WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Exploring the Downside of Dependency Created by Technology and Machine Learning

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DOI: https://doi.org/10.55248/gengpi.5.0324.0804

ABSTRACT—

The integration of machine learning and technology has undeniably propelled society into an era of unprecedented advancements, promising efficiency and innovation across diverse domains. However, amidst this progress lies a complex and often overlooked challenge: the inadvertent creation of dependency. This Paper delves into the multifaceted downsides that accompany our increasing reliance on these sophisticated systems. One critical aspect of this dependency revolves around the potential erosion of human skills and autonomy. As reliance on machine-driven algorithms grows, there exists a looming risk of diminished emphasis on human decision-making capabilities and critical thinking, ultimately impeding our ability to solve problems independently. The consequential impact on employment is also a pressing issue. Automation driven by technology may displace jobs, necessitating widespread retraining and potentially contributing to economic and social challenges. while machine learning and technology offer immense promise, an understanding of the pitfalls stemming from dependency is imperative. Striking a balance between technological advancement and the mitigation of associated challenges is essential to ensure a future where these innovations serve humanity's best interests, preserving autonomy, equity, security, and privacy.

Keywords—Machine Learning, Technology Dependency, Societal Impact.

I. INTRODUCTION

Machine Learning (ML) is a central component of artificial intelligence (AI), enabling computer systems to learn and enhance their performance through experience rather than explicit programming. It involves crafting algorithms and models that allow computers to identify patterns, make predictions, and carry out tasks based on data inputs. The success and efficiency of a machine learning solution are contingent upon the data's nature and characteristics, as well as the efficacy of the learning algorithms utilized [6]. This adaptive learning process enables machines to identify intricate patterns within data and make informed decisions or predictions without human intervention. In contemporary society, the escalating reliance on technology has spurred discussions regarding its multifaceted implications. The evolving landscape of technological advancements has necessitated a nuanced understanding of its far-reaching impacts, prompting inquiries into the dual facets of this dependence. This heightened reliance on technology has triggered a paradigm shift, particularly among adolescents in the 21st century, whose pronounced inclination towards digital tools and devices raises pertinent concerns about its effects on their holistic development. Notably, this surge in technology usage has prompted scrutiny into its potential repercussions on cognitive faculties, physical well- being, and socio- emotional maturity. However, despite the increasing focus on this subject, the research landscape remains in its infancy, offering tentative insights into the intricate relationship between technology usage and its outcomes among youth. This paper endeavors to explore the existing body of literature delving into the influence of technology on diverse facets of human growth, encompassing cognitive, socio-emotional, and physical domains. Moreover, it seeks to distill and summarize these findings while highlighting the crucial areas necessitating further comprehensive and high-quality research. By doing so, it aims to shed light on the complexities surrounding technology's effects, fostering the development of well-founded recommendations grounded in robust empirical evidence. The reliance on Machine Learning (ML) brings forth several concerning downsides. These include the perpetuation of biases present in historical data, leading to unfair decisions and reinforcing societal inequalities. Additionally, ML models are susceptible to adversarial attacks and might lack transparency, operating as opaque "black boxes," hindering trust and interpretability. Overfitting issues and the challenge of generalizing from training to real-world scenarios can reduce the reliability of these models. Moreover, overdependence on ML systems without human oversight poses risks of failures when encountering unforeseen situations, potentially causing significant disruptions. Privacy breaches, ethical dilemmas, and the continual need for updates and maintenance further add to the complexity, requiring a careful and comprehensive approach to mitigate these downsides while harnessing the benefits of ML responsibly[8].

II. WHAT DOES THE RESEARCH INDICATE ABOUT TECHNOLOGY USAGE AMONG YOUNG INDIVIDUALS?

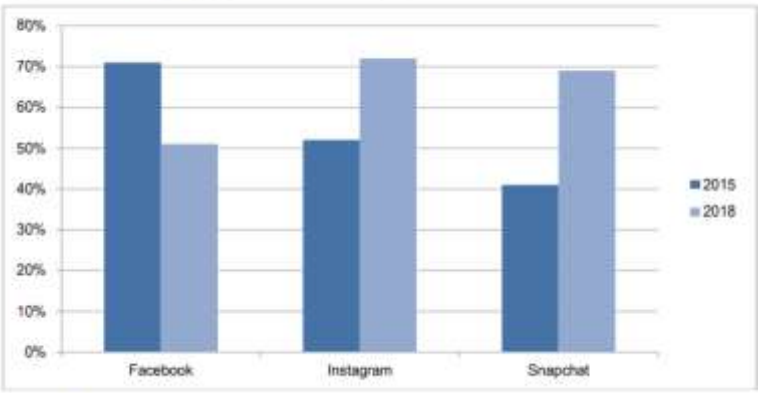
The younger generation is more connected than ever before, especially in countries with high connectivity rates where those aged 15-24 make up the majority of the online population. The internet is mostly used for gaming, social networking, and chatting among young people, with 92% of American teens surveyed reporting daily online activity and 24% saying they are almost always online. In Europe, children are also accessing the internet on multiple devices. American statistics reveal that young people aged 8-18 spend around seven and a half hours daily consuming media content. The vulnerability of developing brains to "plasticity" or experience-driven change underscores its critical importance. Childhood is renowned for its heightened plasticity, as our brains adapt in reaction to experiences. Given that the adoption of AI and ML technologies in higher education remains nascent in numerous countries, we firmly believe that the outcomes of this endeavor will hold significant global relevance, particularly for low- and middle-income nations and various applications beyond local contexts [7].

The impact of technology on society hasn't always been positive. While it has brought about numerous advantages, it has also resulted in undesirable side effects that need to be addressed [3]. However, it is important to note that many of the studies in this area have limitations, and there is a tendency to focus on the negative aspects of technology use. As such, it is crucial to approach these findings with caution and consider the potential positive effects of technology as well. Presently, there is a scarcity of research investigating how technology affects the developing brains of children and adolescents. This paper aims to delve into existing literature on the subject and explore potential implications for functional and emotional well-being.

III. TYPES OF TECHNOLOGY DEPENDENCY?

The initial interpretation of being dependent on technology is when a child necessitates medical devices in their routine activities, which can vary in types. The other interpretation is when children heavily rely on technology to carry out daily tasks, leading to adverse consequences and an unhealthy lifestyle. This dependency on technology can impact several aspects of a child's life. Recognizing signs of dependency and heeding warnings is crucial to ensure a child's technology use is balanced. Nomophobia is a manifestation of technology dependency that can persist into adulthood. Thus, maintaining healthy technology habits is vital for a well-rounded life.

Figure 1.1. Change in popular social media platform use in US teens from 2015-2018



Source: Adapted from (Lenhart, 2015[30]; Pew Research Center, 2018[100]).

IV. TECHNOLOGY DEPENDENCE SYMPTOMS

Technology addiction can cause symptoms comparable to other forms of addiction, such as restlessness, worry, and distress when lacking phone usage. These feelings can hinder concentration and task execution. The dependence on technology can also trigger physical reactions like sweating and shaking, indicating the severity of its impact on both the mind and body. If their irritation or anger is triggered easily in the absence of a device, it could indicate a growing dependence. In such cases, it's crucial to acknowledge that there may be an underlying issue and to respond with empathy and comprehension. Technology provides comfort to individuals regardless of whether they are extroverted or introverted. However, addiction to technology can hinder the brain's capacity to generate natural feel- good neurotransmitters like dopamine, and it can also result in heightened impulsiveness [9]. For extroverts, it enables the creation of new connections regardless of physical distance or location. For introverts, it provides an alternative to human interaction. While these uses are not inherently problematic, excessive dependence on technology should be monitored.

One of the concerns related to relying heavily on technology is the tendency towards impulsive behavior. Often, addiction and impulsivity are interconnected. As technology is easily accessible to many individuals, the need to exercise patience is frequently removed. While the internet provides instant access to information, it also promotes impulsiveness and enables quick decision-making, such as what to store or send on a device. The fear of being without a mobile device or losing contact through a mobile phone is referred to as nomophobia. It has been officially recognized as a medical fear in DSM-VI, allowing for proper diagnosis and access to treatment options that may have otherwise been overlooked. The diagnosis encompasses various psychological factors. Nomophobia diagnosis can be linked to low self-esteem, impulsiveness, and sensation- seeking. The use of technology and access

to social media networks can exacerbate self-esteem issues. Social media platforms promote comparison and the pursuit of unrealistic goals. The use of photo modifying apps further creates distorted images that are projected on our screens, causing low self-esteem. Regular exposure to such images can subconsciously change an individual's self-image and desired identity. Although nomophobia is not directly connected to comparison and low self-esteem, it is a possible consequence of excessive dependence on mobile devices.

V. WHEN TECHNOLOGY BECOMES UNHEALTHY

Technology can provide comfort to both extroverts and introverts. Extroverted individuals may use it to build new relationships beyond the barriers of distance and location, while introverts can use it as a replacement for human interaction. It's crucial to recognize that neither of these uses is inherently negative, but excessive dependence on technology should be kept under observation. If an individual only communicates through a screen or avoids face-to- face interactions due to fear, it's likely they have developed a dependency on technology. Social media provides a means for individuals to maintain contact with long-distance friends and family members, as well as enhance communication with partners, children, and healthcare professionals. Nevertheless, engaging in social media can lead to decreased quality time spent with loved ones and dissatisfaction within relationships, which might be associated with pre-existing relationship issues or psychological concerns. We will evaluates the impact of social media on relationships by highlighting three beneficial and detrimental effects. Relying on social media instead of face-to-face communication can have an impact on both current and potential relationships. Some researchers suggest that individuals with social anxiety may continue to experience difficulties forming in-person relationships when they substitute social media interactions. Additionally, social media use can lead to a lack of in- person relationships. A 2021 study conducted in Saudi Arabia found that over half of the female student participants reported negative effects on their family and friendship relationships due to prolonged social media use, making it harder to communicate in-person. However, further research is needed to fully understand this issue.

Using social media excessively can have a negative impact on the quality time spent with others, leading to conflicts and reduced satisfaction in both romantic and non-romantic relationships. A recent study in 2021 focused on Instagram usage and found that the more a person used the app, the less satisfied they were with their relationship and the more conflicts arose, leading to addictive behavior. Conversely, regularly making sacrifices for one's partner has been shown to enhance relationship satisfaction and decrease the likelihood of conflicts and negative outcomes. However, the phenomenon of phubbing, which involves ignoring someone in a social setting to focus on one's smartphone, is a notable concern. Studies indicate that phubbing is perceived as rude and violates social norms, resulting in diminished emotional connection and interpersonal trust among those affected. Additionally, it may exacerbate jealousy in romantic relationships and diminish overall satisfaction.

VI. TECHNOLOGY AND ML EFFECTING WORK CHARACTERISTIC AND WORK DEMAND

The way in which technology is utilized in a job, whether it is supporting or being supported, plays a crucial role in shaping expectations and opportunities for professional growth. Research consistently underscores the significance of employees maintaining digital connectivity and availability, alongside advocating for a redistribution of responsibilities between humans and technology. This is particularly crucial in fields incorporating automated systems, robots, and specialized technologies like clinical technology. To manage the increased workload, autonomy, and complexity of modern workplaces, employees must possess effective strategies such as mental, analytical, cognitive, and self-regulatory skills to meet the demands required of them. The effectiveness of generative models relies on the quality and diversity of the data utilized during their training. Should these training datasets contain biases, those biases inevitably permeate into the model [4].

This requires them to take greater responsibility for their own professional growth and identity, especially considering the expectation of constant availability. Juggling a demanding workload, frequent interruptions, heightened flexibility, autonomy, intricate tasks, and shifting role expectations all present challenges for employees to navigate. Moreover, the capacity to cultivate and refine one's skills in response to continuous changes and obstacles is growing ever more crucial. Hence, a readiness to learn, adapt, and innovate may emerge as a vital prerequisite for work. The steady progress in technology has opened up new career opportunities for newcomers, but it has also contributed to a growing issue of joblessness. As companies adopt cutting-edge technologies, they can accomplish tasks with fewer employees, relying instead on machines that work more quickly and accurately. While technological advancement is essential, so too is the availability of jobs.

The incorporation of Machine Learning (ML) across different industries has led to notable shifts in work dynamics and requirements. Conversely, technologies such as smartphones often disrupt our ability to enter a state of flow at work—a state characterized by full immersion in an activity while maintaining productivity [10]. ML's ability to augment decision-making processes has also reshaped work demands, empowering employees with data-driven insights for more informed choices. However, this shift necessitates skill adaptation and upskilling, as proficiency in data analysis and machine learning becomes increasingly valuable. Job roles have been redefined, with the emergence of positions specializing in managing and optimizing ML systems. Through an examination of education and cognitive capabilities [8]. This dynamic landscape requires continuous learning and adaptation, as workers must stay abreast of technological advancements to effectively navigate the evolving nature of work spurred by ML integration.

VII. TIPS TO AVOID TECHNOLOGY DEPENDENCE

To prevent children from becoming excessively dependent on technology, several preventive steps can be implemented. Among these measures, instilling the notion of balance stands out as crucial. It is vital to establish a healthy equilibrium between screen time and periods free of technology, as this can foster a deeper understanding of healthy habits and the importance of setting boundaries that should not be surpassed.

a. Stress Management

Stress management goes hand in hand with maintaining balance. During stressful periods, individuals may resort to technology as a means of diversion from the current situation. Adopting effective stress management techniques can discourage individuals from relying on unhealthy coping mechanisms like technology.

b. Interact With Community

Human interaction may be replaced by technology, however, a way to alleviate this is by connecting with your community and being in the presence of individuals you cherish. Taking a break from technology can assist you in finding your balance and feeling connected to the earth. The enhancements in blood glucose management observed in adults participating in supervised exercise games were notably greater compared to those engaging in standard exercise alone [5].

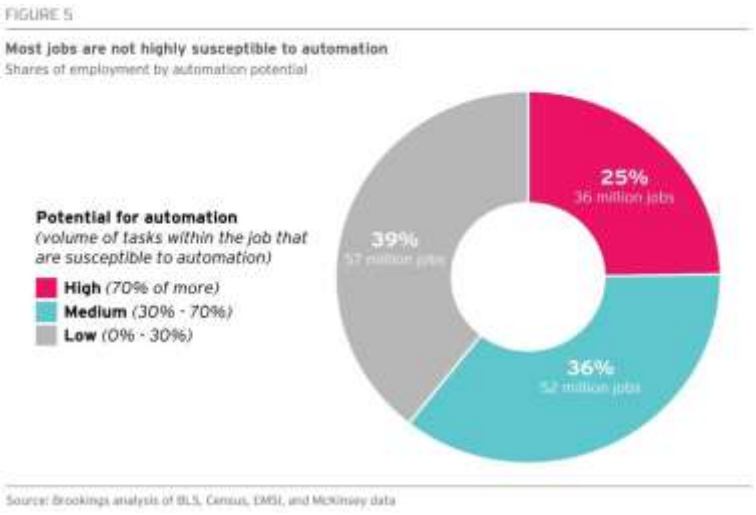
c. Learn The Symptoms

It is important to familiarize yourself with the indications of reliance on technology in order to identify them and seek assistance if necessary. Cognitive behavioral therapy and clonazepam are among the treatment options available for those who are experiencing difficulties. It is essential to acknowledge and recognize technology dependency as a legitimate diagnosis. Striving for equilibrium and cultivating a wholesome lifestyle is crucial to utilizing technology in a responsible and beneficial manner.

Strategies to reduce social media usage include relocating apps to folders or off the home screen, disabling notifications, using internet browser extensions to limit or block access, setting time limits with phone features such as Screen Time or Digital Wellbeing, and taking breaks from social media altogether. While certain studies have constraints, there is a widespread belief that social media is associated with mental health concerns such as depression, anxiety, and diminished self-esteem. Additionally, it is known to spread misinformation about health issues and can worsen pre-existing dangerous behaviors, such as heavy alcohol consumption. It may also lead to reduced physical activity and poor sleep habits, ultimately decreasing productivity in various areas of life, including at home, school, and work.

VIII. OVEREATING, SEDENTARY AND OVERWEIGHT

In recent years, there has been a correlation between increased screen time, including TV viewing and computer usage, and childhood obesity (Subrahmanyam et al., 2000[140]). This could stem from the practice of eating while watching television, which has been shown to raise energy intake through two mechanisms. The utilization of mobile applications for learning, as opposed to traditional learning methods, has a notable impact on the academic performance of undergraduate students. Various studies focusing on issues arising from mobile device use indicate a preference for gaming activities. However, users not only employ these devices for gaming but also for multiple-purpose applications [1]. Moreover, we cannot overlook the potential influence of targeted advertising and marketing of high-energy, low-nutrient foods to children through technology. The relationship between screen time and obesity is not always straightforward. Technological advancements have led to increased screen time, which can adversely affect both physical and mental health [3]. In the US, the prevalence of overweight and obesity surged from less than 50% in the 1960s to nearly 80% today [5]. While television viewing may substitute for other activities like reading, there is limited evidence to indicate that this has a significant negative impact. The consequences of displacement can vary depending on the extent of use and the activities being supplanted. For example, excessive internet use can hinder participation in clubs and sports, whereas moderate use has been shown to encourage participation. This finding aligns with research suggesting that young people can foster connections with their peers through moderate internet usage and shared media experiences.

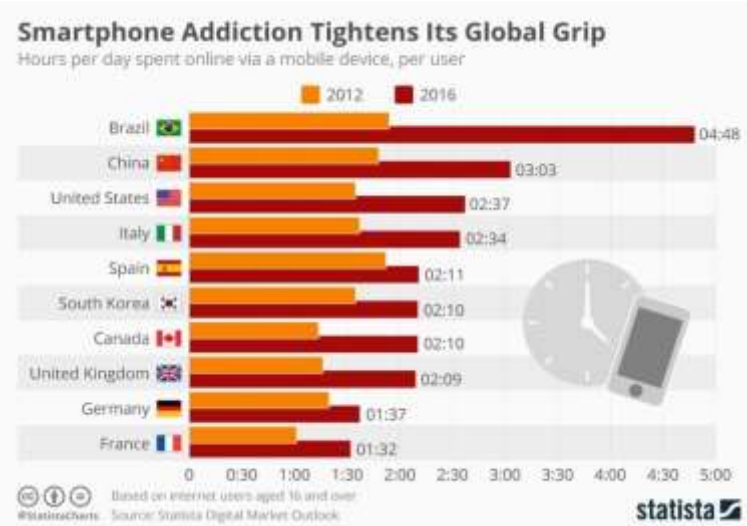


IX.RISK OF MOBILE USAGE

In recent years, the proliferation of mobile phone usage and mobile phone networks has raised numerous concerns regarding potential risks, such as radiofrequency damage, musculoskeletal problems, eyestrain, and sleep disturbance. This has prompted the need for the development of affordable technologies capable of offering students personalized support and services [7]. The usage of mobile phones, particularly by children, has increased rapidly in recent times. However, there is no clear understanding of the potential long-term health risks associated with this group as no previous generation has been exposed to such radiation during their childhood or adolescence, as stated by Hardell in 2018. Apart from the adverse effects on health and relationships, excessive screen time can also lead to addiction [3]. The absence of longitudinal studies on the consequences of prolonged exposure to radiofrequency emitted by cell phones and mobile networks, coupled with the inconclusive nature of the existing literature in this domain, makes it difficult to ascertain the true risks. Insufficient data hinders drawing definitive conclusions regarding the risks associated with long-term, low-level exposure to radiofrequency encountered in everyday settings, as highlighted by Röösli et al. in 2010. Cell phones release radiofrequency radiation within the electromagnetic spectrum's radiofrequency range. The frequency range for 2G, 3G, and 4G cell phones lies between 0.7-2.7 GHz. Meanwhile, the anticipated 5G phones will utilize the frequency spectrum up to

80 GHz. These frequencies are considered nonionizing, which means they have low frequency and energy. Hence, they are not powerful enough to cause DNA damage. On the contrary, ionizing radiation, such as x-rays, radon, and cosmic rays, possesses high frequency and energy levels capable of damaging DNA. When DNA is damaged, it can instigate genetic alterations that elevate the risk of cancer.

Radiofrequency radiation emitted by devices is absorbed by the human body, causing only a noticeable warming sensation in areas where a cell phone is held, such as the head and ear. This slight heating does not result in a significant rise in core body temperature, which is the only consistently recognized biological effect that the public may experience. There is currently no other established evidence of harmful health effects caused by radiofrequency radiation on the human body.



X. CONCLUSION

Over time, technological advancements have transformed the workforce, introducing novel work structures and rendering others outdated, thereby triggering extensive societal shifts. The current technological upheaval is expected to have far- reaching consequences. For instance, the International Labour Organization predicts that the transition to an environmentally sustainable economy may generate 24 million fresh job opportunities across the world by 2030, facilitated by embracing eco-friendly practices in the energy domain, utilizing electric vehicles, and enhancing energy efficiency in both present and upcoming constructions. While the advantages of social media in fostering relationships often emerge naturally, the drawbacks seem to originate from pre- existing relationship issues or underlying psychological concerns. Consequently, individuals must manage their social media usage, as excessive time spent on these platforms can negatively impact various aspects of their lives. is it preferable to live before or after the dominance of the internet and technology? Both have their advantages and disadvantages, but we cannot reverse time. Instead, we should focus on what we can do with the current world. The use of technology is not limited to the younger generation. It is a fundamental aspect of modern society, and we must strive to adapt and stay current with it. The ongoing advancements in technology have resulted in the emergence of new job opportunities for newcomers. However, while it is a current necessity for companies to keep up with these developments, it has also resulted in unemployment. Due to the availability of machines that can perform tasks with greater precision and speed, companies no longer need to hire a large number of employees. Therefore, while technological progress is vital, it is equally important to ensure employment opportunities.

Technology has surely created a lot of dependency in our everyday life but its our responsibility to use it wisely and ethically.

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