Waking Up to the Forensic and Ethics Risks of Systematic Sleep Deprivation

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> Sleepiness befogs the reason undermines the will and the human being ceases to be himself, to be his own, I.—Alexander Solzhenitsyn[1]

Despite President Obama's ban on torture when he took office, the United States has done an about-face in adopting Appendix M of the Armed Forces Manual (AFM), permitting the infliction of prolonged sleep deprivation (SD) and other so-called psychological methods.[2] We are particularly disturbed by the misinformation surrounding the impact of sleep on morbidity and mortality.

The United Nations (1984) Convention Against Torture (CAT) defines torture as the intentional infliction of severe physical or mental pain or suffering (Article 1.1).[3] After the disclosure of the torture program of the Central Intelligence Agency (CIA), the president issued an executive order rejecting the CIA's harsh methods in favor of those outlined in the AFM. The result was a movement away from overt toward covert torture: solitary confinement, stress positions, and SD. In the case of the latter, the AFM recommends that detainees stay awake for 20 hours, 4 hours longer than was recommended when Donald Rumsfeld was Secretary of Defense. The AFM interrogation strategies appear more humane than the use of harsh interrogation techniques during the Bush administration, but the severity is revealed by the requirement that a physician be present.

Numerous human rights organizations have denounced Appendix M. In 2014, Alessio Bruni of Italy, committee member of the United Nations Committee against Torture called for the United States to abolish sensory and sleep deprivation.[4] However, the ever-growing fear of terror, now greater than ever with the advent of ISIS (Islamic State of Iraq and Syria) has led many to concede that desperate times call for desperate measures.

What is a truly effective and consistent means of gathering information remains elusive, due in part to the government's decision to discontinue funding in the 1970s. By the CIA's own admission, brutal methods "do not produce intelligence" or, possibly worse, "will probably result in false answers."[5] In the case of SD, neurophysiological research demonstrates how cognitive abilities diminish. The ability to discriminate between the meaningful and the misleading presents an insurmountable problem to the interrogator in detecting lies and sorting through the delirium and other mental status changes. Inaccurate intelligence and false confessions due to state-sanctioned torture, overt or covert, is the concern of the psychiatrist and the lawyer, as the repercussions can affect not only the prisoner but the safety of our nation.

Menachem Begin described his experience of SD in the Soviet Gulag in his memoir *White Nights*: ". . . wearied to death, his legs are unsteady, and he has one sole desire to sleep, to sleep just a little, not to get up, to lie, to rest, to forget. . . . Anyone who has experienced the desire knows that not even hunger or thirst are comparable with it".[6]

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The advancement of technology and growing awareness of sleep's role in overall health have led to greater understanding of the outcomes of SD since Begin's 1941 imprisonment.

Similar to smoking or drug use, the immediately visible physical impact does not reflect the dysfunction caused in brain mechanisms due to SD. Results can lead to a cumulative load of stress and the disruption of normal physiological and neurophysiological mechanisms.

Physiological and Neural Consequences of SD

Original experiments performed a century ago demonstrated the devastating effects of total SD in animals, which, in all cases, led to death. Converging lines of evidence from more recent animal and human studies suggest that chronic SD causes irreversible systemic physiological damage involving bioenergetic and neuroimmune dysfunction. The effect involves the release of proinflammatory mediators that increase the risk of chronic vascular, metabolic, and neurodegenerative changes, including obesity, diabetes, cardiovascular disease, and dementia. Humans may be especially susceptible to the increased neurological vulnerability related to cognition and executive function.[7] It appears that direct and indirect mechanisms of SD produce substantial brain dysfunction. The brain plays a key role in the response to stress, because it acts as a threat detector and mobilizes physiological and behavioral responses to stress that can be adaptive or damaging. Beyond the acute, fight-or-flight response, a chronic maladaptive stress response results in the disruption of normal physiological and neurophysiological mechanisms such as attention, emotional regulation, memory consolidation, and decision-making.[7] The long-term damage to specific cognitive areas of the brain are not repaired after normal levels of alertness are restored.[8]

Prolonged SD of 20 hours over 48 to 54 days can lead to severe psychological trauma resembling psychosis.[9] It causes sustained brain damage in regions of the prefrontal cortex (PFC), amygdala, and hippocampus that are responsible for memory retrieval and narration of an autobiographical self and further impairs the emotional and social decision-making that guides moral judgments. Many people exposed to SD in combination with other psychological torture may go on to have posttraumatic stress disorder (PTSD).[10] Furthermore, damage to impulse-control systems (i.e., the moral brake) may cause callous and antisocial behaviors.

Empathy is a prosocial behavior that requires the accurate judgment of facial emotions. In a groundbreaking study by Van der Helm and colleagues,[11] the effects of even one night of SD were capable of functionally impairing the human ability to experience the feelings of another person. The consequences of SD seemed to act on similar regions of the brain linked to neurodevelopmental disorders like autism and that govern the interpretation of social interactions.

The impact of torture and its connection to radicalization has been far from fully understood by the governmental authorities responsible for national security. However, it is clear that SD has the ability to compromise our experiential states of self-conscious awareness, language, motivated deliberation, and autonomous choice and ultimately can sabotage a sense of self-identity and moral personhood. By damaging key areas of the brain supporting critical moral faculties, a distorted sense of identity may leave one vulnerable to political radicalization.

Social Radicalization and SD

Although a review of the forensic nature of radicalization is beyond the scope of this editorial, understanding the potential role of SD as a facilitator of radicalization both within and outside the United States is worthwhile. Radicalization is a process by which an individual or a group becomes increasingly extreme in political, social, or religious ideals. This process can apply to a nation that endorses torture after it previously had not, as well as to an individual's shifting ideology. Adolescents may be particularly vulnerable to radicalization, as their brains are still developing.

Adolescence is a period of intersecting biological, emotional, and social maturation. There is widespread neuronal reshaping of dopamine-based reward and emotional decision-making areas of the ventral striatum, amygdala, anterior cingulate cortex (ACC), and PFC. This developmental stage results in increased sensitivity to peer interactions; greater emotional reactivity, including more impulsivity and risk taking; chronic insomnia, and higher rates of depression and suicidality.[12]

SD affects the brain, inducing it to respond in a fashion similar to the developing adolescent brain

and makes it more vulnerable to radicalization. Moreover, results from animal and human neuroimaging studies show that SD causes downregulation of D2 (inhibitory) dopamine receptors[13] in key subcortical regions of the brain. This results in a relative low dopamine state in overlapping emotional and reward centers of the ventral striatum and amygdala, leading to an impaired arousal system with amplified behavioral reactivity. The developing adolescent can show a lack of social judgment and moral decision-making, as is true of the person adversely affected by SD. This susceptibility makes both adolescent and sleep-deprived individuals potential candidates for the social inculcation of extreme religious or political messages.

Between 2007 and 2008, approximately 18 adolescents and young adult Somali Americans secretly left their homes in Minnesota to join the radical terrorist group Al Shabaab. How these seemingly ordinary young men with no history of terrorist activity became committed to a future of violence is uncertain, but their age and shared adversity may have predisposed them to take such a path.

Low social status has been found to have a similar effect to SD in downregulating D2 receptors,[14] leading to greater behavioral disinhibition and increased risk of engaging in violent and compulsive acts. This result stands in contradistinction to individuals with high social status who show up-regulation of D2 receptors. It appears that dopamine plays an essential but complex role in motivational states governing sleep, learning, mood, motor activity, and social situations. Chronic social stress in the form of perceived discrimination, social alienation, and postmigration status were among the many adverse experiences shared by these disenfranchised youth. It is incumbent on psychiatrists treating individuals with a history of exposure to stress and maltreatment early in life to recognize that the cumulative effects of adversity are a major risk factor for later violence and antisocial behavior. Deficiencies in the monoamine neurotransmitter system are linked to increased reactivity of the amygdala and decreased activity in the prefrontal regions, associated with higher prevalence of mental health problems, including anxiety, depression, psychosis, PTSD, and insomnia.[15]

Therefore, two interlocking processes may explain the higher risk of radicalization among this population. First, SD may lead to rapid mood oscillations and behavioral instability with augmentation of both positive and negative emotions. Next, acculturation stress during a vulnerable window of socioemotional development may promote identity confusion fueled by a lack of social integration that predisposes people to favor members of their own group over outsiders. This emotional tendency to divide the world into "us versus them" can be beneficial in reinforcing a sense of social identity and enhancing alliances, which contributes to group cooperation. However, it can have the opposite effect, as well, and can ignite the spread and escalation of aggression and war.

Radicalization can explain how youth armed with moral commitment fueled by a sense of injustice and political or religious doctrine can defeat larger armed forces. There is significant evidence that systematic SD at the hands of Egyptian and Jordanian authorities led some renowned prisoners toward radicalization. In particular, the prominent al-Qaeda operatives Ayman al-Zawahiri and Abu Musab al-Zarqawi underwent harsh interrogation with SD, which some sources believe influenced their motivation to seek revenge against the United States.[16] As we have seen in ISIS, radicalization is rarely limited to individuals. Instead, it spreads, often through the mechanism of social contagion.

Social contagion explains how positive or negative emotions from one person or group may elicit a corresponding set of positive or negative emotions in another group.[17] Social contagion contributes to social identity and societal cohesion, but has also been implicated in pathological criminal behaviors, most recently to radicalization via Internet addiction.[18]

We have seen numerous cases of Internet addiction in concert with SD. The clients have been mostly male and under 30 years of age. For many, their behaviors became aberrant: memory loss, sleep walking, and aggression. For some it even led to violence. In the case of jihadists who had returned to France, their lawyer recounts countless hours spent surfing terrorist websites with the result of at least one on-line radicalization happening within less than a month. Similar cases across Canada and the United States describe adolescents and young adults foregoing sleep, drawn into a cause that promises purpose and belonging. The altered circadian and social rhythms make them especially susceptible to media messages.

The relationship of this increased suggestible state to the pivotal role of on-line terrorist communities is an area worthy of greater investigation. Social conta-

gion can be especially prevalent if the *de facto* and designated leaders of a community (i.e., doctors, lawyers, clerics and politicians), actively or tacitly approve of a cultural shift. Thus, the implications of state-sanctioned torture promoted by community leaders and exacerbated by SD and the global reach of the Internet are alarming.

Neuroethics of SD

Seventy years after Nuremberg, a decade after Abu Ghraib, and more than 5 years since the Obama administration ordered the closure of Guantanamo Bay, the physician's role in torture during wartime is again a topic of controversy.

As a group, physicians are trained from medical school through residency to give the authority of more senior physicians automatic respect, in learning proper triage and care of the sick and injured. However, education in medical ethics, while a part of the medical school and residency curriculum tends to be abstract and does not capture the complex and shifting real world dilemmas that they are likely to face in practice.

Dual loyalty is a frequently encountered ethics-related problem, where a physician is faced with competing demands of their duty to patients on the one hand and obligations to administrative or government officials on the other. Despite a corpus of international rules and recommendations that support the absolute ethics injunction against engaging in any medical activities that do not support the welfare of the prisoner or detainees, prison physicians and military physicians remain at risk of violating medical ethics.

In his seminal work, *The Nazi Doctors*, psychiatrist and psychohistorian Robert Jay Lifton[19] revealed that Nazi physicians were typically not coerced by threats, but were co-opted through explicit offers of prestigious positions and by subtle appeals to patriotism and social welfare. Fast-forward a half century to Abu Ghraib, where well-intentioned physicians monitored interrogations, falsified medical records, and refused to provide basic health care to fellow human beings.[20]

The reasons for this moral debate go beyond the obvious social and political factors to the conscious and unconscious ways we use and degrade our language. In his 1946 essay, "Politics and the English Language," George Orwell[21] noted that meaningless words serve to erode language and in turn obscure clear thinking by allowing the "defense of the indefensible." The use of enhanced interrogation (EI) as a euphemism for torture is a clear attempt to rationalize psychological torture as somehow less damaging than physical harm. This flies in the face of clinical neuroscience research, which has amply demonstrated the severe neuropsychiatric sequelae of SD and associated EI methods.

For the majority of psychiatrists there is passive support for policy change, but little active advocacy. There are exceptions, most notably Brigadier General (Ret) Stephen Xenakis, MD, and psychologist, Jack Saul, PhD, who have galvanized the community of mental health professionals and the military to shine a light on the uncomfortable truth to bring about essential change.

As society's healers, "First, do no harm," is only one of the mandates of the profession.[22] Physicians have a duty that derives from the special relationship they have with individuals who are vulnerable due to sickness. Sickness involves not simply a loss of embodied well-being but a violation of the integrity of the self. It is this very intimate and relational property of the physician to his patient that ideally frames the relationship. As such, this moral engagement should prohibit participation in physical or mental harm that would rob someone of his dignity.

Physicians also have an ethics-based responsibility to promote social justice and to work across disciplines with clergy, lawyers, and military professionals who also have a stake in our collective duties to uphold ethics and international humanitarian laws that forbid torture.

All physicians must state once and for all that torture is wrong under all circumstances and in all forms. They must resist the reflexive trust to obey what the government and its official representatives consider moral. In tolerating SD as a method of EI, the United States faces a slippery slope in creating a precedent in normalizing torture.

By resisting the perversion of medicine in aiding torture, physicians mobilize the moral force of empathy in upholding our principles of justice and equality. This move will not only aid in the war on terror but help to mend a society poisoned by fear and misinformation.

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