacteria are harmless, but they can become dangerous pathogens under certain conditions, such as antibiotic use [8]. It is well known that gut bacteria can harbor many viruses (bacterial phages) [9]. If they do not immediately kill the infected bacteria, these viruses incorporate into the bacterial genome and stay latent for extended periods (they are known “prophages”). These prophages can be reactivated under certain environmental or other factors and act like pathogenic viruses. It is rather surprising that, in general, viruses are so many that they qualify as the most abundant biological entities on the planet. Sometimes, gut bacteria use their activated prophages as weapons to gain an advantage and kill other competing bacteria. Phages could also assist in bacterial evolution as the latter become more virulent [10]. The gut bacteria also seem to interact with the host immune system and can influence the efficacy of cancer immunotherapy [11,12,13]. The microbiome has been blamed for playing direct or indirect roles in many human diseases, including cancer, metabolic syndrome, diabetes, dementia, and others [14]. The outcomes regarding health and disease depend on the balance of powers among the gut/skin/other organ viruses, the gut/skin/other organ microbiomes, and the host immune system. If this balance is disturbed, a biological war between these players will be initiated, and the outcome will be unpredictable. In conclusion, scientific evidence supports the idea that phages in the mammalian intestine, skin, or elsewhere, not only can be engulfed by certain eukaryotic cells but also might escape from the gut or skin, enter the bloodstream, and make their way into other parts of the body, with as yet undiscovered consequences. 2.4 Viral variants Viruses evolve continuously, eventually leading to more transmissible variants, which sometimes can be more lethal than the original strains. The SARS-CoV-2 is an excellent contemporary example. Multiple variants of SARS-CoV-2 are rapidly spreading and are becoming dominant in certain geographic areas [15,16]. For example, the B.1.1.7 variant (United Kingdom) has 23 mutations and 17 amino acid changes; variant 501Y.V2 (South Africa) has 23 mutations and 17 amino acid changes; and P.1 variant (Brazil) has approximately 35 mutations with 17 amino acid changes.

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In April 2021, when this document was first written, I speculated verbatim that “new variants with additional mutations could become able to *evade* our currently available vaccines by weakening the ability of vaccine-induced antibodies to neutralize/block viral entry, and by strengthening the ability of the virus to enter the cells via surface receptors.” The so-called “omicron variant,” isolated in November 2021, already fulfilled this prediction.

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2.5 How COVID-19 and possibly other viruses affect the brain In general, viral invasion of the central nervous system may be achieved by several routes, including transsynaptic transfer across infected neurons, entry via the olfactory nerve, infection of vascular endothelium, or leukocyte migration across the blood–brain barrier. SARS-CoV-2 invades endothelial cells via transmembrane angiotensin-converting enzyme 2 (ACE2) receptor binding and a subsequent proteolytic event, facilitated by transmembrane protease serine 2 [17]. Is there evidence that SARS-CoV-2 can enter the brain? The answer is yes [18]. As already mentioned, one route is by migrating from the cribriform plate along the olfactory tract [19] or through vagal pathways. Another route may include viral entry into brain capillary endothelial cells via the ACE2 pathway. Viral RNA was detected in the medulla and cerebellum by reverse transcription-polymerase chain reaction. However, viral proteins seem to be absent from neurons and glial cells. Consequently, the adverse events of the virus on the brain, including altered neurotransmission and neuronal damage, are likely mediated by neuroinflammation and hypoxic injury through cytokines and other proinflammatory mediators. 2.6 SARS-CoV-2 and possibly other viruses can affect the senses Viruses can affect our senses. For example, SARS-CoV-2 causes anosmia (loss of smell) and ageusia (loss of taste) in 40–70% of COVID-19 patients [20]. These effects persist, but it is unknown for how long. Other neurological symptoms include headache, stroke, impairment of consciousness, seizure, anxiety, and encephalopathy. Current evidence suggests that SARS-CoV-2-related anosmia may be a new viral syndrome specific to COVID-19. This syndrome is likely mediated by intranasal inoculation of SARS-CoV-2 into the olfactory neural circuitry. Since the olfactory sensory neurons do not express ACE2 receptor, the likely explanation for the loss of smell is the damage of accessory cells supporting these neurons. Although anosmia is not a lethal or severe disease, other neurological damage such as blindness could be devastating [21,22]. 3 Adverse scenarios Fifty years ago, one adverse scenario regarding a pandemic was presented in the film “The Andromeda strain,” which describes a pandemic caused by a pathogen of extraterrestrial origin [23]. Here, I present an alternative hypothetical scenario that involves an endogenous virus. Obviously, there is a myriad of similar scenarios, and the one given below can be currently classified as fictional but not impossible. A prophage, which was residing dormant for years in the genome of the commensal gut bacterium Bifidobacterium infantis suddenly, and without an apparent reason, has undergone induction and started to produce viral proteins, which were subsequently assembled into whole phages. After cell lysis, these phages infected other neighboring cells. This cycle was repeated many times, and millions of free virions were released, some entering the systemic circulation (viremia). Some virions reached the lung endothelium and entered the endothelial cells through an, as yet, unknown receptor and started replicating and lysing these cells. The resulting mucous caused the host to cough, thus facilitating the transfer of the virus to other humans through aerosol droplets. Soon, the virus was able to infect, first a few hundred, then thousands, then millions of other unsuspected people through coughing and sneezing. The virus was able to travel all over the world as the pulmonary manifestations were mild, and most infected individuals thought it was a common flu or a similar ailment. Scientists isolated the virus that caused this flu-like disease and determined from its genomic sequence that it was a novel member of influenza virus B, which usually causes seasonal flu. Despite the pandemic nature of the infection, nobody died, and governmental bodies were not highly concerned. Six months later, one individual reported a weakening of his vision, which, within 3 months, progressed to total blindness. This unusual form of blindness quickly spread to other people until scientists performed epidemiological studies, which linked the blindness to the previously mentioned mild flu. Soon afterward, scientists isolated and identified the virus from the brains of blind and subsequently succumbed individuals and confirmed that the sequence matched the virus that caused the unusual flu. More elaborate studies had shown that there was unusual and very severe neuroinflammation around the occipital lobe of the brain (Brodmann area 17), an area responsible for the interpretation of visual signals arriving from the optic nerve. Several therapeutics were tried, but none was proven to be effective. Twelve months into the pandemic, 10 million people lost their vision, and within 18 months, without any success in developing therapies or a vaccine, the blindness had spread to whole nations. 3.1 Blindness The selection of blindness as a chronic consequence of an acute pandemic was deliberate. In 1995, Portuguese author Jose Saramago published a fictional novel entitled “Blindness” (ISBN: 9780151002511), which contributed to him winning the Nobel Prize in literature in 1998. Blindness, as portrayed in the book, is a highly detailed story of a mysterious mass epidemic that caused blindness of a whole nation and the social breakdown that followed. The blindness pandemic, in many respects, is reminiscent of the current COVID-19 pandemic. Blindness caused widespread panic, anarchy, and government lockdowns. The life of the blind people was characterized by filthiness, aggressive manners, disrespect of others, and a struggle to survive by any possible means. The breakdown of society was near total. Law and order, social services, government, schools could no longer function. Families have been separated and could not find one another. People squat in abandoned buildings and scrounge for food. Violence, disease, and despair threaten to overwhelm human coping. One of Saramago’s quotes, describing life after blindness, is reproduced here “Perhaps humanity will manage to live without eyes, but then it will cease to be humanity, the result is obvious…” 3.2 Other ailments Acute pandemics could cause many other chronic diseases that can threaten the sustainability of our present society. Although COVID-19 causes loss of smell and taste, these are considered nonlife-threatening ailments. However, in the long run, the permanent absence of smell and taste will mean the loss of innumerable current pleasures associated with the consumption of food and drinks. Clearly, loss of hearing will not be compatible with current societal functions or human achievements. Acute viral diseases are also associated with innumerable organ-specific diseases such as heart, kidney, and reproductive failures and disturbance of other vital functions that can paralyze our current society, economy, and culture. Even a minor weakening of our memory (mild cognitive impairment) could result in chaotic situations that authors of fiction, such as Saramago, attempt to describe in detail in future books. 3.3 Epilog

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Humans have learned to take for granted what they currently have and enjoy. Perhaps, we did not realize that the human race’s spectacular advances are dependent on several potentially volatile abilities (senses, brain function) and that even one loss, or diminution of such abilities, could be detrimental, causing a collapse of our civilization. The *COVID*-19 pandemic helped us realize that we may be sitting on a *time bomb*, which might *explode* if we continue disturbing the current equilibrium between humans and other planetary partners. In addition to viruses of a rather *exotic origin*, such as SARS-CoV-2, *billions* of *other viruses* and other infectious agents in our gut, skin, and elsewhere are *waiting* for the right time to attack us. The lessons learned from COVID-19 should be a wake-up call for humans to stop disturbing the equilibrium with actions that favor the well-being of humans but put in danger the *existence* of other inhabitants of *planet earth*. Human migration, also known as “travel,” has facilitated the travel of our foes, along with us, in every conceivable corner of the world.

#### **Defense doesn’t assume interconnection and knock-on effects.**

Baum ’23 [Dr. Seth D. Baum; 2023; Executive Director of the Global Catastrophic Risk Institute, Ph.D. from Pennsylvania State University; “Assessing natural global catastrophic risks”; Natural Hazards; Vol. 115; pp. 2699-2719; https://doi.org/10.1007/s11069-022-05660-w] cameron

The distinction between natural and anthropogenic pandemics is particularly blurry. One distinction is between pathogens that arises in nature and pathogens created via biological science and technology, such as gain-of-function experiments and DNA synthesis (Millett and Snyder-Beattie 2017). However, human activity can cause the onset of “natural” pandemics, such as when interactions with *wildlife* cause pathogens to jump from a nonhuman species to humans (i.e., zoonosis; Morse et al. 2012). The risk from wildlife zoonosis may be larger now than during early human history because the larger human population has more points of contact with wildlife. Additionally, zoonosis can also occur in factory farms, a setting that exists in the gray area between natural and anthropogenic (Manheim 2018).

Once the pathogen has infected humans, it is *spread* primarily via human activity.Footnote17 The risk is heavily affected by modern global civilization. On the one hand, modern medicine and public health creates more powerful techniques for reducing the severity of pandemics. On the other hand, global travel and urban density create *more opportunities* for pathogens to spread. Earlier in human history, a catastrophic natural pathogen may have only killed off a smaller, isolated portion of the population, leaving no clear archaeological record, whereas the same pathogen could cause global catastrophe (Manheim 2018). Therefore, the deep historical evidence is consistent with even a high ongoing probability of *human extinction* from natural pandemics, implying that natural pandemic risk can be of large long-term moral importance even if w(cc) is small.

Pandemics could further threaten *civilization collapse*. Pandemics could disrupt the labor pool, causing acute supply chain disruptions with severe effects such as to food security (Huff et al. 2015). A pandemic causing neurological harm, such as in long COVID (Misra 2021), could result in the human population having insufficient *cognitive fitness* to maintain civilization. Furthermore, these sorts of effects could have occurred during pandemics earlier in human history without leaving a noticeable trace. Supply chain disruptions would have been of minimal consequence for most of human history. Medical effects such as neurological harm could go away, for example, if it is not passed to subsequent generations. If w(cc) is large, the potential effects of pandemics on civilization collapse merit careful scrutiny.

One particularly complex and acute pandemic scenario is when a pandemic causes a failure of *stratospheric geoengineering*. Stratospheric geoengineering involves injecting particles into the stratosphere to counteract the harms of anthropogenic global warming. If particle injection is abruptly halted, temperatures rapidly rise, which could cause acute harm known as *termination shock* (Parker and Irvine 2018). Under normal circumstances, abrupt cessation of particle injection may be unlikely due to the desire to avoid termination shock. However, Baum et al. (2013) propose that a catastrophe such as a pandemic could cause the cessation of particle injection, resulting in a “*double catastrophe*” in which the harms of termination shock *compound* the harms of the initial catastrophe. This may be an especially severe pandemic scenario. It is also a scenario rooted in interactions between the natural hazard and human civilization. Further complicating the picture, prior to termination shock, stratospheric geoengineering could shift climates in a way that shifts disease vector patterns, potentially affecting the risk of “natural” pandemics (Tang and Kemp 2021).

Fan et al. (2016) estimate an annual probability of 1.6 × 10–2 for “severe” pandemics defined as pandemics that cause the death of 0.1% of the global human population. The ongoing COVID-19 pandemic is estimated to already exceed this threshold.Footnote18 Thus far, fortunately, COVID-19 has not threatened the collapse of civilization or human extinction. Therefore, the annual probability of pandemics that threaten collapse or extinction is likely to be lower than 1.6 × 10–2, with the collapse probability being higher than the extinction probability, though the exact probabilities are difficult to quantify (Manheim 2018). Nonetheless, there is potential for this risk to be *significantly higher* than the 2 × 10–6 annual probability calculated in Sect. 2.1.

#### **Preceding shocks cause spiraling political reactions that culminate in existential war**---independently, spurs shoot-ups in protectionism, populism, and prolif.

Tatsujiro Suzuki 21, Director and Professor at the Research Center for Nuclear Weapons Abolition, Nagasaki University, Former Vice Chairman of Japan Atomic Energy Commission, et al., “Pandemic Futures and Nuclear Weapon Risks: The Nagasaki 75th Anniversary pandemic-nuclear nexus scenarios final report”, 5-28-2021, https://www.tandfonline.com/doi/full/10.1080/25751654.2021.1890867

The relationship between *pandemics* and *war* is as *long as human history*. Past pandemics have *set the scene* for wars by *weakening societies*, undermining resilience, and exacerbating *civil* and *inter-state conflict*. Other disease outbreaks have erupted during wars, in part due to the appalling public health and battlefield conditions resulting from war, in turn sowing the seeds for new conflicts. In the post-Cold War era, pandemics have spread with *unprecedented speed* due to *increased mobility* created by *globalization*, especially between urbanized areas. Although there are positive signs that scientific advances and rapid innovation can help us manage pandemics, it is likely that deadly infectious viruses will be a challenge for years to come.

The *COVID-19* is the most demonic pandemic threat in modern history. It has erupted at a juncture of other existential global threats, most importantly, accelerating climate change and resurgent nuclear threat-making. The most important issue, therefore, is how the coronavirus (and future pandemics) will increase or decrease the risks associated with these twin threats, climate change effects, and the next use of nuclear weapons in war.5

Today, the nine *nuclear weapons arsenals* not only can *annihilate* *hundreds* of *cities*, but also cause *nuclear winter* and *mass starvation* of a *billion* *or more* people, if not the *entire human species*. Concurrently, climate change is enveloping the planet with more frequent and intense storms, accelerating sea level rise, and advancing rapid ecological change, expressed in unprecedented forest fires across the world. Already stretched to a breaking point in many countries, the current *pandemic* may *overcome resilience* to the point of near or actual *collapse* of *social*, *economic*, and *political order*.

In this extraordinary moment, it is timely to reflect on the existence and possible uses of weapons of mass destruction under pandemic conditions – most importantly, nuclear weapons, but also chemical and biological weapons. Moments of extreme crisis and vulnerability can prompt *aggressive* and counterintuitive actions that in turn may destabilize already *precariously balanced* threat systems, underpinned by *conventional* and *nuclear weapons*, as well as the threat of weaponized *chemical* and *biological tech*nologies. Consequently, the risk of the use of weapons of mass destruction (WMD), especially nuclear weapons, increases at such times, possibly *sharply*.

The COVID-19 pandemic is clearly driving massive, rapid, and unpredictable changes that will redefine every aspect of the human condition, including WMD – just as the world wars of the first half of the 20th century led to a revolution in international affairs and entirely new ways of organizing societies, economies, and international relations, in part based on nuclear weapons and their threatened use. In a world reshaped by pandemics, nuclear weapons – as well as correlated non-nuclear WMD, nuclear alliances, “deterrence” doctrines, operational and declaratory policies, nuclear extended deterrence, organizational practices, and the existential risks posed by retaining these capabilities – are all up for redefinition.

A pandemic has potential to destabilize a *nuclear-prone conflict* by *incapacitating* the supreme nuclear commander or commanders who have to issue *nuclear strike orders*, creating *uncertainty* as to who is in charge, how to handle nuclear mistakes (such as errors, accidents, technological failures, and entanglement with conventional operations gone awry), and opening a *brief opportunity* for a *first strike* at a time when the COVID-infected state may not be able to retaliate efficiently – or at all – due to leadership confusion. In some nuclear-laden conflicts, a state might *use* a *pandemic* as a *cover* for political or military provocations in the belief that the adversary is distracted and partly disabled by the pandemic, increasing the risk of war in a nuclear-prone conflict. At the same time, a pandemic may lead nuclear armed states to increase the isolation and sanctions against a nuclear adversary, making it even harder to stop the spread of the disease, in turn creating a pandemic reservoir and transmission risk back to the nuclear armed state or its allies.

In principle, the common threat of the pandemic might induce nuclear-armed states to reduce the tension in a nuclear-prone conflict and thereby the risk of nuclear war. It may cause nuclear adversaries or their umbrella states to seek to resolve conflicts in a cooperative and collaborative manner by creating habits of communication, engagement, and mutual learning that come into play in the nuclear-military sphere. For example, militaries may cooperate to control pandemic transmission, including by working together against criminal-terrorist non-state actors that are trafficking people or by joining forces to ensure that a new pathogen is not developed as a bioweapon.

To date, however, the COVID-19 pandemic has increased the isolation of some nuclear-armed states and provided a textbook case of the failure of states to cooperate to overcome the pandemic. *Borders* have slammed shut, trade shut down, and budgets blown out, creating enormous pressure to focus on immediate domestic priorities. Foreign policies have become *markedly more nationalistic*. Dependence on nuclear weapons may increase as states seek to buttress a global re-spatialization6 of all dimensions of human interaction at all levels to manage pandemics. The effect of nuclear threats on leaders may make it less likely – or even impossible – to achieve the kind of concert at a global level needed to respond to and administer an effective vaccine, making it harder and even impossible to revert to pre-pandemic international relations. The result is that some states may *proliferate* their own nuclear weapons, further reinforcing the spiral of conflicts contained by nuclear threat, with cascading effects on the *risk of nuclear war*.

#### **Contention 2 is TERROR.**

#### **GenAI enables credible healthcare education, strengthening the overall industry.**

Sami et al ’25 [Dr. Abdul Sami; January 17th; former Assistant Director at the Pakistan Council of Renewable Energy Technologies, Ph.D. from the National University of Sciences and Technology, M.E. from the N.E.D. University of Engineering and Technology; et al; “Medical students’ attitudes toward AI in education: perception, effectiveness, and its credibility”; BMC Medical Education; https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-025-06704-y] cameron

This study demonstrated that *AI* is an *effective* and *credible* tool in *medical education*, offering *personalized learning* experiences and *improved* educational *outcomes*. *AI* tools are *help*ing students learn medical concepts by cutting down on *study-time*, providing *accurate answers*, and ultimately *improving study outcomes*. We recommend developing dedicated AI tools for medical education and their formal integration into medical curricula, along with appropriate regulatory oversight to ensure AI can enhance human abilities rather than acting as a replacement for humans.

Introduction

AI is defined as “the science and engineering of making intelligent machines” [1]. ​​It involves developing computer systems that can perform tasks requiring human intelligence e.g. speech recognition, visual perception, decision-making, and language translation [2]. The emergence of AI has been ground breaking in all frontiers; whether it’s automating processes, improving decision-making, analyzing market trends, or optimizing investment strategies. ChatGPT reached a record breaking 100 million users in just two months, solidifying its position as the fastest-growing consumer application ever. This unprecedented milestone underscores the transformative power of AI [3]. Due to its potential, AI sparked significant interest across the globe.

Incorporation of *AI* in *med*ical *ed*ucation has the potential to *revolutionize learning methods*, *improve educational outcomes*, and ultimately contribute to *better patient care*. To improve medical education, it is essential to recognize the preferred learning styles of medical students. A recent study in Pakistan revealed that the majority of the students prefer self-learning, with other favored methods and styles including small group discussions, traditional class lectures, aural, visual, and reading/writing. Identifying these preferences helps tailor educational approaches to better meet the needs of medical students [4]. Despite the growing interest in emerging technologies, medical education has not kept in pace with the significant advancements in artificial intelligence. Although there have been multiple calls for action, the integration of AI training into undergraduate medical education remains limited, likely due to a lack of research-based evidence [5]. As AI continues to expand in healthcare, incorporating AI education in undergraduate medical education will be highly beneficial for future medical practice, reaching trainees early in their careers. The approach to teaching through AI in undergraduate medical education curricula should be done according to the best available evidence. Given AI’s relative novelty in medical education, a comprehensive literature review is necessary to identify existing evidence, highlight any gaps and conducting further research [6].

Artificial intelligence presents a transformative opportunity as a learning tool in medical education, offering personalized, adaptive learning experiences that can significantly enhance student outcomes [7, 8]. This personalization is especially valuable given the diverse learning preferences among medical students. Integrating AI into medical education also addresses a critical issue: time constraints. Medical students often face overwhelming schedules with limited time to engage deeply with multiple resources. AI tools can streamline learning by efficiently curating relevant content, automating assessments, and providing instant feedback, thus saving valuable time and allowing students to focus more on understanding and applying complex medical concepts. By optimizing study time and improving resource management, AI can significantly alleviate the burden on medical students, making learning more efficient and effective [9]. AI tools not only contribute to theoretical education but can also a play role in development of specific skills related to medical curriculum. A 2024 study highlighted the use of new AI tools that have aided medical students in learning of clinical and surgical skills. These AI tools evaluate students in real-time and provide feedback for improvement. Students have utilized these tools for assistance in minimally invasive surgery, tumor resection, suturing and catheterization. AI tools were also able to effectively evaluate skills of students and discriminate them into groups such as proficient and novice. The study concluded that AI tools can be instrumental to medical education through the avenues of student evaluation, teacher evaluation, and providing feedback to students and teachers [10].

#### **A weak healthcare industry emboldens bioterror---a credible one deters it.**

Kosal ’14 [Dr. Margaret E. Kosal; December 9th; Associate Professor at the Sam Nunn School of International Affairs at the Georgia Institute of Technology, Ph.D. in Chemistry from University of Illinois at Urbana-Champaign; “A New Role for Public Health in Bioterrorism Deterrence”; Frontiers; https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2014.00278/full] cameron

When this commentary was submitted in April 2014, only a handful of scholars and policy-makers in the defense and security communities were following the Ebola outbreak in West Africa, which was over 4 months old at that time. Now that *thousands* of people have *died*, cases have spread to the US and Europe, and thousands of US uniformed military are being deployed on humanitarian assistance/disaster relief missions, attention and interest are significantly heightened. The *events* of the last few months demonstrate the *criticality* for *interdisciplinary thinking*, which is more challenging due to different historical contexts, knowledge bases, interests, lexicon, and perspectives. This commentary will explore the creation of new relationships between deterrence, infectious disease, and *public health* to reduce the threat of *bio*logical *terror*ism and increase *international security*. Examining the *global spread* of re-emerging *infectious disease*, such as the re-emergence of polio from northern Nigeria, offers a *novel case* study for thinking about how to deter potential bioterrorists who seek to use infectious disease. Polio outbreaks have more directly affected the *developing world* compared to the US or other nations with *robust public health* sectors. This example suggests that a bioterrorist attack would also be *more* *devastating* for developing countries in low-resource settings compared to the western world. Credibly, *communicating* this may offer a new approach to deterring bioterrorism by foreign actors. Although a robust *public health* sector has long been noted to *reduce* the *vulnerability* to a *bioterrorism* attack, actively *promoting* the strength of US *public health* can also serve as a *powerful deterrent* in its *own right.* The issue of terrorist groups utilizing biological weapons against other states is a mounting concern, yet little deterrence research in the field of political science addresses methods of dealing with the threat of *bioterrorism*. Thus, creating new conversations among the life sciences, public health, and political science can lead to new perspectives on deterring bioterrorism. The issue of bioterrorism deterrence, if addressed, has been often added or subsumed under the auspices of deterrence strategies associated with nuclear weapons. In the second half of the twentieth century, nuclear deterrence dominated geopolitics and national security strategies. At its height, the threat of mutually assured destruction (MAD) existed in which both superpowers possessed arsenals with second-strike capabilities, i.e., the ability to respond to a first nuclear strike on land via use of nearly undetectable submarine-launched ballistic missiles with nuclear warheads.

#### **Credibility is key to vaccines AND disease response.**

De Freitas ’21 [Dr. Loren De Freitas; August 18th; Ph.D. in Health and Related Research from the University of Sheffield; et al; “Public trust, information sources and vaccine willingness related to the COVID-19 pandemic in Trinidad and Tobago: an online cross-sectional survey”; The Lancet; https://doi.org/10.1016/j.lana.2021.100051; brackets original] cameron

The *study* found that increasing levels of *trust* in the medical sector were associated with *decreasing* levels of belief in *misinfo*rmation as well as a greater likelihood of getting tested and sharing names of contacts. This demonstrates the *importance* of *public trust* in *managing* public health *emergencies* and is consistent with results in other settings. In the early phase of the COVID-19 pandemic in the United States, one study found higher levels of trust in government sources such as the *C*enters for *D*isease and *C*ontrol and lower levels of trust in social media such as Facebook. This is important for public health communicators when deciding which media to use to share information on COVID-19 as well as ensuring that these media outlets share accurate and reliable information. Our study also found that lower levels of education health literacy were associated with increased levels of belief in misinformation. Previous studies have shown that belief in misinformation negatively affected compliance with public health measures. Thus, correcting misinformation, implementing targeted health education campaigns and continuing to build trust in the medical sector may support compliance with public health measures in this pandemic and future public health emergencies.

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Our exploratory study may also provide some early insights into the behavioural factors influencing vaccine willingness and hesitancy in Trinidad and Tobago. Vaccine hesitancy is a complex phenomenon which the WHO has defined as the delay in acceptance or refusal of vaccines despite availability of vaccination services.[23 ] In our study, 62.8% of participants were willing to take a COVID-19 vaccine if available. Similar rates were seen in other regional countries such as Paraguay and the Dominican Republic while high rates of vaccine willingness (above 80%) were seen in Mexico, Brazil and Puerto Rico [18 ]. In the non-English speaking Caribbean, Haiti had the lowest rate of vaccine willingness at 43.6%. [18 ] In Ghana, a notable increase in vaccine willingness was observed from 62.9% in August 2020 to 82.9% in March 2021, after the first batch of vaccines arrived in the country.[24 ] This suggests that vaccine decision-making is a dynamic process and may be situation dependent. The WHO has identified three factors that contribute to vaccine hesitancy. These include confidence -trust in vaccine safety and the health system; complacency - low risk perception resulting in the vaccine viewed as unnecessary and convenience -accessibility, affordability and availability.[25 ] Most participants in our study had high levels of confidence in medical professionals/medical institutions and considered vaccine safety, risk of infection, cost and ease of availability of the vaccine as important factors in their decision-making. These may be key areas on which to focus to promote vaccine uptake in the country. However, we also found that vaccine willingness in the health professional group was 61.5 %. Vaccinated health professionals are more likely to recommend vaccines to patients.[26 ] As this group is uniquely placed to influence vaccine uptake, it is imperative to build vaccine confidence amongst health professionals by addressing their own concerns, understanding what factors influence health professionals’ decision to accept and recommend the vaccine. 4.1 Potential practical implications In order to promote compliance with public health measures and encourage vaccine uptake, two possible strategies may be considered, based on the findings of our exploratory survey study. Firstly, the various health professional associations should play a key role in delivering accurate information to the public since their opinions are likely to be highly trusted. This may help individuals differentiate misinformation as well as increase a person's confidence in the vaccines. Secondly, we suggest the government engage communities to understand local needs and clearly communicate the reasons for implementing public health measures. Although Trinidad and Tobago and the Caribbean have performed comparatively well in containing the pandemic, adequate vaccine uptake in the region is an essential element in curbing the pandemic. As COVID-19 vaccination programmes are initiated in Trinidad and Tobago, self-reported behaviours, public trust and vaccine opinions may change either positively or negatively. Thus, it is important to have continuous campaigns reinforcing credible information on COVID-19 and public health measures. 4.2 Study strengths and limitations This study is one of the first to evaluate public trust, information sources and vaccine willingness in the English-speaking Caribbean region during the current COVID-19 pandemic. The study used a validated WHO questionnaire tool to conduct the survey. Additionally, the results may provide insights to inform public health interventions in the country such as developing strategies for effective public communication and to support vaccine uptake. There are limitations that should be acknowledged. Firstly, the survey was cross-sectional in nature and therefore the results are specific to that period of time. Secondly, while the online survey method has its advantages and allows for our study results to be timely generated during the pandemic, it was not possible to use probability sampling. Additionally, as a result of the recruitment method used for this online survey study it was not possible to calculate a response rate. Hence, the generalisability of the findings to the wider population is limited and results should be interpreted with caution. However, this survey study is exploratory and the results may still be valuable in providing useful insights on areas for prioritisation for future research. Finally, this study was unable to specifically focus on the growing Venezuelan migrant population in Trinidad and Tobago. As migrant groups are especially vulnerable in the pandemic, a separate study should target this sub-population. Details on the mechanism behind vaccine hesitancy were beyond the scope of our study and should be explored in order to support effective vaccination programmes. It would also be useful to conduct qualitative research (ensuring adherence to local restrictions) to provide a deeper understanding of the factors contributing to vaccine willingness.

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5. CONCLUSION

This study examined *public trust*, information sources and vaccine willingness related to COVID-19 in Trinidad and Tobago. Our study found that *health sources* were *most* *trusted* by the public and *increasing trust* and *confidence* in the *medical* *sector* may increase *COVID-19* *vaccine* *willingness* rates. These results may guide public health response activities and identify areas for prioritisation and improvement with the ultimate objective being to curb the spread of COVID-19 in this country.

#### **Engineered pathogens cause extinction.**

Bryan Walsh 20, the Future Correspondent for Axios, Editor of the Science and Technology Publication OneZero, Former Senior and International Editor at Time Magazine, BA from Princeton University, “BIOTECHNOLOGY: Engineering a Killer,” End Times: A Brief Guide to the End of the World, Chapter 6, pp. 204-206, ISBN: 978-0275948023

I’ve lived through disease outbreaks, and in the previous chapter I showed just how unprepared we are to face a widespread pandemic of flu or another new pathogen like SARS. But a *deliberate* outbreak caused by an *engineered* pathogen would be *far worse*. We would face the same agonizing decisions that must be made during a natural pandemic: whether to ban travel from affected regions, how to keep overburdened hospitals working as the rolls of the sick grew, how to accelerate the development and distribution of vaccines and drugs. To that dire list add the terror that would *spread* once it became clear that the death and disease in our midst was not the random work of nature, but a deliberate act of malice. We’re scared of disease outbreaks and we’re scared of terrorism—put them together and you have a formula for *chaos*.

As deadly and as disruptive as a conventional bioterror incident would be, an attack that employed existing pathogens could only spread so far, limited by the same laws of evolution that circumscribe natural disease outbreaks. But a virus engineered in a lab to break those laws could *spread faster* and *kill quicker* than *anything* that would emerge out of nature. It can be designed to *evade medical countermeasures*, frustrating doctors’ attempts to diagnose cases and treat patients. If health officials manage to stamp out the outbreak, it could be *reintroduced* into the public again and again. It could, with the right mix of genetic traits, even *wipe us off the planet*, making engineered viruses a *genuine existential threat*.

And such an attack may *not even be that difficult* to carry out. Thanks to advances in *biotech*nology that have *rapidly reduced* the *skill level* and *funding* needed to perform *gene editi*ng and *engineer*ing, what might have once required the work of an army of virologists employed by a nation-state could soon be done by a handful of talented and trained individuals. Or maybe just one.

When Melinda Gates was asked at the South by Southwest conference in 2018 to identify what she saw as the biggest threat facing the world over the next decade, she didn’t hesitate: “A bioterrorism event. Definitely.”2

She’s far from alone. In 2016, President Obama’s director of national intelligence James Clapper identified CRISPR as a “weapon of mass destruction,” a category usually reserved for known nightmares like nuclear bombs and chemical weapons. A 2018 report from the National Academies of Sciences concluded that *biotech*nology had rewritten what was possible in creating new weapons, while also increasing the range of people capable of carrying out such attacks.3 That’s a fatal combination, one that plausibly *threatens the future of humanity* like *nothing else*.

“The *existential threat* that would be *most available* for someone, if they felt like doing something, would be a *bioweapon*,” said Eric Klien, founder of the Lifeboat Foundation, a nonprofit dedicated to helping humanity survive existential risks. “It would not be hard for a small group of people, maybe even just two or three people, to kill a hundred million people using a bioweapon. There are probably a *million people* currently on the planet who would have the *technical knowledge* to pull this off. It’s actually surprising that it hasn’t happened yet.”

#### **Food imports are a likely target for terrorism, introducing pathogens and collapsing food supplies.**

Adebola ’21 [Dr. Olufunke Adebola; July 21st; Chief Data Scientist at the Centre for African Leaders in Agriculture, Ph.D. in International Affairs and Science and Technology from Georgia Institute of Technology; “Analyzing the Threat, Vulnerability, and Consequences of Agroterrorism”; Proliferation of Weapons and Dual-Use Technologies; pp. 279-295; https://sci-hub.ru/https://link.springer.com/chapter/10.1007/978-3-030-73655-2\_14; brackets original] cameron

---FAD stands for Foreign Animal Disease, FPD stands for Foreign Poultry Disease

In 2018, agroterrorism is ranked medium risk in the border/perimeter security environment because of the increases in international trade and human and animal migration due to state failure and climate change. As humans migrate due to conflict situations in many countries, they could import foreign animal and plant diseases from terror groups interested in agriculture. This risk also increases as international trade across the borders continues. A terror group could *intentionally* introduce a *FAD* or *FPD* into the country by trading *infected livestock* or *plants*. It is often difficult to detect disease without advanced clinical testing in the early stages of a disease. This risk is intensified because of the *extensive animal movement patterns* in the U.S. It is common practice to move animals across State lines between their birth andslaughter. There is the possibility that a sick animal infects other animals, increasing the risk of disease spread. However, human migration from failing or failed States increases the mega-city environment’s risk because humans can illegally import plant and animal agents and toxins. Terrorist groups would find it attractive to attack the cyberinfrastructure of food supply chains to disrupt food distribution and cause food insecurity. Also, *terrorist groups* could *contaminate* large cities’ *food supplies* because of the *substantial* potential *impact* an *attack* could have.

The peer competitor is ranked medium risk because of the existence of international norms that prohibit the “development, production, acquisition, transfer, stockpiling, and use of biological and toxin weapons [102].” These international norms reduce the risk of a State actor with access to these materials and capabilities deploying these materials in the act of agroterrorism. The virtual environment is also ranked medium risk because of open communities of scientific cooperation and data sharing that encourage the development of cybersecurity guidelines. The terrorist group is ranked *high risk* because based on rational choice considerations, *terrorists* will *choose agroterrorism* if it will align with their goals and has a *high impact* at relatively *low cost* compared to other alternatives. The relative *ease* of introducing livestock or plants and the *potential damage* could make biological *agroterrorism attractive* to *terrorist groups*. Also, the *dual-use* capabilities of chemical agents can make chemical agroterrorism attractive. For example, while chemical agents such as anhydrous ammonia, chlorine, and hydrogen cyanide are useful for legitimate purposes in industrial purposes, and as such, *easily available*, introducing these agents in the food supply can cause *enormous damage*.

In 2023, the risks in all environments increase as the advancement of current gene modification technologies may increase access to these technologies, especially by terrorist groups. With the *abundance* of easy-to-follow guidelines on *gene modification*, terrorist groups could create *bioweapons* such as *pathogens* that are pesticide resistant and other zoonotic *diseases*. The emergence of ISIS-type *insurgents*, due to continued instability in different parts of the world, would also lead to failing or *total State failure* would increase the terrorist group environment’s risk. ISIS was known for recruiting and inspiring followers through social media and encouraged to conduct homegrown attacks. At *significant risk*, it could be exploiting human and animal migration to neighboring States, particularly the mega-cities, making them *attractive targets* for an agroterrorism attack. Also, as mega-cities become inundated with a continuous influx of people, city infrastructure, particularly water and sanitary facilities, could become stretched beyond capacity and resulting in cholera and typhoid diseases. When these diseases occur, chlorine can be useful for disinfecting healthcare facilities and drinking water but could also be introduced into *food sources*.

A weakened international order due to difficulty in enforcing penalties against State actors and their proxies that violate international norms increases the risks in the peer competitor and virtual environments. International norms operate on the principle of good faith that requires signatories to an international norm act under the stipulations of the norm [103]. For example, signatories to international norms are expected to be honest with the reporting of their chemical, biological, and radiological stockpiles. In other words, these norms have no actual power to force individual members to comply with their rules. As more rouge States flout international laws without penalty, it could encourage more States to disregard the regulations resulting in weakening the laws.

In 2035, the *risks* in all six environments is expected to be *high*. At this time, terrorist groups would have increased their cyberwarfare capabilities in the virtual environment, operated in the virtual space, and created *vaccine-resistant* bioengineered animal or plant *pathogens*. These pathogens can cause *enormous* plant and animal *damage* and wage *psychological warfare* on the citizens. The increased virtualization of currency and financial transactions will also increase the risks in the virtual environment. These currencies and financial transactions will enable nefarious activities while complicating tracking and attribution of responsibility.

As violent terrorist groups *seize* more *territories* in failed and failing States with ability to operate without regard to international norms, they could develop sites for creating *chemical*, biological and radiological *weapons* that could be used in an *agroterrorism attack*.

#### **Supply collapse causes extinction**---extremism, conflict generation, global instability, and runaway competition---US agriculture is key**.**

John Castellaw 18, Lieutenant General in the United States Marine Corps, member of the Center for Climate and Security’s Advisory Board, teaching fellow in the College of Business and Global Affairs at the University of Tennessee, “Why Food Security Matters”, 3-14-2018 https://www.foreign.senate.gov/imo/media/doc/031418\_Castellaw\_Testimony.pdf

The *U*nited *S*tates faces *many threats* to our National Security. These threats include *continuing wars* with *extremist elements* such as *ISIS* and potential wars with rogue state *North Korea* or regional *nuclear* power *Iran*. The heated *economic* and *diplomatic competition* with *Russia* and a *surging China* could *spiral out of control*. Concurrently, we face threats to our *future security* posed by growing *civil strife*, *famine*, and *refugee* and *migration challenges* which create *incubators* for extremist and anti-American government factions. Our response cannot be one dimensional but instead must be nuanced and comprehensive, employing “hard” as well as “soft” power in a National Security Strategy combining all elements of National Power, including a Food Security Strategy.

An American Food Security Strategy is an *imperative* factor in *reducing* the *multiple threats* impacting our National wellbeing. Recent history has shown that *reliable food supplies* and *stable prices* produce more stable and secure countries. Conversely, food insecurity, particularly in poorer countries, can lead to *instability*, *unrest*, and *violence*. Food insecurity *drives mass migration* around the world from the *Middle East*, to *Africa*, to *Southeast Asia*, *destabilizing* neighboring populations, *generating conflicts*, and threatening our own security by disrupting our economic, military, and diplomatic relationships. Food *system shocks* from extreme food-price volatility can be correlated with protests and riots. Food price related protests *toppled* governments in *Haiti* and *Madagascar* in 2007 and 2008. In 2010 and in 2011, food prices and grievances related to food policy were one of the major drivers of the *Arab Spring* uprisings.

These conclusions are based on my decades of experience while serving as a Marine around the world and from a lifetime as a steward of the soil on my family farm in Tennessee. I see food security strategy in military terms as either being “defensive” or “offensive”. “Defensive” includes those actions we take to protect our agricultural infrastructure including crops, livestock and the food chain here in the United States. Conversely, the “Offensive” side of food security takes the initiative to deal with food security issues overseas and this is where I will spend most of my time today.

There is a good reason for our success on the “defensive” here at home in ensuring our own food security. As my good friend and former Tennessee Deputy Agriculture Commissioner Louis Buck points out to me, American agriculture has *always* been about public/private enterprise. The Morrill Act of 1862 – showing our Country’s foresight and confidence in the future even in the dark days of our Civil War – created our Land Grant University model of teaching, research and extension. And equally importantly, we have a *private sector* that values *individual initiative*, unleashing an *unparalleled vitality*. With that vitality *driving innovation*, our farmers and ranchers leverage the *expertise* and *information* from the public sector to *manage risks* and *seek profits* from deployed capital. But above all, American farmers and ranchers are our “citizen soldiers” on the front lines here at home fighting to guarantee our food security.

America is also blessed with fertile soil, water availability, moderate climate, and the advanced *technology* to successfully *utilize* our abundance. Whether I walk the corn fields of Indiana or the cotton fields of Tennessee, I see agricultural technology in use that is amazing. Soon after I retired from the Marines and came home to the family farm, I climbed into the cab of a self-propelled sprayer. Settling into the seat was like strapping into the cockpit of one of the aircraft I flew, except the sprayer had more computing power and better data links. All these factors, public and private, natural and manmade, *hard work* and *innovation*, combine to provide the American people with the widest choices in the world of wholesome foods to eat and clothes to wear.

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[https://www.uxtigers.com/post/ai-hallucinations#:~:text=Projecting%20out%20the%20regression%20of,expected%20to%20happen%20around%202027](https://www.uxtigers.com/post/ai-hallucinations%23:~:text=Projecting%2520out%2520the%2520regression%2520of,expected%2520to%2520happen%2520around%25202027).

#### **5. Gen AI misinfo is speculative and exaggerated, and is non-unique.**

**Simon et. al 23** [Dr. Felix M. Simon is a communication researcher and Research Fellow in AI and Digital News at the Reuters Institute for the Study of Journalism, a Research Associate at the OII and a former doctoral student at the Oxford Internet Institute., 10-18-2023, "Misinformation reloaded? Fears about the impact of generative AI on misinformation are overblown," Misinformation Review, https://misinforeview.hks.harvard.edu/article/misinformation-reloaded-fears-about-the-impact-of-generative-ai-on-misinformation-are-overblown/, DOA: 2-9-2025] oli

We have argued that **concerns over the effects of gen**erative **AI on the information landscape—and**, in particular, **the spread of misinformation—are overblown**. These **concerns are part of an old and broad family of moral panics surrounding new technologies** (Jungherr & Schroeder, 2021b; Orben, 2020; Simon & Camargo, 2021). When it comes to **new information technologies**, such **panics might be based on the mistaken assumption that people are gullible**, driven in part by the third-person effect (Altay & Acerbi, 2023; Mercier, 2020).

These **concerns** also tend to **overlook the fact that we already owe our** current **information environment to a complex web of** **institutions** that has **allowed the media to provide broadly accurate information**, and **for the public,** in turn, **to trust much of the** **information** communicated by the media. These institutions have already evolved to accommodate new media, such as film and photography (Habgood-Cote, 2023; Jurgenson, 2019), even though **it has always been possible to manipulate these media.** Moreover, it’s far from clear that the **more technologically complex forms of manipulation are the most efficient**: nowadays, **journalists and fact checkers struggle not so much** **with deepfakes but with visuals taken out of context** or with crude manipulations, such as cropping of images or so-called “cheapfakes” (Brennen et al., 2020; Kapoor & Narayanan, 2023; Paris & Donovan, 2019; Weikmann & Lecheler, 2023).

A limitation of our argument is that we mostly rely on evidence about the media environment of wealthy, democratic countries with rich and competitive media ecosystems. Less data is available in other countries, and we cannot rule out that generative AI might have a larger negative effect there (although, arguably, generative AI could also have a larger positive effect in these countries).

We are not arguing that nothing needs to be done to regulate or address generative AI. If misinformation is so rare in the information environment of wealthy, democratic countries, it is thanks to the hard work of professionals—journalists, fact checkers, experts, etc.—and to the norms and know-how that have developed over time in these professions (e.g., Paris and Donovan, 2019; Silverman, 2014). Strengthening these institutions and trust in reliable news overall (Acerbi et al., 2022) will likely be pivotal. Journalists, fact checkers, authorities, and human rights advocates will also face new challenges, and they will have to develop new norms and practices to cope with generative AI.4 This includes, for instance, norms and know-how related to disclosure, “fingerprinting” of content, and the establishment of provenance mechanisms.5 Digital and media literacy education could also help abate issues arising with AI-generated misinformation (e.g., Doss et al., 2023).

Time will tell whether alarmist headlines about generative AI were warranted or not, but regardless of the outcome, the discussion of the impact of generative AI on misinformation would benefit from being more nuanced and evidence-based, especially against the backdrop of ongoing regulatory efforts.

The Council of Europe (2019), for example, stresses that the exercise and enjoyment of individual human rights and “the dignity of all humans as independent moral agents” should be protected from underexplored forms of algorithmic (aided) persuasion which “may have significant effects on the cognitive autonomy of individuals and their right to form opinions and take independent decisions” (paragraph 9). Elsewhere, the upcoming EU AI Act will likely include stipulations regarding how the issues discussed here should be best addressed, while the United States has released a blueprint for an “AI Bill of Rights” and is trying to regulate the use of AI in a fraught political environment. In addition, there are efforts by non-governmental organizations such as Reporters Without Borders to draft guidelines that “safeguard information integrity” amid the growing use of AI for information production, dissemination, retrieval, and consumption.

Yet, while such efforts are laudable and required, they should be based on the best available evidence—especially if this evidence questions received wisdom. **Excessive and speculative warnings about the ill effects of AI** on the public arena and democracy, even if well-intentioned, **can also have negative externalities**, such as **reducing trust in factually accurate news and the institutions that produce it (**Hameleers, 2023) or overshadowing other problems posed by generative AI, like nonconsensual pornography disproportionately harming women even if they do not scale up (Kapoor & Narayanan, 2023), or the potential for identity thefts and scams.

Our aim is not to settle or close the discussion around the possible effects of generative AI on our information environment. We also do not wish to simply dismiss concerns around the technology. Instead, in the spirit of Robert Merton’s observation that “the goal of science is the extension of certified knowledge” on the basis of “organized skepticism” (Merton, 1973, pp. 267–278) we hope to contribute to the former by injecting some of the latter into current debates on the possible effects of generative AI.

#### **6. Missinfo is being fought already, ai integration is helping**

**W**orld **E**conomic **F**orum 24, 6-14-20**24**, [], "How AI can also be used to combat online disinformation", https://www.weforum.org/stories/2024/06/ai-combat-online-misinformation-disinformation/, 3-6-2025 (The World Economic Forum is the International Organization for Public-Private Cooperation. It provides a global, impartial and not-for-profit platform for meaningful connection between stakeholders to establish trust, and build initiatives for cooperation and progress.) //SJFH

The proliferation of artificial intelligence (AI) in the digital age has ushered in both remarkable innovations and unique challenges, particularly in the realm of information integrity.

AI technologies, with their capability to generate convincing fake texts, images, audio and videos (often referred to as 'deepfakes'), present significant difficulties in distinguishing authentic content from synthetic creations. This capability lets wrongdoers automate and expand disinformation campaigns, greatly increasing their reach and impact.

However, **AI is not a villain in this story. It also plays a crucial role in combating disinformation and misinformation. Advanced AI-driven systems can analyse patterns, language use and context to aid in content moderation, fact-checking and the detection of false information.**

Understanding the nuances between misinformation (unintentional spread of falsehoods) and disinformation (deliberate spread) – as is crucial for effective countermeasures – could also be facilitated

by AI analysis of content.

The social cost of disinformation

The consequences of unchecked AI-powered disinformation are profound and can erode the very fabric of society.

The World Economic Forum’s Global Risks Report 2024 identifies misinformation and disinformation as severe threats in the coming years, highlighting the potential rise of domestic propaganda and censorship.

The political misuse of AI poses severe risks, with the rapid spread of deepfakes and AI-generated content making it increasingly difficult for voters to discern truth from falsehood, potentially influencing voter behaviour and undermining the democratic process. Elections can be swayed, public trust in institutions can diminish, social unrest can be ignited, and violence can even erupt.

Moreover, disinformation campaigns can target specific demographics with AI-generated harmful content. Gendered disinformation, for example, perpetuates stereotypes and misogyny, further marginalizing vulnerable groups.

Such campaigns manipulate public perception, leading to widespread societal harm and deepening existing social divides.

A multi-pronged approach to tackle fake content

The rapid development of **AI technologies often outpaces governmental oversight**, leading to potential social harms if not carefully managed.

**Industry initiatives like content authenticity and watermarking address key concerns about disinformation and content ownership.** These tools require careful design and input from multiple stakeholders to prevent misuse, such as eroding privacy or persecuting journalists in conflict zones.

For example, the Coalition for Content Provenance and Authenticity (C2PA) – integrated by Adobe, Arm, Intel, Microsoft and TruePic – addresses the prevalence of misleading information online through the development of technical standards for certifying the source and history, or provenance, of media content.

To further mitigate the risks associated with AI, developers and organizations must **implement robust safeguards, transparency measures and accountability frameworks.**

By establishing comprehensive systems, developers can **ensure that AI is deployed ethically and responsibly**, thereby fostering trust and promoting the beneficial use of AI in various domains.

In addition to technical measures, **public education on media literacy and critical thinking is essential to empower individuals to navigate the complex landscape of digital information.**

Schools, libraries and community organizations play a vital role in promoting these skills, providing resources and training programmes to help individuals develop the ability to critically evaluate information sources, discern misinformation from factual content, and make informed decisions.

Collaboration is key to tackling misinformation

Moreover, collaboration among stakeholders, including policy-makers, tech companies, researchers, and civil organizations, is vital to effectively address the multifaceted challenges posed by AI-enabled misinformation and disinformation.

This situation highlights the importance of fostering a global understanding and cooperation to tackle the spread of false information facilitated by the rise of man-made content and AI technologies.

The AI Governance Alliance, a flagship initiative by the World Economic Forum and part of the Centre for the Fourth Industrial Revolution, unites experts and organizations worldwide to address the complex challenges of AI, including the generation of misleading or harmful content and the violation of intellectual property rights.

**Through collaborative efforts, the Alliance develops pragmatic recommendations to ensure that AI are developed and deployed responsibly, ethically and for the greatest benefit of humanity.**

Another Forum initiative is the Global Coalition for Digital Safety, which is spearheading efforts to combat disinformation by promoting a whole-of-society approach to enhancing media literacy. This includes understanding how false information is produced, distributed and consumed, and identifying the necessary skills at each stage to counter it.

The coalition brings together tech companies, public officials, civil society and international organizations to exchange best practices and coordinate actions aimed at reducing online harms.

Advancing our approach to digital safety

As AI continues to transform our world, it is imperative to advance our approach to digital safety and information integrity.

Through enhanced collaboration, innovation and regulation, we can harness the benefits of AI while safeguarding against its risks, ensuring a future where technology uplifts rather than undermines public trust and democratic values.

By working together, we can ensure that AI serves as a tool for truth and progress, not manipulation and division.

#### **9. T: Ai key to fight misinfo**

Christine **Clark** 24, 9-17-20**24**, [], "How AI Can Help Stop the Spread of Misinformation", No Publication, https://today.ucsd.edu/story/how-ai-can-help-stop-the-spread-of-misinformation, 3-6-2025 (Researcher at the University of California San Diego) //SJFH

**Machine learning algorithms significantly outperform human judgment in detecting lying during high-stakes strategic interactions**, according to new research from the University of California San Diego’s Rady School of Management. The study can have **major implications for the spread of misinformation, as machine learning could be used to bolster efforts to reduce fictitious content on major platforms like YouTube, Tik-Tok and Instagram.**

The paper, to be published in Management Science, focused on participants’ ability to detect lying on the popular British TV show “Golden Balls,” which aired from 2007 to 2010. It finds that while humans struggle to predict contestants' deception behavior, algorithms perform much better.

“We find that **there are certain ‘tells’ when a person is being deceptive**,” said Marta Serra-Garcia, lead author of the study and associate professor of behavioral economics at the UC San Diego Rady School of Management. “For example, if someone is happier, they are telling the truth and there are other visual, verbal, vocal cues that we as humans are share when we are being honest and telling the truth. Algorithms work better at uncovering these correlations.”

The algorithms used in the research achieved an impressive accuracy rate, correctly predicting contestant behavior 74% of the time, compared to the 51%-53% accuracy rate achieved by the more than 600 humans who participated in the study.

In addition to comparing machine learning and human abilities to detect deception, the study also tested how algorithms could be leveraged to help people better tell apart those who lie and those who tell the truth.

In one experiment, two different groups of study participants watched the same set of “Golden Balls” episodes. One group had the videos flagged by machine learning before they viewed them. The flags indicated that the algorithm predicted the contestant was most likely lying. Another group watched the same video and after they viewed it, they were told the algorithm flagged the video for deception. Participants were much more likely to trust the machine learnings’ insights and better predict lying, if they got the flag message before watching the video.

“Timing is crucial when it comes to the adoption of algorithmic advice,” said Serra-Garcia. “Our findings **show that participants are far more likely to rely on algorithmic insights when these are presented early in the decision-making process.** This has particular importance for online platforms like YouTube and TikTok, which can use algorithms to flag potentially deceptive content.”

Coauthor Uri Gneezy, professor of behavioral economics at the Rady School added, “Our study suggests that these **online platforms could improve the effectiveness of their flagging systems by presenting algorithmic warnings before users engage with the content, rather than after, which could lead to misinformation spreading less rapidly.”**

Some of these social media websites are already using algorithms to detect suspicious content, but in many cases, a video has to be reported by a user and then investigated by staff who can flag the content or take it down. These processes can be drawn out, as employees at tech companies like TikTok get overburdened with investigations.

The authors conclude, “Our study shows how technology can enhance human decision making and it’s an example of how humans can interact with AI when **AI can be helpful**. We hope the findings can help organizations and platforms better design and deploy machine learning tools, especially in situations where accurate decision-making is critical.”

# **Miller 23 (Stanford University, Katharine Miller, “AI overreliance Is a problem. Are explanations a solution?,”** [**https://hai.stanford.edu/news/ai-overreliance-problem-are-explanations-solution**](https://hai.stanford.edu/news/ai-overreliance-problem-are-explanations-solution)**)**

# **n theory, a human collaborating with an AI system should make better decisions than either working alone. But humans often accept an AI system’s recommended decision even when it is wrong – a conundrum called AI overreliance. This means people could be making erroneous decisions in important real-world contexts such as medical diagnosis or setting bail, says** [**Helena Vasconcelos**](https://helenavasc.com/)**, a Stanford undergraduate student majoring in symbolic systems.One theory: AI should explain its decisions. But in paper after paper, scholars find that explainable AI doesn’t reduce overreliance.“It’s a result that doesn’t align with our intuition,” Vasconcelos says. In a recent study, she, Ranjay Krishna of the University of Washington, and Stanford HAI affiliates** [**Michael Bernstein**](https://profiles.stanford.edu/michael-bernstein)**, an associate professor of computer science, and** [**Tobias Gerstenberg**](https://profiles.stanford.edu/tobias-gerstenberg)**, an assistant professor of psychology, asked: Would AI explanations matter if it took less mental effort to scrutinize them? What if there was a greater benefit to doing so?In experiments with online workers, Vasconcelos and her colleagues found that people are less likely to over-rely on an AI’s prediction when the accompanying AI explanations are simpler than the task itself and when the financial reward for a correct answer is greater. The team concluded that if a task is hard and the explanation is simple, it does reduce overreliance.**

# **Nonunique. Reliance is inevitable but any access is better than none**

# **Kolchenko 18 [ Vasiliy Kolchenko, 12/2018, "Can Modern AI replace teachers? Not so fast! Artificial Intelligence and Adaptive Learning: Personalized Education in the AI Age", HAPS,** [**https://files.eric.ed.gov/fulltext/EJ1227770.pdf**](https://files.eric.ed.gov/fulltext/EJ1227770.pdf) **]**

# **Reliance on AI is inevitable because in many situations modern AI is more effective and much more efficient than people. Not only can it win in chess and Jeopardy, it can also evaluate radiological images better than radiologists and avoid traffic accidents better than truck drivers, saving lives in both cases. In education, AI promises to deliver what has always been the highest goal of pedagogy, wise and caring guidance for each student, adapted to the individual’s needs. AI would potentially provide customized learning resources and activities, combined with the pace and style of instruction that best suits each individual student (Luckin et al. 2016).**

Turn:**AI can optimize green energy sourcing**

**Cho, Renee.** https://news.climate.columbia.edu/2023/06/09/ais-growing-carbon-footprint/**.**

Because of its ability to analyze enormous amounts of data, artificial intelligence can help mitigate climate change and enable societies to adapt to its challenges. AI can be used to analyze the many complex and evolving variables of the climate system to improve climate models, narrow the uncertainties that still exist, and make better predictions. This will help businesses and communities anticipate where disruptions due to climate change might occur and better prepare for or adapt to them. Columbia University’s new center, Learning the Earth with Artificial Intelligence and Physics (LEAP) will develop next-generation AI-based climate models, and train students in the field. AI can help develop materials that are lighter and stronger, making wind turbines or aircraft lighter, which means they consume less energy. It can design new materials that use less resources, enhance battery storage, or improve carbon capture. AI can manage electricity from a variety of renewable energy sources, monitor energy consumption, and identify opportunities for increased efficiency in smart grids, power plants, supply chains, and manufacturing. AI systems can detect and predict methane leaks from pipelines. They can monitor floods, deforestation, and illegal fishing in

**Turn: Education is the key to addressing climate change.**

**Education is essential to prevent climate change.**

https://www.un.org/en/climatechange/climate-solutions/education-key-addressing-

climate-change.

Education is a critical agent in addressing the issue of climate change. The UN

Framework Convention on Climate Change (UNFCCC) assigns responsibility to Parties of the Convention to undertake educational and public awareness campaigns on climate change, and to ensure public participation in programmes and information access on the issue. Education can encourage people to change their attitudes and behavior; it also helps them to make informed decisions. In the classroom, young people can be taught the impact of global warming and learn how to adapt to climate change. Education empowers all people, but especially motivates the young to take action. Knowing the facts helps eliminate the fear of an issue which is frequently colored by doom and gloom in the public arena. In this context, UNICEF has tapped into the minds and imaginations of children around the world to capture what it means to be a child growing up in the age of rapid climate change. Warrant: Specifically, AI can help with climate change lite.

Atkins, Carmen 2024,

https://www.nature.com/articles/s43247-024-01392-w. Accessed February 14,

2025.

In the face of climate change, climate literacy is becoming increasingly important.

With wide access to generative AI tools, such as OpenAI’s ChatGPT, we explore the

potential of AI platforms for ordinary citizens asking climate literacy questions. we focus on a global scale and collect responses from ChatGPT (GPT-3.5 and GPT-4) on climate change-related hazard prompts over multiple iterations by utilizing the OpenAI’s API and comparing the results with credible hazard risk indices. We find a general sense of agreement in comparisons and consistency in ChatGPT over the iterations. GPT-4 displayed fewer errors than GPT-3.5. Generative AI tools may be used in climate literacy, a timely topic of importance, but must be scrutinized for potential biases and

inaccuracies moving forward and considered in a social context.