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Technological Literacy Needed: Gadget Influences on Mental Health in GenZ Population - Observed Common Challenges

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Lisa Broom, RN, BSN has worked in a variety of nursing roles throughout her career and is currently working as the Consult Liaison Psychiatric Coordinator for Ozark Center Comprehensive Behavioral Health Services in Joplin, Mo. In her current role, she is in the hospital setting, assisting the Inpatient Psychiatric Team in the care of the medically ill with psychiatric issues. All her various nursing roles have given her excellent insight into not only medical illnesses but psychiatric illnesses at all stages of life. She has also raised two daughters, who were not exposed to gadgets as they grew, so this has given her excellent comparison to use when analyzing adolescents today. Her insight brings a nursing and mother's perspective to the growing challenges that increased gadget use has on young people today.

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Abstract

The mental and behavioral changes observed among Generation Z (individuals born between 2000 and 2013) are a growing concern for academic and medical professionals. Generation Z is uniquely characterized by their upbringing in a digital era, often described as "born holding screens in their hands and raised by social media." Numerous studies suggest that the pervasive use of wireless devices contributes to the rise of medical and behavioral disorders within this demographic. These challenges, unprecedented in previous generations, underscore the urgent need for further investigation. Over the past two decades, wireless technologies - ranging from mobile phones to children's toys - have faced significant criticism regarding their safety due to prolonged exposure to electromagnetic fields (EMF). While these technologies are widely adopted, some researchers have reported potential biases in industry-sponsored studies that downplay the harmful effects of EMF radiation. Given that many biochemical processes in humans rely on electrical signaling between cells, consistent EMF exposure may disrupt these processes, potentially contributing to severe health outcomes, such as brain tumors in young children or negative impacts on biological functions.

The article is organized on a two-part approach. First, we gathered insights from two board-certified medical professionals specializing in psychiatry and mental health. They responded individually to six interview questions, sharing their observations about the typical Generation Z patients they work with, particularly young women. Their responses shed light on the mental health challenges unique to this age group, shaped by their constant exposure to technology and social media. Second, we conducted a literature review that explores how consistent exposure to gadgets and EMF affects biological cells and brain function. We aim to explain how these exposures contribute to the growing mental health crisis in Generation Z. Also, the findings highlight the necessity of technological literacy not only among educators and health professionals but also within the general public. Raising awareness of the risks associated with consistent gadget use and EMF exposure is essential across all segments of society.

Keywords**:** *GenZ Mental Health, Wireless Technologies, Electromagnetic Exposure*

Introduction

Impacts of external Electro-Magnetic Fields (EMF) on biological cells, human health, and mental conditions have been described in multiple academic articles, textbooks, various internet sources and led to creation of governmental policies. With the advancements in technology, the U.S. population becomes more vulnerable to the negative impacts, especially when new technologies are not assessed well following effective procedures. Public concerns regarding EMF from cell-base-towers, cell phones, and wireless devices raised as well. On another hand, medical providers observe high increase of neurological conditions such as ADHD and autism spectrums. As a result, there is a need to raise awareness alerting young-adult gadget-users about the risks related to close contacts of devices with their bodies for a prolonged period. Gen Z is the first generation born into a digital culture, where every aspect of daily life is highly digitalized and mediated [1].

Recent research highlights the link between the increasing dependence of Gen Z females on digital devices and the rising rates of neurological conditions such as ADHD and autism spectrum disorders [2]. Prolonged exposure to electromagnetic fields (EMF) emitted by these devices may contribute to these developments, with studies suggesting potential disruptions to neural development and cognitive functioning. These findings are also relevant to broader societal challenges, including the decline in birth rates observed in the U.S. and globally. As younger generations experience higher incidences of neurological and mental health issues, there may be a further effect on future generations, potentially leading to escalated health conditions, further influence on demographic and reproductive trends, and brining long-term concerns for public health.

This paper adopts a "reversed" format, where we present data (Part One) before diving into the literature review (Part Two). As it is mentioned above, the data comes from interviews with two medical experts holding advanced degrees, and actively practicing in psychiatric clinics in southern Midwest region over the years. Demographically, both responders are in the age group of 50+ years old. They shared their concerns about mental conditions of young active gadget users and answered to six questions on the topic. We asked to avoid using heavy medical terminology to make the information more accessible to a general audience. The responses are provided exactly as they were given, with no changes to the wording or punctuation, allowing readers to draw their own conclusions. The supporting literature review follows the data presentation.

1. Collected Data - Responses of Medical Specialists

Question 1: Have you observed a notable increase in demands for mental health services among the youth population over the past decade?

Responder A: *Absolutely, we have seen an influx of demand for psychiatric services. Our patient population is getting younger especially those that are made more aware of psych diagnosis and treatments through social media. Generally speaking, in the past, there existed a small gap of time that these folks did not seek psychiatric care. That is to say the child and adolescent population, the 6 to 17 age group and then the slightly older adult patient population that typically made up our panel of patients. What I have noticed currently is that I have a growing number of 20-s (the traditional college age population) that are seeking treatment. There is a new characteristic to those patients: they are absolutely assured of their diagnosis before they even come to seek professional help. They are well armed with information from social media about diagnostic criteria, and they can typically cite symptomology in line with that diagnosis. However, what makes this unusual is that with each presentation, their complaints seem to shift: for instance, one month it is obsessive-compulsive disorder OCD, the next months - it is borderline personality disorder.*

Responder B: *Yes, we have seen an increase in young people seeking help for their mental health, and it seems that it is often at the request of a family member that they live with (parents, siblings, grandparents, etc.). I work in the ER so of course, many of these*

requests are because of acute needs – suicidal thoughts, suicide attempts, severe behavior problems, and even homicidal thought. While being assessed in the ER, many times, if not all of them, admit to many hours of "screen" time – TV, video games, smart phones, etc. I also have recently worked outpatient mental health and have seen the same thing.

Question 2: Could you provide a brief comparison between two populations: one that grew up without digital devices and another that grew up with them?

Responder A*: It seems that in my experience the population that has grown up with cellular device access struggles more with a sense of mental stability. Briefly, one notable change is the formation of identity in our population. For example, without a device, previous generations where able to formulate their sense of identity mostly from a center of family structure, social structures like religious groups and neighborhood identities and educational institutional influence. Today, with access to a device that literally opens the world for you, formation of identity is further out from the center of the wheel of those previous influences -which is more chaotic and less established forms of influence, certainly a less controlled form of influence.*

Responder B: *I think that those that grew up with gadgets are requiring more help with their mental health needs vs. someone who have not grown up with gadgets. Most of these young people are admitting to eight or more hours per day on gadgets during school hours. Most schools even issue computers for young students to use during the school year. There are many young people who never open a book now because of their books being loaded on to their school issued computer. Then they come home and play video games and watch TV, so most of their awake hours are spent using some kind of gadget/device that has a screen.*

Question 3: Based on your experience, what is the approximate gender distribution among individuals seeking mental health services, specifically between biological females and biological males?

Responder A: *In my patient population there are slightly more females versus males presenting for initial psychiatric evaluations. With that being said, women are embodying more masculine egocentric/traditional male role traits, and men are encouraged to body more feminine/nurturing traits.*

Responder B: *In the acute setting that I work in, I think that the number of young biological males vs. young biological females that are seeking help is about the same. Something interesting is that in both of those groups we are seeing more violent behavior and it seems like these individuals are the ones that are spending time playing video games*.

Question 4: Briefly summarize observed resent changes in Youth Self-Esteems:

Responder A*: There has been a noticeably increase of "self-esteem" one rooted in ego, selfish versus self-esteem of being able to fit in with your immediate community.*

There seems to be arising more of a cult of self-worship that is directly tied into the echo chamber of a personal "device". For instance, all input that does not validate your immediate self-gratification can simply be ignored with a computer or remote interaction. With traditional formations of self-esteem, youth were sharpened with the immediacy of an "in the flesh" response from another unfiltered, raw live human being.

Responder B*: We have seen a lack of self-esteem issues on the increase in the younger population and in my opinion a great deal of this has to do with all of their time spent watching screens and comparing themselves with the people they see, which is unattainable because the people they are watching on their screens, are not based in reality.*

Question 5: What are the most noticeable social role-model modifications in female GenZ population?

Responder A: *Desire to be gamer, YouTube-er, and to live in virtual reality. Current typical GenZ female patients are often on autistic spectrum, could be angry, or upset. Instructed by social media what to say or behave. Desires to be "a stream-er" has increased. Also, with concomitantly poor emotional and self-regulation. Increase of socialize isolation, for seeing GenZ to find Community on the basis of mutually shared pathologies with less willingness to listen to advice from experts, but willingness to seek mental health care. Decreased access to healthcare/mental health services exacerbates the problems around self-diagnosis.*

Responder B: *In the GenZ population, role models seem to be based on social media popularity – YouTube, Instagram, movie stars, etc. The problem I see with that is that most of their role models are not based in reality. They don't stop to think that the people they adore and are trying to emulate, are not real. When they try and "be" like these individuals that they look up to, they are unsuccessful of course, and then mental health issues evolve.*

Question 6: Give a brief comment on recent increases of Autism, ADHD, and Gender identity crises among Gen Z patients:

Responder A: *Bad behavior needs excuse by sickness: I am sick that is why I do not behave. Society is becoming more tolerant to neuro-drive urgent equals increasing neuro-divergent prevalence. More females vs. males report gender dis-balance and need for a "correction" (from their prospective and self-diagnosis).*

Responder B: *We have definitely seen an increase in all of these with all young people, but gender identity issues are definitely on the rise the most with the GenZ population. Comparing the girls 10 years ago vs. girls now: a lot more ADHD, behavioral issues, and acute needs (suicidal thoughts, homicidal thoughts, self-harm, etc.). Comparing girls now vs. boys now: about the same for acute needs, but girls seek help more than boys in the outpatient setting. Boys used have for of a propensity for violence, but now we see this in just as many girls as boys.*

2. Review of the Literature … and Some Authors' Thoughts

In the presented Literature Review the authors attempted to outline the most interesting themes related to those issues. We tried to avoid a formal "academic language" making the content understandable for a wide-ranging audience. Covered topics include discussions about existing cellular regulation and standards, pediatric recommendations for avoiding early usage of gadgets, as well as some interesting thoughts about industrial lobbying, and sponsored research affiliated with production of Wi-Fi devices.

2.1 Hidden Exposures

Giving a guest speech at University of Melbourne on November 30, 2015, Dr. Debra Devis, a distinguished Professor and Founding Director Board on Environmental Studies and Toxicology, National Research Council, pointed that there were approximately six billion of cellphones, eight million of transmitted devices, fifteen billion of internet connected devices, and "we need to say that we do not know a lot about public health effect of this radiation" [3]. Mobile phone radiation provokes many unanswered questions. These questions should be asked, conducting solid research studies in a such area a high demand. At the present time, the majority of cell-phone manufactures are well informed about potential harm of wireless devices, although this information is not usually publicly disclosed. The data about radiation exposure of smartphones is hidden in the long phone settings menu list, making clients unaware of that subject, thus, crafting a public perception of insignificance of the issue. As an example, in Apple iPhone, the information can be accessed through the following menu commands: Settings-General-About-Legal-RF exposure. The similar long chain of commands has to be performed for other cellphone brands. Although the majority of cellphones are coming with information, which can be outlined as "do not keep it in your pocket next to your body without exceeding exposure", this information is unseen by customers. On the other hand, very slowly, and in the majority of cases outside of the United States (such as in Europe, Australia, and in Israel), wireless providers have started informing their customers about consequences of inappropriate use of cellphones and exceeded EMF radiation. The main concern for public safety is that EMF radiation exposure must be significantly reduced.

2.2 Existing Standards for Wireless Technologies

The majority of current standards for wireless devices are based on outdated assumptions and data, staying unchanged for two decades. For example, in 1997, when the first standards for cellphones were established, a typical user was a male military, medical, or business person, with approximate weight of 200 lb. User manuals recommended to wait at least 6 mins after using a cell phone before exposing your head to heat. At that time, the main concerns of cellphone side effects were focused only on heat exposure. The current situation is significantly different from mass market communication twenty-five years ago. It should be emphasized, that majority of population had smaller head sizes, this included females and youngsters. Old standards do not take into account that modern children are heavy users of cellphones, and their developing brain is under consistent exposure of harmful level of EMF radiation. Despite that, the one of the most growing communication markets is a market of wireless toys for young children [3]. The current generation of children are disproportionately affected by environmental exposures. In December 2012, the

American Academy of Pediatrics released an open letter from its President Dr. Thomas K. McInerney, saying that the variances in bone density and the amount of fluid in a child's brain compared to an adult's brain could allow children to absorb larger quantities of RF energy deeper into their brains than adults. "It is essential that any new standards for cellphones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes" [4].

Despite the intense changes in mobile phone industry and the associated social behavior, the Federal Communications Commission (FCC) has not reviewed the standards for cellphone radiation exposure since 1996. The current FCC standards for maximum radiation exposure levels are still based on the heat emitted by mobile phones. These guidelines specify exposure limits in terms of the Specific Absorption Rate (SAR), which measures the rate the human body absorbs RF radiation. The current acceptable SAR limit = 1.6 watts per kilogram (W/kg) of tissue. Although wireless devices sold in the US must guarantee that they do not exceed the maximum allowable SAR limit, multiple concerns have been raised that longstanding RF exposure affects the brain and other tissues, and leads to types of brain cancer, including glioma and meningioma [5].

2.3 Communication Monopolies and Industry-Funded Research

These days, telecommunications sectors (which are often consolidated into local monopolies) strictly regulate pricing and customers' choices leaving them with a minimum of control. It relates not only to the selected internet packages or cell-phone services. The Telecommunication Act of 1996, also called 'the most lobbied bill in history', states in the Section 332(c)(7)(B)(iv) that the local government authority do not proceed on installation of new cell-towers. Obviously, any public health concerns about the effects of tower radiation cannot deny tower licenses as long as the towers comply with the regulations of the Federal Communications Commission: "No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions" [6].

After this act, the industry had been given a green light to installing these facilities in more than 300000 sites at any selected location, including churches, school yards and even trees. Alster [7] presented a clear documented evidence of a strong industry influence on the American Federal government with consistent lobbyist strategies of wireless market frontrunners: "Wireless market leaders AT&T and Verizon work through the Cellular Telecommunications Industry Association (CTIA). But they also do their own lobbying, spending nearly $15 million through June of 2014, according to data from the Center for Responsive Politics (CRP). In all, CTIA, Verizon, AT&T, T-Mobile USA, and Sprint spent roughly $45 million lobbying in 2013. Overall, the Communications/Electronics sector is one of Washington's super heavyweight lobbyists, spending nearly $800 million in 2013-2014, according to CRP data". (p. 4).
There is an important question to pose - how a relatively low level of radiation of cellphone towers contributes to a public health? Historically, the main concern about RF emission relates to cellphones closely located to the head of a human. Since RF emission strength is proportional to the distance between the device and the head, some scientists refuse talking about the likelihood

of a direct health impact of cellphone towers. “But this issue might be not so simple to solve. There is an increasing evidence suggesting that exposure to even a low emission levels at typical cellular frequencies between 300 MHz and 3 GHz can have a wide range of negative effects” p.11 [7].

Levitt and Lai [8] compared the health condition of 530 people leaving within 300 meters from cell towers with the control group of participants who lived more than 300 meters away. The authors pointed that symptoms of nausea, loss of appetite, and difficulties in moving were as stronger as closer a person lived to the cell tower. Participants who lived closer than 100 meters, had significant depressive tendencies, loss of memory, and problems with concentration. Silvany [9] raised red flags with similar questions, saying that “based on current available literature, it is justified to conclude that RF-EMF [electromagnetic fields] radiation exposure can change neurotransmitter functions, blood-brain barrier, morphology, electrophysiology, cellular metabolism, calcium efflux, and gene and protein expression in certain types of cells even at lower intensities” (p. 202). The author described cellphone towers effect not only on humans, but on other living organisms as well: top of trees directly facing the tower dried out, birds’ embryos of fifty eggs were damaged after EMF exposure, as well as 32% of calves developed nuclear cataracts. Alster [7] referred to his interview with Dr. Leif Salford, a former President of the European Association for Neuro-Oncology: “In the spring of 2000, Professor Salford told me that wireless usage constituted the world’s largest biological experiment ever” (p. 22).

At the present time, numerous medical professionals, engineers, and scientists (including experts in interdisciplinary areas) participating in the research related health impact of wireless exposure have raised important and even provocative questions about industry-funded (by wireless providers) studies. Typically, those studies confirm null-hypotheses, such as “there is no effect” or “there is no correlation” between extensive EMF radiation and public health. Multiple studies, which report the alternative-hypotheses of “there is an effect” or “there is a correlation”, often did not have (or lost) a required funding to continue their work in that area. Alster [7] referred to the words of one of his interviewees: “There is no money to do research, and it is not going to come from government, because government is controlled by industry” (p. 28). Another reason that creates difficulty for deep quantitative research studies is impossibility of finding an appropriate population for the ‘control groups’, those people who do not use cellphones for a significant period of time, and do not live under any exposure of electromagnetic fields or wireless devices from any directions or facilities. The text below is a direct quotation from the book [7] published by Center for Ethics, Harvard University: “Dr. Henry Lai, emeritus professor of bioengineering at the University of Washington, has reviewed hundreds of published scientific papers on the subject. He wanted to see how many studies demonstrated that non-ionizing radiation produces biological effects beyond the heating of tissue. This is critical since the FCC emission standards protect only against heating. The assumption behind these standards is that there are no biological effects beyond heating. But Dr. Lai found that just over half—actually 56%—of 326 studies identified biological effects. And the results were far more striking when Dr. Lai divided the studies between those that were industry-funded and those that were independently funded. Industry-funded research identified biological effects in just 28% of studies. But fully 67% of non-industry funded studies found biological effects” (p. 20).

Huss et al. [10] analyzed how the funding sources impact on conclusions and interpretation of the research results in studies related to health impact of cellphone usage. They pointed on “industry-

funded studies were least likely to report a statistically significant results compared to studies privately funded, publicly funded, or funded with mixed sponsorship. Thus, interpretation of results should take sponsorship into account" (p.1).

Davis [3] stated that despite good awareness of wireless providers about potential harm and health impacts of EMF exposure, governmental policies towards increasing safety standards are not purposively changed from 1996, because it would create a high financial risk for communication industries, facing future astronomical expenses towards compensations for public health harm. The authors made a direct analogy between wireless and tobacco industry strategies. It took almost two hundred years for the government to put a label on a cigarette box warning about potential health damage.

2.4 Teens & Children Wireless Population

In May 2016, Pediatric Societies Annual Conference (in Baltimore, MD) released a video file [11], called 'Doctors Present Evidence of Wireless Radiation Impacts on Children'. The most distinguished specialists presented their opinions on contemporary changes of public health, and social behavior associated with aggressive wireless environment. One of the concerning issues is a dramatically increasing number of neurodevelopmental disorders such as Autism and Attention Deficit Disorder (ADD or ADHD) in children and adults. According to the authors, contribution of electromagnetic exposure is a very important factor in autism development. Throughout the last decade, autism became a very common and expensive global disease to treat. During the same period, there is an enormous increase of EMF exposure based on routinely used gadgets and internet devices.

Chemical and molecular activity in brain identifies how the brain will generate its own electromagnetic waves. On the molecular and metabolic levels, Wi-Fi (and EMF in general) coming into interference with brain-generated waves that could cause breakages in DNA by creating mutations. It was reported that a certain percentage of autism patients have unusual mutations in DNA that their parents do not have. After mutations are generated, they can be carried out on subsequent generations. After continuous EMF exposure, proteins and cell membranes are damaged and become stiff and more brittle. Thus, information channels in a cell do not work appropriately, and a cell became inefficient. Thus, individuals diagnosed with autism may experience exacerbated symptoms, as well as wireless radiation can provoke autism [11]. Similar results were reported by Amen [12], a neuropsychiatrist, and one of the most recognizable experts in treating ADHD. According to the author, Attention Deficit Disorder as a national health crisis that continues to grow, pointing out at observable relationship between over-using of wireless devices (including toys and games) and increasing number of ADHD patients. As a result of a heavy wireless abuse, behavioral problems, sleep difficulties, as well as problems with the whole entire immune system increase. "Underlined level of environmental vulnerability causes catastrophic health-problems. Electromagnetic exposure makes it worse. Our addictive care-free use of Wi-Fi all over the places is a main contributor for healthcare crises in the U.S. and in the World" [11].

The American Academy of Pediatrics (AAP) established a policy recommending no screen time for children under the age of two. This guideline was grounded in two primary considerations. The

first is developmental impact: a child's developing brain requires active interaction with caregivers to build critical bonds that support self-awareness and interpersonal connections. Disrupting this parent-child relationship through excessive device use can lead to negative behavioral responses, such as aggression, as children may perceive a lack of engagement as a form of neglect. These disrupted bonds are now evident in the Gen Z population, many of whom were raised during the early 2000s when emerging gadget technologies increasingly competed for parental attention. The resulting lack of consistent interaction may have contributed to weaker parent-child connections and long-term developmental implications.

The second factor pertains to the outdated nature of current safety standards. As it was mentioned above, the most standards were developed nearly three decades ago, during a time when the widespread use of internet-enabled devices by toddlers was inconceivable. In comparison, it is now common for young children to access internet-connected devices during everyday activities. Given these shifts, there is an urgent need to revise and update safety standards to reflect the realities of modern technology use and its profound implications for early childhood development and familial relationships.

2.5 Household Reduction of EMF Exposure …at no cost…

Several practical recommendations have been proposed to mitigate the potential environmental and health impacts of wireless devices. These recommendations are derived from a review of multiple online sources and consultations with medical professionals. Key strategies include:
(1) reducing exposure during nighttime by unplugging wireless routers to minimize EMF interference during sleep;
(2) encouraging men to avoid storing cell phones in pockets, as studies have linked this practice to reduced sperm motility and potential DNA damage;
(3) advising both men and women to avoid carrying cell phones near the chest, recognizing that breast cancer can affect individuals of all genders;
(4) setting limits on children's screen time and regulating Wi-Fi usage to reduce prolonged exposure;
(5) maintaining a diet rich in antioxidants, with melatonin identified in numerous studies as a natural defense against oxidative stress potentially caused by EMF exposure; and (6) exploring alternatives to wireless connections, such as using wired internet, to reduce environmental EMF exposure.

These recommendations underscore the importance of both individual and systemic approaches to addressing the risks associated with modern wireless technologies, particularly for vulnerable populations such as children and individuals with prolonged exposure to devices.

Conclusion

The mental health challenges faced by female Gen Z individuals are intricately linked to their prolonged exposure to electromagnetic fields (EMF) from digital devices. Raised in a highly digitalized environment, this generation has seen a significant rise in mental health conditions such

as anxiety, depression, ADHD, and autism spectrum disorders, particularly among young women. Prolonged use of gadgets disrupts neurological development and emotional regulation, with EMF exposure interfering with neural signaling and cellular repair mechanisms. These effects are particularly detrimental during formative years, compounding the psychological pressures brought by constant connectivity and social media influence.

This generation's upbringing also highlights a disruption in traditional parent-child interactions. Early adoption of gadgets by parents and children alike has reduced opportunities for consistent emotional bonding, fostering feelings of detachment and reducing the resilience typically built through strong interpersonal relationships. For many, social media has replaced real-world connections, presenting unattainable ideals and exacerbating feelings of inadequacy, fueling a cycle of poor mental health outcomes. The societal implications of these trends extend beyond individual mental health. Emerging research suggests that EMF exposure may negatively affect reproductive health, contributing to reduced fertility and increased risks of genetic mutations. Combined with the declining birth rates in the U.S. and globally, this raises concerns about the long-term health and sustainability of populations.

Addressing these challenges requires immediate action. Outdated EMF safety standards, designed decades ago for limited and occasional device use, must be revised to reflect modern patterns of continuous exposure, especially among younger demographics. Public awareness campaigns targeting parents, educators, and healthcare providers are essential to promote healthier technology habits and reduce excessive device usage. In conclusion, the mental health crisis among female Gen Z individuals is deeply tied to their digital upbringing and associated EMF exposure. By addressing these issues through updated standards, public education, and further research, we can mitigate the risks and foster a healthier, more informed generation.

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