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Building the Hyper-Capable Operator: Should the Military Enhance Its Special Operations Warriors?

by

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Abstract

Warfighting technologies have been improving since the dawn of mankind, and modern warfare is now more complex, interconnected, and faster paced than ever before. Minor tactical actions produce profound strategic results, both positive and negative. At the knife's edge of this complex environment is America's special operations forces (SOF). Despite exquisite training and enhanced battlefield technology, the actual SOF operator remains a "Human v1.0." As such, the American military must deliberately implement a biological Human Enhancement (HE) program for its special operations warriors, and build the "Hyper-Capable Operator."

SOF is the appropriate organization to run such a program due to its peculiar culture, already present support structure, and high consequence of its operations. Addressing the ethical concerns of such a program, this study examines the issue through the lenses of the individual soldier and the military organization. Numerous HE technologies with appreciable military utility, both cognitive and musculoskeletal, are presented. The permanence of any enhancement is of topmost concern, due to its cascading impacts upon the soldier, the military, and society. Additionally, the soldier's decision-making autonomy should never be compromised via an enhancement. Finally, this study delivers specific policy recommendations, to include the use of volunteers and safeguards against coercion, for the implementation of such a program.

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TABLE OF CONTENTS

Introduction

Since time immemorial, humans have steadily improved the quality and efficacy of their tools, and this has held true in the realm of warfare. From our very beginning we have, unfortunately, sought to improve the effectiveness and efficiency of our killing equipment. From swords and spears to supersonic stealth aircraft and nuclear missiles, humans are advancing military technology at dizzying speeds. Concurrently, the communications revolution of recent decades enables a limitless amount of data and information to be available to essentially everyone. Furthermore, the steady march of globalization and an ever-present news cycle is amplifying the effects of seemingly minor actions across the globe. Today's military leaders must process larger amounts of rapidly arriving information to make a decision, the outcome of which will have larger impacts than ever before. Faced with such compounding trends in the lethal profession of warfare, there exists a legitimate national security need for human enhancing technologies.

This phenomenon exists at all levels of the military. Theater commanders and front-line leaders alike face an overwhelming flow of data and a complicated decision-making environment. Even the elite soldiers of America's Special Operations Forces (SOF) are finding it difficult to address these rapid changes, especially when placed against the reemergence of near-to-peer competition.[1] To combat these difficulties, United States Special Operations Command (SOCOM) has endeavored towards what it calls the 'Hyper-Enabled Operator.'[2] Via the

[1] Vivienne Machi, "SOCOM Commander: Expanding Missions Require New Technologies," *National Defense Magazine*, February 14, 2017, http://www.nationaldefensemagazine.org/articles/2017/2/14/socom-commander-expanding-missions-require-new-technologies.

[2] Yasmin Tadjdeh, "SOCOM Pursuing 'Hyper-Enabled Operator' Technologies," *National Defense Magazine*, May 22, 2018, http://www.nationaldefensemagazine.org/articles/2018/5/22/socom-pursuing-hyper-enabled-operator-technologies.

optimization of technology, a hyper-enabled SOF operator would enjoy streams of video intelligence feeds, battlefield situation awareness tools, line-of-sight and satellite communications, and various other capabilities all with optimized human-machine interfacing. Coupled with the best weapons technology available, such an operator is the most exquisitely equipped soldier on the battlefield. By harnessing the powers of advanced technologies, the SOCOM Commander, General Tony Thomas III, believes SOF can stop "drowning in data…spending hours sorting the wheat from the chaff."[3] Yet despite such organizational efforts and technological advances, the hyper-enabled operator still runs a first edition biological core processor, and is susceptible to rapid energy depletion. Strenuous military training exercises can increase the wisdom and grit of an operator, but peel back the skin and you will still find a "Human v1.0."

Fortunately, possibilities in the field of human enhancement (HE) have come quite far in recent years. Cognitive enhancements, for example, can increase the rate of information absorption and ease of recall, leading to improved training effectiveness and a decrease in required training time. Advancements with anabolic steroids look to remove all of the 'bad' components while keeping the muscle-building 'advantages' of their use. Other technologies in both the cognitive and musculoskeletal fields show further promise for delivering human enhancements. As described above, the technology and communications revolutions have combined with a complex strategic environment in such a way as to overload the human weapon system. With this operating arena in mind, America must pursue and implement the availability of biological human enhancement technologies for its special operations warriors.

[3] Machi, "SOCOM Commander."

Yet such a policy reveals a bevy of serious and thought-provoking questions. Is such human enhancement ethical? What if the military makes it a required 'treatment' and punishes those who do not comply? Will this lead to an elite class or category of humans? Will these enhancements be permanent? Who will be held responsible if an enhanced soldier commits a war crime? Is the military trying to play God? All such questions are valid and deserve informed and thoughtful debate across the medical, academic, and military professions alike.

This paper aims to clarify and shape the current debate on most, if not all, of these concerns. The ethical and moral dilemmas are deep, legitimate, and are already heavily debated. Virtue ethics (an inherently known or understood good) would say HE goes against the natural order of humanity, 'playing God' a bit too much, and enables malicious nations to further their evil goals. Conversely, and generally agreed to within this study, utilitarian ethics (actions for the greater good) argues HE presents numerous benefits, both to the soldier and the nation, to completely void any possibility of implementing an HE program. Yet a voice from the battlefield is lacking in the current discussion. The possible loss of an operator's decision-making autonomy, as well as enhancement permanence, are central tenets to address in advocating for a HE program. Additionally, the basic morality of such a program lies within the essential military need to always maintain as large an advantage over the enemy as possible. With warfare a modern inevitability, moral and ethical issues with the equipping and enhancing of soldiers are misguided, and should instead be directed at the elimination of war. As such, this paper will discuss the current status, applicability, and appropriateness of some human enhancement technologies. Finally, policy recommendations for the implementation of human enhancement technology into the SOF world are put forth.

Scope of Discussion

Aiming to keep this study, discussion, and recommendations correlated to the realm of possible and realistic technologies, certain human enhancement related topics will not be covered. For example, bionic implants or limb replacements, especially if/when forced upon an individual, are outside the scope of this study. No doubt ethical considerations exist concerning the appropriate use and legality of such technologies, and the utility of advanced prosthetics for therapeutic reasons (limb lost to roadside bombing for example) is without question. However, the use of bionic implants and replacements for enhancement purposes crosses into the realm of transhumanism. For a better discussion on the technological possibilities, ethical debate, and arguments for/against transhumanism, see the work of Nick Bostrom (arguing for transhumanism) and Francis Fukuyama (arguing against transhumanism).[4]

While transhumanism definitely has a shock factor, more benign human advancements have also been argued to be human enhancement technologies. The use of proper nutrition and education have been presented as a form of human enhancement. True, advances in nutritional knowledge and the application of education theory have improved humanity's health and welfare, especially over the alternative of us 'mindlessly roaming the wild.' Häggström conveys the arguments of better nutrition resulting in humanity being generally taller with a longer lifespan, and education raising the general I.Q. of humans.[5] Yet such advancements are a natural evolution of human progress, and do not significantly alter or enhance a human's biological

[4] Nick Bostrom, "Why I Want to Be a Posthuman When I Grow Up," in *Medical Enhancement and Posthumanity,* ed. Bert Gordijn and Ruth Chadwick, (New York: Springer, 2008), 107-136; Francis Fukuyama, *Our Posthuman Future – Consequences of the Biotechnology Revolution* (New York: Farrar, Straus and Giroux, 2002).

[5] Olle Häggström, *Here Be Dragons: Science, Technology, and the Future of Humanity* (Oxford: Oxford University Press, 2016), 38.

functions. We should, of course, lead a healthy and nutritious lifestyle with corresponding lifelong learning, but this study does not characterize such actions as human enhancement.

What this study will debate is the implementation of biological human enhancement technology, meaning inside the skin-suit. Any technology presented will be readily available, or in the advanced stages of technological research. The immediacy of availability is required to maintain first-mover advantage upon the battlefield. As modern technological advancements are no longer the exclusive property of the state, such technologies are for sale on the open market. This market of course includes America's adversaries. As evidenced by the Chinese scientist altering the DNA of an unborn set of twins to confer immunity to HIV, America's present and future adversaries may be less bothered by the idea of human enhancement.[6] Correspondingly, America must start to address the possibility of meeting enhanced enemy opponents on the battlefield by fielding enhanced special operations warriors of its own.

Why Start with Special Operations?

America's Special Operations Forces are best positioned to exploit a military human enhancement program due to their mission requirements, unique cultural traits, and enhanced support structures. SOF faces the most ambiguous and uncertain environments, often operating without adequate security overwatch, limited communications reach-back to higher headquarters, and non-decisive force should the battle become truly pitched. The enhancement of America's SOF operators is a logical step to ensure a maximized competitive advantage. SOF's frequent

[6] Chinese scientist Dr. He Jiankui edited the DNA of twin girls in vitro to make them immune to HIV, and did so desiring to "make China a force in genetic science." Preetika Rana, "How a Chinese Scientist Broke the Rules to Create the First Gene-edited Babies," *Wall Street Journal*, May 10, 2019, https://www.wsj.com/articles/how-a-chinese-scientist-broke-the-rules-to-create-the-first-gene-edited-babies-11557506697?mod=searchresults&page=1&pos=1.

conduct of 'no-fail' missions, such as the daring rescue of a hostage or the takedown of Osama bin Laden, further advocate the necessity of maximizing the military effectiveness of each operator. Such operational characteristics result in the real possibility of minor tactical actions possessing significant strategic impacts.

Risky missions aside, SOF also possess key characteristics beneficial to an enhancement program. For example, special operations warriors are operationally comfortable in structurally ambiguous situations, meaning the SOF unit lacks concrete guidance from higher echelons, but still drives towards the overall objective in accordance with the higher commander's intent. The infantile status of human enhancement technology dictates any program would have heightened levels of ambiguity surrounding benefits and side-effects. Further, the small-unit structure of SOF forces presents the best possible environment to evaluate the effectiveness of an enhancement program.

SOF's small-unit structure and inherent close-knit intimacy results in a heavily-resourced effort towards the maintenance of the mind, body, and spirit of each operator. Due to the relentless drumbeat of SOF deployments since September 11, 2001, SOCOM now furnishes nearly every SOF operational unit with a dedicated team of health and welfare specialists. Operational units are generally equipped with a medical doctor, a strength and conditioning coach, a mental health professional, a physical therapist, and sometimes their own dedicated chaplain or performance dietician.[7] With such a team enmeshed into the strengths, capabilities, weaknesses, and personal issues of individual SOF operators, they are best positioned to properly administer, monitor, and counsel through any enhancement program. The intimate knowledge of

[7] Victor J. Caputo, "Fueling the SOF Human Weapon System," *AFSOC,* March 6, 2018, https://www.afsoc.af.mil/News/Article-Display/Article/1461623/fueling-the-sof-human-weapon-system/.

the unit's operators allows these support teams to treat each case as a relationship instead of a number in the system, and thus be trusted agents in the explanation and implementation of any proposed program. An unknown non-SOF outsider administering such a program would be immediately met with skepticism. Additionally, such teams can easily integrate with an operator's family, explaining the program, its expected benefits, what will happen to the soldier, as well as positive and negative behaviors to watch for. The impacts of an HE program extend beyond the operator, and thorough integration with the family addresses potential second and third order effects.

With its unique and highly consequential operational demands, America's SOF units are the logical place to undertake military human enhancement programs. SOF's peculiar culture creates an environment ripe for effective enhancement program implementation, while the robust and individualized support structure inherent to SOF units will help ensure a safe program for the soldier and their family. This allows for clear-minded decisions regarding what HE technologies to adopt and implement.

Possible Human Enhancement Options

Human enhancement technology specifically advantageous to special operations military purposes should be considered in two different biological domains: musculoskeletal or cognitive. Musculoskeletal enhancements include technology affecting the musculature, skeletal structure, and vascular system. Cognitive enhancements, for our purposes, concern the ability to process, retain, or retrieve information, as well as changes to one's psychological state.[8] To determine

[8] 'Mood' is another descriptor commonly used in academic writings pertaining to cognitive human enhancements.

what enhancements are suitable for use by the special operations community, a brief description, to include understood advantages and disadvantages, of current or near future HE technologies is included.

Musculoskeletal Enhancements

The mission demands and operational impact of a SOF mission require a special operations soldier to have their body operating at the pinnacle of performance. The musculoskeletal system must be capable of enduring prolonged periods of time at peak levels of physical exertion. Other senses also need to operate at heightened levels, as a lack of awareness could cause a fatal reactionary delay. The HE technologies presented here are inherently non-permanent, and 'bionic' enhancements are not considered.

1) Sight in the Infrared Spectrum

Scientists recently discovered a way to enable sight in the infrared light spectrum. The typical mammalian eye is only capable of viewing a certain frequency range of light, known as the visible light spectrum. Infrared (IR) light exists at too long a wavelength to be viewed by the human eye. While all matter emits IR energy in the form of heat, this technology specifically targets Near IR (NIR). Researchers in China, working with scientists in the United States, found a way to artificially modify the observed wavelength of NIR energy by injecting the eyeball with special nanoantennae that bind to the photoreceptors of the eye.[9] These nanoantennae receive the incoming NIR energy and change it to a different wavelength that is actually visible to the human eye. This modified NIR wavelength is then discernible to retinal photoreceptors where it

[9] Yuqian Ma, Jin Bao, and Yuanwei Zhang, "Mammalian Near-Infrared Image Vision through Injectable and Self-Powered Retinal Nanoantennae," *Cell* 177, (April 4, 2019): 1-13, https://doi.org/10.1016/j.cell.2019.01.038,

is subsequently sent onwards to the brain for processing. Though not an inherently pure biological enhancement, these NIR enabling nanoantennae deserve specific discussion for two reasons.

First, the effects last long enough to be militarily relevant, but are ultimately temporary and require no reversal process. The researchers state the NIR enabled vision lasts for approximately ten weeks.[10] Its lack of permanence eliminates many of the ethical concerns discussed later. Secondly, the ability to see at night is a highly desirable trait for military forces, especially SOF who conduct the preponderance of their missions at night. The use of mechanical aids to see at night, known as Night Vision Devices (NVDs), has been around for decades. While this technology has steadily improved, it still has many drawbacks, such as a constrained field of vision, cost, weight (extended operations require carrying replacement batteries), and the ever-present chance of malfunction or breakage.

Beyond advantages during night operations, operators rapidly transitioning from bright outdoor sunlight to a dimly lit hut or cave can immediately know if a threat is present. Such elimination of the time needed for their eyes to adjust to the new low-light environment decreases risk and allows for speedier operations. Further, the use of flashlights in such environments would not be immediately required, giving the tactical advantages of stealth and surprise to enhanced operators. Though the scientists have only tested these NIR enabling nanoantennae on mice, there is similarity in the eye biology between mice and humans.[11] The researchers do plan human trials, since this ocular nanotechnology presents medically therapeutic

[10] Ma et al, "Mammalian Near-Infrared Image Vision," 11.
[11] David Grossman, "Nanoinjections Let Mice See Infrared Light," *Popular Mechanics*, March 4, 2019, https://www.popularmechanics.com/science/animals/a26593454/nanoinjections-mice-see-infrared-light/.

possibilities. While the HE component of this technology is not ready for immediate or near-term implementation into the SOF HE program, it is a technology the SOF community would be wise to keep a keen eye on.

2) A Better Steroid

Despite the extreme physical demands placed upon military members of all types, and especially upon SOF, current military regulation prohibits the use of steroids by servicemembers.[12] Ostensibly, this is due to the negative medical side-effects associated with steroid use. But the past twenty years have seen advancements in the understanding of endocrine system physiology and how to tailor the application of steroidal compounds. Selective Androgen Receptor Modulators (SARMs) are a type of drug that control the androgen receptor of specific tissue.[13] By controlling which type of tissue (bone, muscle, skin, hair, larynx, etc) is or is not allowed to absorb the testosterone treatment, SARMs dramatically reduce the possibility of the negative side effects associated with traditional steroid use, such as testicular atrophy, alopecia, sexual dysfunction, and hypogonadism.[14] The ability to tailor the application of testosterone treatment specifically to the musculoskeletal structure presents desirable possibilities for enhanced strength, speed, and endurance of SOF operators.

Beyond the near-elimination of the negative side effects from traditional steroid use, the impacts of SARMs lack permanence. Thus, the operator has to continue taking the SARMs and sustain the physical fitness regimen to reap SARM's benefits. The requirement for SOF

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[12] Steroids are banned via Department of Defense Directive 1010.4, February 20, 2014. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/101004p.pdf.

[13] M. Otto-Duessel, et al. "Enhanced Evaluation of Selective Androgen Receptor Modulators in Vivo," *Andrology* 1, no.1 (2013): 29, doi:10.1111/j.2047-2927.2012.00006.x

[14] Amelia Miklos, et al. "Selective Androgen Receptor Modulators (SARMs) in the Context of Doping," *Farmacia* 66, no. 5 (2018): 758-762.

operators to execute their missions at the highest possible levels of speed, strength, and stamina dictate intense training regimens, while the rigors of combat operations induce wear and tear upon the operator's musculoskeletal structure. A logical application of SARMs is a medically monitored – see the SOF unit support structure mentioned earlier – program during pre-deployment training to maximize the operator's lethality. The supervised and continued use of SARMs during deployment would keep the enhanced operator at the highest level of performance possible. Upon return from deployment, or at any other time as determined by the supervising medical team, the operator would be discontinued from the SARMs program. Since the impacts of chronic SARMs usage are currently unknown,[15] a deliberately cyclical application keeps the risks to a minimum. As SOF personnel are continually required to operate at the extreme edge of human musculoskeletal performance, SARMs presents a viable option to further enhance that upper threshold, increasing enhanced strength, speed, and stamina while minimizing medical risk to the enhanced operator.

Mental/Cognitive Enhancements

While the musculoskeletal performance of SOF operators is a critical component of their profession, so too are their cognitive abilities. Prolonged SOF missions in modern warfare require sustained levels of mental alertness, along with the ability to rapidly process and recall relevant yet complicated mission-critical information. Non-surgical enhancement options to improve the cognitive performance of SOF operators principally operate via two methods: pharmacological means or electrical stimulation. Surgical HE options, such as deep-brain

[15] Miklos et al. "Selective Androgen Receptor Modulators," 758.

electrodes or computer chip implantation are not considered in this study due to their operational complexity and ethical concerns.

1) This is your brain on drugs…Psychopharmaceuticals

The problem of how to sustain heightened levels of alertness has plagued militaries for centuries; woe be the sentry who is caught sleeping at his post. SOF missions already stretch operator's mental endurance to the edge, and the future looks like more of the same. Caffeine, generally consumed via coffee, has been a traditional antidote, and the societal acceptance of energy drinks is further fueling the caffeine craze. However, caffeine has its downsides. It's addictive properties and short duration of effects are familiar to all coffee drinkers.[16] And in combat, it is not always possible to brew a fresh cup-of-joe.

The Air Force has addressed this by offering pilots, especially those flying single-seat aircraft such as fighters, a medically modified amphetamine. Known as 'go pills,' these too have negative side effects, as described by the Tarnac Farms incident related elsewhere in this paper. On the civilian side, otherwise healthy college students are thought to use Adderall and Ritalin as an academic and focus aid. Though a widely held societal belief, it is actually not that common.[17] The desire to enhance a human's level of focus and alertness exists in both military and civilian sectors. Despite decades of research and trial, it appears there is no fix for mental

[16] Side effects can include agitation, sleeplessness, nervousness, irritability, and nausea. Paul Scharre, and Lauren Fish, "Human Performance Enhancement," *Super Soldiers* (Washington,DC: CNAS, 2018): 8, www.cnas.org/super-soldiers.

[17] A study of almost 11,000 college students in 2005 revealed just 6.9% had used illegal stimulants in their life, with 4.1% having done so within the last year. Sean Esteban McCabe, et al. "Non-Medical Use of Prescription Stimulants Among US College Students: Prevalence and Correlates from a National Survey," *Addiction* 100, no1 (2005): 96–106.

exhaustion that does not include undesirable cognitive side effects impacting one's psychological state.

Any psychopharmaceutical with mood altering properties (or side effect) is not recommended for inclusion to SOF's HE program. Though psychiatric therapy depends upon the use of psychopharmaceuticals, it is somewhat unfamiliar ground for the treatment of otherwise 'normal' individuals. A relatively new drug, known as XBD173, is purported to eliminate the feeling of fear in its users (an anxiolytic), and contains no addictive properties.[18] A squad of 'fearless' warriors appears to be a solution to many military problems. But the loss of one's cognitive autonomy and personal agency removes the very delineator between human soldiers and autonomous drones. The use of, and respect for, the feeling of fear tempers rash and potentially disastrous decision making. Though the action might be valiant, there is no need to repeat a "Charge of the Light Brigade."[19] Additionally, even the temporary pharmacologically induced altercation of a soldier's mood/state of mind removes the responsibility assignment from the individual and places it in a nebulous web incorporating the command chain, the individual, and potentially the pharmaceutical corporation.[20] Special operations warriors need to maintain their unaltered decision making capabilities to properly deliver their specialized effects upon the battlefield.

2) Neuro-Priming: The New Shock Therapy

For decades, electric shock therapy to the brain has been a useful way to therapeutically treat various psychiatric conditions. Transcranial direct current stimulation (tDCS) has been the

[18] Caron, *A Theory of the Super Soldier,* 11.
[19] Alfred Lord Tennyson's timeless poem memorializes the heroic yet disastrous British cavalry charge against an entrenched Russian artillery defense at Balaclava, during the Crimean War in 1854.
[20] See "Legal Concerns of HE" section, this paper.

standard method for years, while transcranial alternating current stimulation (tACS) is showing even better effects in recent trials.[21] To treat severe depression, for example, carefully placed electrodes deliver a small electric current to re-align the alpha oscillations in the patient's left frontal cortex with those in the patient's right frontal cortex, the imbalance of which is a major indicator of severe depression.[22] However, such shock therapy is no longer restricted to use in psychiatric therapy.

Scientists have found applying tDCS to different parts of the brain positively improve a healthy adult's ability to learn.[23] Without any negative side-effects, the application of tDCS to the prefrontal cortex has displayed improvements in working memory and learning, as well as verbal fluency.[24] Indeed a sort of brain stimulation cottage industry has recently sprouted. Today, one can purchase cognitive-enhancing tDCS kits on Amazon.[25] Research has also found tDCS aimed at a different part of the brain improves one's motor skills and athletic performance, an opportunity commercially pounced upon by a company named Halo Neuroscience. Producing a headphone styled device worn before athletic training (or a fine motor-skills session, like piano or guitar), Halo aims to improve athletic training performance via transcranial electric stimulation.[26] The headphones are worn for approximately 20 minutes prior to training, a method known as 'neuro-priming,' then training is commenced as usual.

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[21] Morgan Alexander et al. "Double-blind, Randomized Pilot Clinical Trial Targeting Alpha Oscillations with Transcranial Alternating Current Stimulation (tACS) for the Treatment of Major Depressive Disorder (MDD)," *Translational Psychiatry* 9, no. 106 (2019): 106. https://doi.org/10.1038/s41398-019-0439-0.

[22] Alexander, "Double-blind," 106.

[23] Douglas Fox, "Brain Buzz," *Nature* 472, (April 14, 2011): 156-158.

[24] Csaba Poreisz et al., "Safety Aspects of Transcranial Direct Current Stimulation in Healthy Subjects and Patients," *Brain Research Bulletin* 72, no. 4-6 (2007): 208-214.

[25] Different brands and styles are available with most costing less than $200USD.

[26] "Haloneuro," Halo, accessed on March 18, 2019, www.haloneuro.com.

Such a method is incredibly advantageous to military members, especially the SOF community, as many physical training activities require the wear of protective equipment (helmets, hearing protection/radio headphones, etc.). In fact, United States Navy Special Warfare Command (NSWC, the home of Navy SEALs and Special Boat Teams) is testing a similar Halo product to improve training efficiency.[27] The Defense Advanced Research Projects Agency (DARPA) is currently investigating if the same effects can be delivered via electrical stimulation to peripheral nerves, instead of directly into the cranium, via a process called Targeted Neuroplasticity Training.[28] With the DARPA project focused on cognitive improvement, and Halo's products geared towards physical events, electric stimulation of the brain seems poised to improve the full-spectrum efficacy of military training programs and events. Though the long-term effects of electric stimulation on healthy subjects is unknown, the SOF community as a whole should undertake this neuro-priming technology for use in various aspects of cognitive and physical training.

With various human enhancement technologies coming to maturity, the special operations community has multiple options. Safer strength enhancement via SARMs and the ability to see NIR energy both possess appropriate military advantages with no detrimental side effects. On the cognitive side, alertness aids still have their issues, and state of mind-altering pharmaceuticals are a definite no-go. Neuro-priming technology, however, shows serious promise in improving training efficiency, and should be pursued. Importantly, the enhancement effects of all three technologies are temporary.

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[27] Hope Hodge Seck, "Super SEALs: Elite Units Pursue Brain Stimulating Technologies," accessed March 31, 2019, https://www.military.com/daily-news/2017/04/02/super-seals-elite-units-pursue-brain-stimulating-technologies.html.

[28] Tristan McClure-Begley, "Targeted Neuroplasticity Training (TNT)," DARPA, accessed September 28, 2018, https://www.darpa.mil/program/targeted-neuroplasticity-training.

Permanence of Enhancements

A steady concern regarding HE is the permanence of any modification, procedure, or drug effect. Permanence here is meant to include enhancements that are not reversible, or the reversal procedure/process is so extreme as to induce undue harm upon the human. Implementing permanent HE, whether via bionic implantation, genetic modification, or other technology opens a veritable Pandora's box of issues. The fear of creating a 'better class of citizens' is quite real, and any hereditary enhancement could create a 'better class of human.' The risks associated with permanent HE outweighs the benefits to the military and present far-reaching issues to society. As such, no HE that does or reasonably could create permanence of HE, especially if there is a possibility of hereditary transference, should be considered for United States military application.

Military Issues

The risks and issues permanent HE present to the military include, but are surely not limited to, possible legal problems encountered during conflict, war termination conditions, and long-term care for the permanently enhanced soldiery. Regardless of the consent component discussed elsewhere, any possible advantage the military would enjoy by permanently enhancing its soldiers is overridden by the associated risks and costs.

Despite years of training and education efforts by military and civilian leadership, it is unlikely the commission of illegal and unethical acts against enemy combatants and/or non-combatants will be entirely eliminated. The violations at Abu Ghraib in Iraq, or the burning of Korans in Afghanistan are recent high-profile examples of such incidents. The scope and scale of

such acts may have lessened, but some professional soldiers continue to break legal boundaries and commonly understood ethical principles. Despite the reasons behind why such actions happens, the fact is they do, and they will continue to occur. If such an act were to be committed by a permanently-enhanced soldier, the military would run afoul of numerous issues and problems. To start, to whom is the crime attributed? If the soldier was forced to enhance, then attribution should at least be shared with his/her commanding officer, and farther up the chain-of-command as required.[29] Leveringhaus furthers the argument by advocating those that designed the technology should also bear some of the attribution burden, especially if the soldier's agency is impacted or compromised.[30] While this is a sound method to ensure the quality of HE technologies, such attribution could apply to all HE, permanent or not.

If a soldier were to receive an enhancement and subsequently commit a war crime, the culpability of that enhancement in the commission of the crime will receive immediate scrutiny. A simply and logical component of the administered punishment would be to remove the soldier's enhancement. Should the enhancement be temporary, such as the aforementioned SARMs, the military can simply discontinue the issuance of such technology, and the soldier will stop receiving the benefits. Should a greater trend begin to develop whereby enhanced soldiers are more prone to committing such crimes, thereby indicating a likely unpredicted side effect, the enhancement removal process is still straightforward. Such is not the case with permanent enhancements. Consider if the soldier receives a bionic eye, capable of telescopic vision and sight across a wider spectrum of light compared to a human's eye. The soldier then uses this enhanced capability in the commission of a crime. Obviously, the soldier gave up his biological

[29] Leveringhaus, "Assigning Responsibility in Enhanced Warfare," 147-149.
[30] Leveringhaus, "Assigning Responsibility in Enhanced Warfare," 149.

eye to receive the bionic replacement. Were the military to have to remove the bionic eye, what then? Is the soldier reduced to monocular eyesight? How painful, risky, and costly would it be to attempt an eye transplant? Even worse to consider is if the enhancement was genetic in nature. The military needs an ability to continually reassess the performance of its HE, with the corresponding ability to correct (or remove) the enhancement if necessary. Permanent HE undermines the ability for this to happen swiftly and with a minimum amount of cost and risk to the individual.

Beyond the need to correct a HE, permanently enhancing a soldier creates problems with how to classify such a soldier. Should a permanently enhanced soldier now be labeled a weapon system, and subject to a Geneva convention weapons review? Does the degree of 'change' induced by the HE influence such a classification? Patrick Lin presents the case that soldiers enhanced to an 'uncontrollable' level (presumably something like a 'berserker' drug) would violate the Geneva Additional Protocol I (API) Article 36, and such soldiers could be further subject to the Biological and Toxin Weapons Convention.[31] However, Lin assumes the enhancement removes the soldier's autonomy, a condition this study does not support. So long as autonomy is maintained, current regulations put forth in the Convention are adequate for addressing battlefield malfeasance. Further, as Savirimuthu puts forth, physical and cognitive enhancements could actually be in compliance with API as the desired outcome of the

[31] Patrick Lin, "Could Human Enhancement Turn Soldiers into Weapons that Violate International Law? Yes," *The Atlantic,* January 4, 2013, https://www.theatlantic.com/technology/archive/2013/01/could-human-enhancement-turn-soldiers-into-weapons-that-violate-international-law-yes/266732/.

enhancement is fewer civilian casualties and suffering.[32] The solution appears to lie somewhere in the combination of the intent of the enhancement, and the actual enhancement itself.

Despite the ongoing discussion at the international level, the domestic military could choose to label a permanently enhanced soldier as a weapons system, as it (the enhanced soldier) would obviously require a substantial investment of resources in maintenance and sustainment. Such a designation immediately reclassifies the soldier from a sentient subject to an object; just another part number in the vast web of military equipment. In such a case, what happens to the soldier? How much of his or her free choice is removed? Caron astutely mentions travel restrictions would be realistic for the military to impose upon its enhanced soldiers, mostly for national security reasons.[33] Additionally, what are the 'maintenance' costs of a permanently enhanced soldier? The military would wish to protect its investment, and a large amount of specialized medical expertise would need to be onboarded to properly care for the permanently enhanced soldier. And is such an individual now a 'soldier for life' due to the permanence of the enhancement? Would he or she be allowed to eventually leave the military, and under conditions of his or her choosing? If so, what is the cost and difficulty of care for such HE veterans? As can be seen, the use of permanent HE reveals numerous and difficult resourcing concerns for the military, and self-determination issues for the individual soldier.

Societal Issues

Cautiously peering into the future, the prospect of permanently enhanced soldiers returning to society uncovers still more issues. As Dr. Patrick Lin correctly asserts, the military,

[32] Joseph Savirimuthu, "Singularity and the Art of Warfighters: The Geneva Convention on Trial," in *Super Soldiers: The Ethical, Legal and Social Implications,* ed. Jai Galliott and Mianna Lotz (Burlington, Vermont: Ashgate, 2015), 176.
[33] Jean-Francois Caron, *A Theory of the Super Soldier* (Manchester: Manchester University Press, 2018), 106-107.

as a driver of technological advancement, often induces unforeseeable civilian impacts and consequences called 'blowback.'[34] While the internet stands above the rest as a prime example (born out of the DoD's ARPANET of the 1960s), other technologies include the global positioning system (GPS) and the common computer.[35] The introduction of permanently enhanced soldiers into society touches upon a democracy's right to be informed and voice their opinion, the potential to create a 'better' class of citizens, and potentially the creation of a new 'species' of homo sapiens.

Currently, the general public is wary of human enhancement. Pew research reveals an approximately two-thirds majority of Americans are worried (either very or somewhat) about HE and would not want cognitive enhancements or synthetic blood (meant to improve athletic performance).[36] While the Pew study did not address the military component, it is clear American society is nervous and unsupportive of biomedically enhancing humans. As the protectors of American democracy, it would behoove the military to allow public debate on the use of permanent HE for its soldiers. While public opinion indirectly impacts the military via America's elected officials, the open debate should be had to ensure the voice of the 'common man' is heard.

The chances of creating a 'better' class of citizen could quickly become a reality as permanently HE'd military members began matriculating back into society. Whether the enhancement is cognitive or physical, the enhanced person is enjoying their advantage 24/7. As

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[34] Patrick Lin, "Ethical Blowback from Emerging Technologies," *Military Ethics and Emerging Technologies*, ed. Timothy J. Demy, George R. Lucas, Jr., and Bradley J. Strawser (London: Routledge, 2014), 56-74.
[35] Lin, "Ethical Blowback from Emerging Technologies," 59.
[36] Pew Research Center, *U.S. Public Wary of Biomedical Technologies to 'Enhance' Human Abilities* (Washington, DC: Pew Research Center, July 26, 2016), http://www.pewresearch.org/science/2016/07/26/u-s-public-wary-of-biomedical-technologies-to-enhance-human-abilities/

discussed by Lin, the presence of two distinct levels of capability would be incredibly disruptive to the labor market and athletic competition.[37] The 'have nots' could quickly see their employment prospects lessen as a steady stream of 'haves' veterans flow into the work force with their always-available intellect or strength. Corporations, delighted by the performance of their enhanced employees, would rewrite job requirements to preferentially hire the enhanced military veterans. Those currently serving in the military would thus be incentivized to seek DoD available permanent enhancements to conform to the shifting civilian hiring market. Although such labor discrimination could be legislated against, there would be a disruptive and painful transition period. Conversely, the disingenuousness of a government wanting its military class to be enhanced, and then legislating against the societal benefits of such enhancement, would undoubtedly invite legal challenges.

The societal problems only get worse if the enhancement is hereditary. As gene therapy gains traction and regulatory approval, it is not impossible to imagine its use for HE in the near future. For example, scientists believe the genetically altered twin girls, mentioned earlier, will pass on their HIV immunity to their offspring.[38] Were those girls to have received cognitive or aesthetic genetic alterations, such traits would also present in their offspring. A permanent though non-hereditary enhancement applied to military personnel does still contain an 'off' switch by terminating the enhancement program. It will take a literal lifetime for the enhanced veterans to die off, but it is possible to remove the 'haves' and 'have nots' situation. However, such is not the case with a hereditary enhanced attribute. This is where the concern of 'playing

[37] Lin, "Blowback from Emerging Technologies," 65.

[38] Preetika Rana, "How a Chinese Scientist Broke the Rules to Create the First Gene-edited Babies," *Wall Street Journal*, May 10, 2019, https://www.wsj.com/articles/how-a-chinese-scientist-broke-the-rules-to-create-the-first-gene-edited-babies-11557506697?mod=searchresults&page=1&pos=1.

God' is most realized and most relevant. As permanently enhanced soldiers have children and their hereditary benefits (be they physical or cognitive) are passed to another generation, an entirely new subspecies of homo sapiens starts to form. Imagine the societal implications when a growing segment of the population is born with higher IQs, or speed and strength characteristics potentially better than those of elite professional athletes. Such a possibility lends frightening credence to the concerns surrounding HE creating a 'ruling class' of superhumans.

Despite the military's role in this scenario, the technology to create such a problem will start in the civilian sector, and thus at some point be available for sale to the general – albeit extremely wealthy – population. Daniel Suarez's fictional thriller *Change Agent* delves into such a future society, wherein 'designer babies' are genetically altered to enjoy cognitive, aesthetic, and physical features superior to their 'naturally produced' counterparts.[39] While Häggström describes the human ability to intuitively know when something is or is not morally acceptable via the 'yuck factor,' the military would be wise to stay away from the hereditarily permanent human enhancement possibilities.[40]

Post-Military Careers of the Permanently Enhanced

The post-military employment possibilities of permanently enhanced soldiers create another concern. Beyond the impacts of enhanced soldiers to the 'normal' civilian workplace, what if the enhanced soldier desired a return to the security sector? Krishnan presents this very possible situation and takes the discussion further to address the use of enhanced veterans as

[39] *Change Agent* by Daniel Suarez is a creative, thrilling, and enjoyable way to explore the various moral, societal, ethical, and legal dilemmas surrounding genetic modification and enhancement. This research was inspired in part by Suarez' engaging novel. Daniel Suarez, *Change Agent* (New York: Dutton Publishing, 2017).
[40] Häggström, *Here Be Dragons,* 49-50.

private military contractors.[41] Indeed, it is entirely conceivable that a group of enhanced veterans could band together and form their own version of the infamous Blackwater privateers. Or, enhanced soldiers could just work for various security firms. Given the United States' historical proclivity to utilize the global security services industry,[42] how would such enhanced contract employees be managed?

Of course, the use of unofficial soldiers, whether contracted security professionals or not, is not restricted to the Unites States. Russia, for one, enjoys the political ambiguity and governmental freedom afforded by the use of unofficial military forces - forces oddly working in concert with the Kremlin's ultimate aims. The famous 'little green men' of Crimea in 2014 were officially reported by Moscow as being "self-defense groups," yet were actually plainclothes intelligence operatives and Russia's elite Spetsnaz soldiers.[43] Likewise, "military contractors" was the title afforded the approximately 300 Russians killed and wounded in Syria by U.S. defensive actions in February 2018.[44]

Krishnan describes this trend in international security operations as a form of "neomedievalism," whereby sovereign nations forego the political risks of deploying national troops to messy low-intensity conflicts in developing nations, opting instead to hire/send security services corporations to conduct the armed involvement.[45] Now add HE veterans into the mix,

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[41] Armin Krishnan, "Enhanced Warfighters as Private Military Contractors," *Super Soldiers: The Ethical, Legal, & Social Implications*, ed Jai Galliott and Mianna Lotz,(Surrey, England: Ashgate, 2015), 65-80.
[42] Krishnan, "Enhanced Warfighters," 71.
[43] Max Boot, "Chapter One: The Changing Character of Conflict," *Armed Conflict Survey* 1, no.1 (2015): 18-19. DOI: 10.1080/23740973.2015.1041721; Vitaly Shevchenko, "'Little green men' or 'Russian invaders'?" *BBC Monitoring*, March 11, 2014, https://www.bbc.com/news/world-europe-26532154.
[44] Alex Lockie, "A Massive Battle Between US and Syrian Pro-Regime Forces Reportedly Killed More than 200 Russians," *Business Insider*, February 13, 2018, https://www.businessinsider.com/us-strikes-in-syria-reportedly-killed-russian-military-contractors-2018-2.
[45] Krishnan, "Enhanced Soldiers in Private Military Contractors," 76.

whether home grown or operating as 'soldiers of fortune' abroad, and the future of conflict becomes disturbing indeed. Administering permanent HE to operators makes all of these possibilities conceivable. Government could try to regulate or legislate a solution to these issues, but to place employment or travel restrictions on HE veterans clearly runs afoul of America's Constitution. But as Pugliese presents, the government (via the military) made the investment in that enhanced soldier and thus conceivably can dictate subsequent actions and restrictions upon the enhanced operator.[46] However, such an argument quickly presents HE soldiers as an inanimate object owned by the military. Such an ethical and legal conundrum furthers the argument that HE technology should not be permanent.

Overall, the use of permanent HE by the military results in a cost-benefit analysis that is more negative than positive. Hindrances to a soldier's self-determination, the cost and effort of lifetime maintenance of permanent enhancement, and war crimes resolution all impact the military component. Additionally, the issues of permanent HE of military members flows into general society, where concerns about fairness, employment, the creation of societal classes, and even of a new subspecies abound. For the military to consider implementing any HE that does or reasonably could result in permanent benefits requires significantly more testing, research, and societal debate.

Ethical Considerations

[46] Joseph Pugliese, "On Human and Machine: When is a Soldier not a Soldier?," *Super Soldiers: The Ethical, Legal, and Social Implications*, ed. Jai Galliott and Mianna Lotz (Burlington, Vermont: Ashgate, 2015), 25-36.

The debate and decision to pursue human enhancement technologies uncovers numerous ethical topics for debate, both for the individual who is debating going forward with an HE technology, and for the organization implementing an HE program. This section discusses various ethical concerns for the individual and the organization, while bridging the two with a focused discussion on the legal concerns regarding assignment of responsibility to enhanced soldiers.

Individual Decisions and Concerns

Any decision to undertake a human enhancement is of course, an intensely personal one. Such an endeavor should only be commenced after careful consideration and complete understanding of the probable rewards and possible risks, along with deep discussions with family, friends, and medical professionals. In the military, and especially in SOF, the drive to excel is ever present, but that is not the sole factor influencing the operator's decision. At the heart of human enhancement, viewed through the lens of the individual, is the profound belief in self-determination and associated values.

An adult human, being of an age of legal consent, has the ability to determine for themselves what is and is not acceptable to do to their body. For example, the adult can decide to consume alcohol, a legal barbiturate, if s/he so chooses, despite likely knowing all of the negative biological side-effects of alcohol consumption. The choice belongs solely to the individual. A different example more related to the topic of HE in SOF is the consumption of nutrition supplements (Creatine powders, protein shakes, branch-chain amino acids, etc.) by those seeking to improve their performance via a bolstered musculature. These supplements arrive from an unregulated industry, and users consume at their own risk, but the individual user still self-determines whether or not to supplement. In both of these examples, the self-

determining humans decide what to do biologically, in essence, to their bodies. The human knows the individual risks, as well as the legal bounds (driving under the influence as an example) of their actions, yet still makes the determination.

Either example above can be viewed through a different lens of how the individual defines an ideal version of themselves. One might view themselves as more social at a party when holding a drink. Or one might consume sports supplements to improve musculature in a drive to achieve their desired aesthetic. Individuals have the right to determine what the 'ideal' version of themselves is, and should be free to pursue that vision, so long as no hurt comes to others in the process. [47] As Roduit et al point out, the morality concerns of HE, at least as determined by the individual, are not properly addressed by the standard bioethical principles of justice, safety, and autonomy.[48] This is primarily due to the inherent limitations of each principle, as they try to apply objective reasoning to something the authors view as a subjective individual decision.

As the subjectivity of the decision applies to the use of HE by SOF operators, the personal decision matrix remains the same. Each operator must evaluate their *ideal* version of themselves, and what is required to get there. Some might determine that increased strength or endurance will complete their ideal vision. For others, it might be faster cognitive skills and greater memory. Each individual operator must self-determine what their *ideal* self is, and if possible, be allowed to pursue that vision. This freedom of choice should be respected, which includes the operator's freedom to choose *not* to receive an enhancement. Put another way, the

[47] Johann A.R. Roduit, Vincent Menuz, and Holger Baumann, "Human Enhancement: Living Up to the Ideal Human," in *Global Issues and Ethical Considerations in Human Enhancement Technologies*, ed. Steven James Thompson, (Hershey, Pennsylvania: IGI Global, 2014), 60-63.
[48] Roduit, Menuz, and Baumann, "Human Enhancement: Living Up to the Ideal Human," 54.

SOF operator gets to self-determine, free from negative outside consequences, what path s/he will undertake, and continue to be a respected member of the unit regardless of HE status.

Differences from PED use in Sports

In advocating the use of steroids or other forms of performance enhancing drugs (PED), some will argue such pharmaceuticals are already, and rightly so, banned in athletic competition, and that such a ban should extend to the military as well. Currently, the United States military does ban the use of steroids, and a soldier is subject to punishment under the Uniform Code of Military Justice were they to use PEDs or similar drugs.[49] As PED use in athletics confers an unfair advantage to a player, he/she tilts the contest in their favor. As it cannot be assumed every player on the pitch has taken PEDs, the playing field cannot be guaranteed to be as equal as possible. Since a purpose of sport is to serve a spectator's desire for competitive entertainment, it is in the best interest of the sport's governing body to ban PEDs and ensure as equal a sporting contest as possible. Thus, the removal of PEDs from the playing field, with subsequent bans and fines against perpetrators, is appropriate and should continue.

Yet these guidelines and understanding of PEDs simply do not apply to the field of battle. With martial action, the risks and rewards are infinitely higher than athletic competition. At the conclusion of an athletic contest, *all* players from *both* sides survive and get to go home. Upon the conclusion of a battle, many combatants from both sides have paid the ultimate price. And that ultimate price was paid in their fervent belief of a higher ideal than a competitive sporting

[49] Steroids are banned via Depart of Defense Directive 1010.4, February 20, 2014, as such substance use is "incompatible with readiness, the maintenance of high standards of performance, and military discipline."

event. As the role of a soldier is to conduct the mission for the attainment of objectives that ultimately deliver a bigger aim, the soldier naturally wants every advantage possible over the adversary. And as warfare entails fatal risk, that desire for advantage is only magnified. As such, the risk/reward matrix inherent to military action dwarfs that of athletic competition, and individuals considering an HE program should dismiss the 'PED in athletics' argument. Tenets of virtue ethics are also at play here, as the soldier seeking enhancement is doing it for the virtuous reason of being as good as possible at his profession.[50] Much as the soldier must ensure the highest level of readiness of their military equipment (weapons, radios, uniforms, etc), the decision to undergo HE is the desire to ensure a correspondingly high level of readiness exists within themselves.

Finally, the individual's decision to undergo an HE technology can be purely utilitarian in nature.[51] True, the individual will receive some wholly-personal benefit from the technology, such as increased strength or improved cognitive abilities, but the 'why' behind the decision is vital. A professional soldier understands their role is to defend the state and its citizenry, and in order to defend the greater good, they endeavor to make themselves the best and most-lethal soldier possible, thus partaking in an HE program, and knowing all along their defense of the state could result in their death.

The personal choice to undertake HE technologies is exactly that, personal. Each operator must choose for himself, based upon his own ethical and moral frameworks, whether human enhancements is right for his self-determined vision of the ideal self. Comparisons to

[50] Virtue ethics refer to the motivation one has for undertaking an action, ultimately in the drive to be a good person.

[51] While utilitarianism focuses on the 'greatest happiness principle,' here it is assumed the population being defended by the soldier prefers life to death, as well as the continuation of self-determined government versus rule by a foreign power.

performance enhancing drugs in athletic competition are ill-placed, and operators considering HE should disregard such comparisons, just as non-operators should refrain from making such comparisons.

Legal concerns of HE

A logical place to tie together the individual and organizational considerations regarding HE in SOF is the aspect of assigning responsibility. If a soldier becomes enhanced, and subsequently does something wrong, how much responsibility should the enhanced soldier bear for that act? What if the soldier was forced to accept the enhancement? What if the soldier volunteered? Since HE as a warfighting technology is unique to the battlespace in that it directly impacts the humans prosecuting the war, the ability to assign responsibility gets muddy. This does not need to be the case, as the wise use of responsibility assignment with restricted HE options can deliver benefits to both the organization and the enhanced warfighter.

A starting point is Leveringhaus' discussion of assigning responsibility in either a backward-looking or forward-looking sense.[52] Backward-looking is the retrospective assignment of responsibility, meaning the act has already happened, while forward-looking is the prospective assignment of responsibility, meaning the actor will be held accountable for whatever happens during their assigned mission.[53] Various types of HE can quickly make the assignment of responsibility difficult, as can the various coercion components inherent to military structures. During the early months of Operation Enduring Freedom, American fighter pilots accidentally bombed Canadian ground forces conducting a live-fire training event at a place called Tarnac Farms. Upon investigation into this friendly fire incident, the American pilots blamed their

[52] Leveringhaus, "Assigning Responsibility in Enhanced Warfare," 141-152.
[53] Leveringhaus, 141-152.

actions on the side effects of 'go pills' and further claimed their use was forced by higher authorities.[54] In this case, were the pilots to blame, or the higher authorities who ordered them to take the 'go-pills?' This is a small example of how HE technology is impacting the responsibility-gap in warfare. As Leveringhaus points out, just war theory tends to apply the retroactive approach in assigning responsibility, which unnecessarily hinders the adoption of HE technology and its benefits to the warfighter.[55] This does not need to be the case, however, as proper HE policies can limit or remove the responsibility gap emerging in HE technology application.

By combining the proper HE technology with a prospective assignment of responsibility, the enhanced soldier understands the legal foundations upon which they will be fighting. It is fundamentally unfair, while eroding trust in the establishment, for a soldier to be retrospectively held accountable for actions taken while under the forced acceptance of a warfighting technology (HE or otherwise). Conversely, the soldier is empowered when informed that "any and all actions taken during, and outcomes resulting from, this mission are your responsibility." For an operator to voluntary accept an HE means they are taking the responsibility of HE side-effects/outcomes upon themselves. A comprehensive understanding by the operator of what those side-effects might be is a natural requirement, and one that should be constructed by the advisory committee on HE discussed later in this study, and further emphasized by the unit's medical and psych personnel.

[54] Anke Snoek, "Among Super Soldiers, Killing Machines and Addicted Soldiers: The Ambivalent Relationship between the Military and Synthetic Drugs," in *Super Soldiers: The Ethical, Legal and Social Implications,* ed. Jai Galliott and Mianna Lotz (Burlington, Vermont: Ashgate, 2015), 103.
[55] Leveringhaus, "Assigning Responsibility in Enhanced Warfare," 151.

The military can go a step farther in just war concerns by limiting the HE technologies it makes available to its SOF forces. HE that could conceivably operate (meaning execute its function or have decisional autonomy) without direct and explicit input from the human would be forbidden. This immediately blurs the distinction of who is *actually* in charge of the technology. Possible examples here include bionic implants or prosthetics, especially those linked to the internet or some other form of battlespace network. While autonomous technology and its advantages have their place in an organization, weaponized and grafted to an operator is not such a place. Additionally, HE impacting the mood or psychological state of the operator should also be eliminated from consideration. Regardless of the intent or outcome of a mood changing HE, the enhanced operator must always be wholly and conclusively in command of her own mental faculties. This allows for the 'principle of ethical disobedience'[56] described by Caron, whereby the enhanced soldier (in this case a SOF operator) *must* retain the ability to reject illegal or unethical commands. Examples here include pharmaceuticals designed to eliminate fear, or electrodes built into helmets that can induce different psychological states.[57] The automatic dismissal of HE technologies impacting decisional autonomy (either remotely or directly) will better enable the prospective assignment of responsibility, thereby alleviating concerns of who is truly in command of the HE technology.

Combining a volunteer program with a restricted list of available HE technologies empowers both the military organization and the SOF operator. As part of the volunteer process, applicants are told how the HE might impact their future actions, and that they will be responsible for their actions and outcomes in future operations. Thus, operators are presented a

[56] Jean-Francois Caron, *A Theory of the Super Soldier: The Morality of Capacity-Increasing Technologies in the Military* (Manchester: Manchester University Press, 2018), 47.
[57] Caron, *A Theory of the Super Soldier,* 11-12.

first choice of refusal for the possible impacts of an HE. With the onus of responsibility shifted slightly more to the operator, via the prospective approach, the organization benefits by a lessening requirement to produce overly detailed mission orders. While intended to decrease risk (both operational and legal), such orders tend to overly restrict the options and perceived freedoms of choice by subordinate commanders and operators. The organization can now issue orders based upon the 'what' is to be achieved versus the 'how' to achieve it. A clear understanding of responsibility further empowers the enhanced operator with greater freedom of choice. These 'intent-based' orders give the operator freedom to creatively determine the best course of action, and how to best utilize their enhancements for mission effectiveness. The concerns about assignment of responsibility need not be a hindrance to implementing HE in SOF, but through sound policy can be an avenue to unleash the incredible maturity of SOF, furthered by HE technologies.

Decisions and Concerns Facing the Organization and Society

A military organization considering the implementation of an HE program faces numerous ethical issues. These range from the military's moral obligations to its soldiers, the motivations driving the use of the HE technologies, and the expected utility of the enhancement. Further concerns touch on the privacy of HE soldiers, and the acceptance of HE uses by society at large. Although the ethical concerns are diverse and complicated, human enhancement technologies should still be introduced and implemented by the SOF community.

The military needs to first understand a few key characteristics of HE technologies. First and foremost is that HE is not the long sought super-weapon that will make war obsolete. HE will deliver improved effects, perhaps even decisive ones, but these effects will not be realized above the operational level. HE SOF operators will continue to deliver high-operational or even

strategic results from their tactical actions, but only so long as the tactical operation is at the enemy's decisive point of weakness, and such action is actually aligned to a strategic objective. Cognitively enhanced commanders at the theater or campaign level might be able to out-think their adversary, getting inside the enemy's decision-making process and prosecuting targets that result in cascading problems for the enemy. It's also unlikely a group of stronger and faster thinking soldiers is going to deter an adversary from undertaking aggressive actions. Indeed, the military should be on guard against the other side of this coin--that martial action will become *too* common as policy makers believe that having and employing enhanced soldiers produces less risk, and thus war becomes the primary choice of national power projection. Though the 'riskless war' debate is outside the scope of this argument, it bears mentioning.

From an organizational perspective, the *sine qua non* of the military is to deliver asymmetric advantages on the battlefield to accomplish national strategic objectives rapidly and with the least loss of life. This is accomplished by maintaining a military force with the best possible training, equipment, and warfighting technology. The military heartily embraces technological innovation, as does the general society it is protecting. Thus, it seems the pursuit of human enhancement technologies should be included as part of the everlasting pursuit of martial advantage. In no way is this a call for the removal of thoughtful and informed debate surrounding HEs, but institutional barriers should be carefully reevaluated to determine their true purpose and usefulness as applied to HE.

The military has no problem with other medical procedures designed to protect the force. Indeed, the forced acceptance of vaccinations dates back decades, and not entirely without

controversy.[58] Why then should HE be viewed any differently? A cognition enhancing HE enabling rapid analysis of intelligence information, which ultimately forces a unit maneuver that saves lives, has a similar utility to immunizations: the protection of the force. Concerns surrounding the permanence of any HE are legitimate – and discussed in depth above – yet can be avoided with thoughtful policy application. The purpose of the military again becomes the base of the discussion surrounding HE in the military (or SOF in particular).

A different way to think of HE in SOF is as a means to an end. If the end (or objective in military parlance) is the rapid completion of the war, the means are the materiel/forces available to achieve that end. A HE SOF unit is a force available to achieve the objective, nothing more.[59] While this flies in the face of Kantian deontology (undergoing human enhancement is morally wrong as it is not universal, *and* it is being done to perpetrate the killing of others, which is also wrong), war can be argued as a logical exception.[60] Until the threat of war and thus the need for armed defense is universally removed, the requirement for soldiers remains, and thus the military should field a force as lethal as possible. Therefore, for anyone to take issue with the development and use of HE operators, they need to first take issue with the reason for the existence of these warriors. In other words, the problem lies with the ends, not the means.

Furthermore, and as already introduced above, the military has a moral obligation to secure the maximum protection of its fighting force. Relatedly, so does the sponsoring

[58] Via Executive Order, military members were forced to receive the anthrax vaccine prior to deployment for the 1991 Gulf War. At the time, the vaccine was yet to be fully certified for use, but the threat of biological warfare prompted civilian and military leaders to require its administration. Armin Krishnan, "Enhanced Warfighters as Private Military Contractors," in *Super Soldiers: The Ethical, Legal and Social Implications*, ed. Jai Galliott and Mianna Lotz (Burlington, Vermont: Ashgate, 2015), 69-70.

[59] Roduit, Menuz, and Baumann, "Human Enhancement: Living Up to the Ideal Human," 62.

[60] Gary E. Jones, and Joseph P. DeMarco, *Bioethics in Context: Moral, Legal, and Social Perspectives* (Peterborough, Ontario: Broadview Press, 2016), 38-40.

government and by association the protected polity. Failure to do so results in a wanton loss of life upon the battlefield, and a rapid decay of the state's security apparatus; few if any citizens would enlist knowing their government would be so cavalier with their lives. One of the great ironies of the military revolves around the resources expended in pursuit of exquisite lethality while attempting to render its own force kill-proof. Through the lens of utilitarianism, the implementation of HE in SOF simultaneously advances both of these objectives. Enhancing the strength and speed of an HE operator could place a SOF soldier at an advantageous point to shoot the enemy, and subsequently allow the rapid exfiltration of said operator from an overly dangerous situation, thereby saving his life and improving the security of the state. In other words, the greater good is serviced by having more capable SOF soldiers. Cognitive enhancements deliver similar effects via enhanced decision making, as the operator could more quickly determine the advantageous location, or the realization of incoming doom.

The moral obligation to maximize protection of its own force contains an interdependent component, that of what the enemy will do/is capable of. As technological innovations influencing national security systems are increasingly produced in the commercial domain, the chances of adversarial acquisition of such technology also increase. In a globalized economy, it is impossible for a nation to completely monopolize any technological innovation that might have utility in a military situation. Thus, national militaries must attempt to predict the future capabilities of adversaries. The NIR nanoantennae introduced earlier provides an excellent example. This technology was developed jointly by Chinese scientists and American academics, and thus it should be assumed by *both* nations that the other will pursue its use for military advantage. Failure to project this, and not prepare countermeasures for it, places a nation's

military forces, and by association the nation those forces defend, at increased risk due to the disadvantaged status of the less-capable military.

Ultimately, the military recognizes strategic benefit – and by proxy the entire nation it is defending – by creating as many asymmetries on the battlefield as possible. Human enhancement, of SOF operators or other forces, can create these asymmetries and capitalize on the benefits. Though military and national leaders need to understand the use of HE will not eliminate the threat of war, and it is likely the battlefield benefits of HE will eventually be negated by an adversary who also employs HE soldiers, such use should also not bring about *more* war, as an HE operator is still flesh and bone and capable of being killed. Moral obligation drives the need to maximize force protection, while understanding the enemy also gets a vote in determining what capabilities to employ on the battlefield.

Policy Recommendations

Building heavily upon the work of Mehlman, Lin, and Abney, this study now sets out to deliver a policy recommendation for military use in delivering human enhancement technologies to its special operations forces.[61] As Mehlman et al correctly point out, the military requires its own unique policy for researching and implementing human enhancement technologies.[62] As already presented, the increased levels of risk and operational challenges inherent to SOF missions drive additional need for an immediate yet prudent HE program.

[61] Maxwell J. Mehlman, Patrick Lin, and Keith Abney, "Enhanced Warfighters: A Policy Framework" in *Military Medical Ethics for the 21st Century,* ed. Michael L. Gross and Don Carrick (Surrey, England: Ashgate Publishing, 2013), 113-126.
[62] Mehlman, Lin, and Abney, "Enhanced Warfighters," 123-126.

Consent with Volunteers

The discussion surrounding consent in a military context is well founded in historical examples. Notorious instances of military medical malfeasance abound, from Nazi experimentation and Tuskegee syphilis testing, to the forced administration of untested anthrax vaccines to U.S. servicemembers prior to the Gulf War in 1991. More recently, the previously discussed Tarnac Farms friendly fire incident was at least influenced by the directed use of 'go' pills – medical-grade amphetamines given to aircrew to maintain alertness during long missions.[63] Where the discussion concerning consent in the military typically settles is in the realm of coercion.

The inherent characteristics of military structure present vast opportunities for coercion. Heavily rank focused and hierarchical in nature, underlings are under extreme pressure to adhere to established norms, or risk consequences that are quite real and quite well known. Beyond the obvious coercion components of such an organizational structure, the SOF community possesses a deep fraternal bond of absolute devotion to the fellow warrior and team. Such devotion can lead to undue influence upon the operator, this time lead by peer pressure and a deep fear of being a hindrance to the team and/or mission. With such opportunities for coercion to take hold, the implementation and management of any HE program must be thoroughly thought out.

To combat these influences, this policy recommends utilizing a volunteer methodology. As an HE project of this type has not been attempted before, there is no historical case study upon which to base, good or bad, its method of gathering subjects. The recommended HE technology will be briefed by a medical professional, thoroughly covering the predicted

[63] Snoek, "Among Super Soldiers," 103.

enhancements and possible risks. The SOF unit's leadership, both officer and enlisted (senior enlisted personnel in SOF units wield incredible influence), will not be present during the briefing. Once the medical professional is finished presenting the projected advantages, possible risks, program implementation procedures, etc., the perspective SOF unit is free to ask questions, and the HE program administrators (the previously discussed support team, at a minimum) can start considering volunteers. As any such program will likely require unique medical tests or conditions to be safe and appropriate, it is possible not all volunteers will be accepted into the program.

Even if all volunteers are accepted, the official program status of anyone in the unit will simply be 'accepted' or 'not accepted.' This serves primarily to keep the unit leadership from exercising undue influence and treatment, positive or negative, upon any member of the unit. If a member volunteered and was not accepted, then their status is simply 'not accepted.' The medical team will not be required, and recommend should be forbidden, from disclosing the names of those who did not volunteer to the unit leadership. The leadership does have a legitimate need to know who the 'accepted' soldiers are, for reasons discussed next. Classifying all soldiers not in the program as 'not accepted' provides maximum possible protection from positive or negative comments on military performance reports and evaluations. Additional and simple procedures could be put in place (individual briefings for example) to further minimize peer pressure effects. The use of volunteers and procedural protections against organizational coercion align with recommendations put forth in the Belmont Report to ethically protect human subjects in medical research.[64]

[64] Office of the Secretary, *The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research* (Washington, DC: Department of Health, Education, and Welfare, April 18,

Program Support Network Extends Beyond the Operator

The reason for unit leadership knowing who is 'accepted' into the program allows for support structures to be built around the SOF operator's families. The impacts of any HE program will not exist in a vacuum; the program will have impacts on the member's family. The unit commander can marshal these resources to family members, ensuring a thorough program explanation along with counseling and medical support is available to the family members of 'accepted' operators. Such a structure builds a 360° support network around the operator, delivering the best chance to identify and highlight any problems at the earliest possible moment. Aside from supporting the operator, such resourcing also supports and protects the family. Spouses will likely have questions and concerns the operator will not think to ask, and the operator will undoubtedly be more at ease knowing their family is also cared for during the program.

Scoped Necessity

In their policy frame recommendation, Mehlman et al contend the use of HE to achieve a military objective "must be reasonably necessary," and that using HE is only necessary when "there is no other means of achieving the objective that offers a better ratio of risks to benefits."[65] While in general agreement that HE should not be conducted just for the sake of it, or what Hilary Jaeger calls "the administrative convenience,"[66] Mehlman does not expand on

1979), accessed on March 10, 2019, https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/read-the-belmont-report/index.html.

[65] Mehlman, Lin, and Abney, "Enhanced Warfighters," 121.

[66] Hilary F. Jaeger, "A Glance at the tip of a big iceberg: Commentary on 'Recommendations for the ethical use of pharmacological fatigue countermeasures in the US Military,'" *Aviation, Space, and Environmental Medicine* 78, supl. 5 (May 2007): B128-B130.

situations where an HE would or would not be reasonably considered necessary, leaving the issue rather unresolved. Expanding on the issues described in the introduction, a more nuanced argument for the necessity of HE in SOF is now presented.

The need to operate at higher levels of physical and cognitive performance is nothing new to the military. What is new is the amount of information being forced upon military members, with the unwritten expectation that *all* of the information will be digested, analyzed, and an appropriate (at the tactical, operational, and strategic levels) decision rendered. The physical demands are also tied to this information overload, as communications and battle management gear add pounds upon a soldier's back. More situational awareness technology equals more gear in the pack which equals greater musculoskeletal strain upon the soldier. The added gear also requires additional and precious training time. Specific to the SOF community, operators conduct missions in truly austere regions of the world, across incredibly difficult terrain, and with less reachback staff support than conventional forces. Additionally, these missions are often politically sensitive, meaning a small or tactical error can quickly deliver strategic consequences. The October 2017 deaths of four US Army Green Berets in Niger, and the subsequent domestic and international storm, serves as a recent and vivid example of such a situation.[67] Outcomes of this tactical action reach to the major operational level, with similar such missions now requiring intense aerial support and mission approval from higher levels of the command. Both of these outcomes subsequently restrict the flexibility and responsiveness of SOF units and their missions.

[67] "October 2017 Niger Ambush Summary of Investigation," *DoD Defense,* May 10, 2018, https://dod.defense.gov/portals/1/features/2018/0418_niger/img/Oct-2017-Niger-Ambush-Summary-of-Investigation.pdf.

This policy recommendation, however, does not endorse a blanket approach to applying broad and constant HE to SOF. Rather, the necessity needs to be scoped. In other words, HE tech is made available to address a very specific requirement. For example, the use of SARMS to target increases in muscle strength, or tDCS to specifically improve memory retention. Though a mood changing HE is generally concerning, SOF personnel by their very nature do not have a need to activate 'fearless berserker' mode, and thus such a mood or mental state enhancing HE would not be offered. Determining what HE to offer volunteers should be discussed by higher headquarters and unit leadership alike. Relatedly, Mehlman et al wisely recommend the establishment of an independent advisory group of legal, medical, and bioethical experts to review and approve military HE options.[68] Further, this panel will work alongside higher headquarters to make the decision as to *what* HE tech to implement, as well as the *how.* To limit its chances of coercive influence on the program, the panel will not have authority over the *who* participates in any HE program. Such a panel will help assuage fears that the military will abuse its HE program and create an army of mindless cyborg killing machines.

Off-ramping

Just as easily as an operator can participate in an HE program, they should be able to cease participation. The military organization running the HE program should have a "no questions asked" off-ramping ability for any accepted operator who subsequently decides, for whatever reason, to discontinue use of the HE. Granted, the nature of the HE technology might require some time to safely off-ramp the operator, but such a process must be established and thoroughly briefed before program implementation. Having an available off-ramp delivers two

[68] Mehlman, Lin, and Abney, "Enhanced Warfighters," 123.

important components to the program. First, it furthers the understanding that the health and well-being of individual operators is the foremost objective of the organization. To have the unit willingly say, “We unhesitatingly place your individual well-being above the organizational benefits this HE delivers” is a strong statement to the operators. Secondly, such off-ramping is the natural backside complement to the volunteer-only concept described earlier. This further bolsters the decisional autonomy of the individual and decreases any coercion effects. The administering medical professionals do not need to inform military leadership of any off-ramped operators during the program. In place of a mandatory “off-ramping” report to unit leadership, the member will be given the choice whether or not to have the administering medical team notify leadership. A concluding report will simply indicate how many ‘accepted’ operators off-ramped over the course of the program. Identities of those who off-ramp will never officially be shared with military leadership. Such procedures further constrain the possible negative impacts to an operator’s career, and any future coercive effects from team or unit leadership.

Conclusion

Human enhancement technology has the potential to revolutionize the effectiveness of America’s special operations warriors. With SOF already operating on the extreme edge of mission risk and ambiguity, the addition of targeted HE technologies would deliver asymmetrical advantages upon the battlefield. Enhancement of musculature via SARMs and temporarily enhanced vision from injected ocular nanoantennae are both appropriate and ethically responsible. Neuro-priming for academic and physical training events delivers cognitive uptake and retention efficiencies, decreasing training timelines and expediting readiness. Such benefits

from musculoskeletal and cognitive enhancements benefit the SOF warrior in both offensive and defensive operations. Structural strengths inherent to special operations units make SOF the natural home for such an enhancement program.

Despite the ethical concerns presented by human enhancement technologies, a thoughtful implementation plan with the appropriate checks and balances can satisfactorily deliver HE's benefits to America's special operations warriors. The concern of permanence and its cascading ethical issues are avoidable by discarding any HE technology rendering permanent effects. The need to preserve the decision-making autonomy of an enhanced soldier can be safeguarded in a likewise manner. While many will argue that enhancing soldiers is an unethical act, the state has an obligation to maximize the safety and protection of its fighting force, while trying to create as advantageous position as possible upon the battlefield.

The recommended HE policy for SOF protects the force from many ethical concerns. Yet more research can be done in determining public opinion of HE, and the personal/organizational ethics of the prescribed policy. For example, does the use of 'calling for volunteers' affect the type and intensity of coercion generally present in a hierarchical (e.g. military) organization? How is *autonomy* viewed by military members, and do they believe they have the ability to pursue their *ideal* self? What is the public perception of non-permanent human enhancement technologies used in a national defense role? Relatedly, what is the public opinion if American forces were to be disadvantaged in a fight against an adversary employing enhanced soldiers? Answering such questions will aid policy makers and military leaders to properly scope an HE program.

However, gathering those answers should not preclude the immediate implementation of an HE program as prescribed by this study. While general society continues to debate the

chances and consequences of HE creating a ‘haves’ and ‘have nots’ situation, the legitimate need for enhance special operations warriors is too great to ignore. This need will continue to grow as other advancing military technologies place ever increasing demands upon America’s elite soldiers, and HE technologies are purchased by America’s adversaries. It is time to evolve the ‘hyper-enabled operator’ into the ‘hyper-capable operator.’

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14. ABSTRACT

Warfighting technologies have been improving since the dawn of mankind, and modern warfare is now more complex, interconnected, and faster paced than ever before. Minor tactical actions produce profound strategic results, both positive and negative. At the knife's edge of this complex environment is America's special operations forces (SOF). Despite exquisite training and enhanced battlefield technology, the actual SOF operator remains a "Human v1.0." As such, the American military must deliberately implement a biological Human Enhancement (HE) program for its special operations warriors, and build the "Hyper-Capable Operator."

SOF is the appropriate organization to run such a program due to its peculiar culture, already present support structure, and high consequence of its operations. Addressing the ethical concerns of such a program, this study examines the issue through the lenses of the individual soldier and the military organization. Numerous HE technologies with appreciable military utility, both cognitive and musculoskeletal, are presented. The permanence of any enhancement is of topmost concern, due to its cascading impacts upon the soldier, the military, and society. Additionally, the soldier's decision-making autonomy should never be compromised via an enhancement. Finally, this study delivers specific policy recommendations, to include the use of volunteers and safeguards against coercion, for the implementation of such a program.

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