THE INTERSECTION OF TECHNOLOGY AND EVERYDAY LIFE

by

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Growing up in the age of technology, mobile phones and tablets are all that we've ever known. As a society, we have become reliant on the connectedness that our phones give us to people from all across the world. In some cases, we have become addicted to how we interact with screen-based technology. Built into phones and apps are different techniques to keep us looking longer and scrolling more. I am going to analyze how our use of screen-based technology and phones has changed over time and examine the impact that this has had on society—specifically with Generation Z. With my background in computer science and coding, I will develop an app that focuses on bringing people back into real life. After certain intervals of time of continuous use of your phone, the app will pop up a reminder to take a break, drink some water, and bring yourself back into the moment. With this gentle reminder, I'm hoping to enable people to relieve their dependency to screen-based technology a bit. With the research that I gather, I will interpret the importance of the app and the potential applications it will have to daily life and the impacts it could bring to my generation.

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Note: You can view the code for PhonePause at https://github.com/laurvh/PhonePause

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Introduction

The aim of this research is to delve into the addiction that modern society has developed towards screen-based technology. With the widespread availability of technology, our reliance on it has significantly increased. By examining the factors that have contributed to this phenomenon, individuals can gain a deeper understanding of how they can break this cycle of dependency.

It is essential to understand what makes certain apps and social media platforms so addictive. In some cases, these companies work with psychologists to ensure that their apps keep users engaged and glued to their screens. By studying these techniques, I could develop an app that counteracts these addictive strategies.

Furthermore, as a society, we must understand how we can break this addictive behavior. Once we have identified the factors contributing to addictive screen-based technology use, we can incorporate tools in our app to help users avoid falling into an unhealthy cycle.

The impacts of this addiction on the population are significant, and it is crucial to comprehend the implications of technology overuse on individuals and society as a whole. Through this research, I can explore the personal effects of addictive technology use and how it can affect different aspects of daily life, including academic performance, mental health, and physical well-being.

As screen-based technology is an integral part of modern life, finding a healthy balance between its use and disuse is crucial. This research will help us gain a better understanding of the impact of screen-based technology on our minds and bodies and

enable us to make informed decisions about our usage, leading to a more conscious and balanced relationship with technology.

Literature Review

Societal Impact of Technology

The use of social media and screen-based technology has become increasingly prevalent in today's society, with many people using their devices to connect with others, access information, and participate in online activities. However, the impact of these technologies on individuals and society as a whole has become a topic of concern, with research suggesting both positive and negative effects.

Over the past couple of decades, technology has become an integral part of our daily lives, leading to the emergence of a new "technogenic environment" (Kulzhanova et al., 2020). This new environment has enabled globalization and interconnectedness on an unprecedented scale. However, as we become more reliant on technology as a society, it can also lead to a sense of disconnection from real-life interactions, resulting in challenges to self-identity and a sense of belonging (Kulzhanova et al., 2020).

While technology allows us to be the most connected in history, it also removes the "person" from it. This is a separation of real people with the online version of themselves. The rapid development of this "technogenic environment" has significant implications for the natural world. This raises important ethical and philosophical questions about the role of screen-based technology in society and its impact on the

planet. Furthermore, the "technogenic environment" causes some unique problems in self identity and finding where a person "belongs" in the world.

Social media, in particular, has had a significant societal impact by changing the way individuals interact and communicate with each other (Lopez-Fernandez, 2021). While it allows us to connect with people from all over the world, it can also lead to a sense of isolation and loneliness. Social media users often present a highly curated and idealized version of their lives, leading to feelings of inadequacy and low self-esteem in others (Lopez-Fernandez, 2021).

Furthermore, the rapidly evolving technosphere makes it challenging to predict and track its impact on society (McCarthy and Boster, 2019). As a collective, we are able to push the limits of creativity with the use of screen-based technology (Kulzhanova et al., 2020). There is a whole world created through our use of technology. This technosphere is rapidly evolving to fit the changing desires and needs of technology. Every technological advancement aims to make our lives easier or better, but it also brings new challenges and problems. For instance, the use of smartphones and other digital devices has led to a rise in distracted driving and other accidents (Borlase et al., 2016).

However, technology is not all negative. It has the potential to positively impact society and promote creativity (Kulzhanova et al., 2020). Technology has allowed for greater access to information and the ability to connect with people across the globe. For example, children now have access to multiple languages and different language interactions that would not have been possible without technology, leading to potentially better language development (McCarthy and Boster, 2019). Furthermore, McCarthy and

Boster (2019) argue that technology can provide opportunities for children to learn and develop important skills, such as critical thinking and problem-solving. As one can see, technology is not an overarching evil. With the right applications, individuals are able to further society and help set future generations up for success.

However, the impact of technology on communication has also led to concerns about privacy and trust. Malik et al. (2016) found that individuals' intentions to share photos on social media were influenced by their levels of privacy and trust in the platform. This highlights the need for greater transparency and accountability from social media companies in protecting users' personal information.

Nevertheless, the addictive and dangerous qualities of technology must be acknowledged and addressed. Social media addiction, in particular, can have detrimental effects on mental health, leading to anxiety, depression, and other mental health disorders (Lopez-Fernandez, 2021). Additionally, problematic social media use can lead to a decrease in academic performance, a decrease in face-to-face social interaction, and an increase in social anxiety (Tanega and Downs, 2020).

In other words, the impact of social media and screen-based technology is complex and multifaceted. Technology has brought significant changes to society and has the potential to positively impact our lives. However, we must also be aware of its negative impacts and work towards minimizing the risks associated with technology use. While it has provided opportunities for connection, education, and entertainment, it has also led to concerns about addiction, privacy, and environmental sustainability. As technology continues to develop and become more integrated into our daily lives, it is

important to consider its potential impacts and work towards creating a society that uses screen-based technology in a responsible and sustainable way.

Addiction to Technology

Addiction to screen-based technology, particularly social media, has become a significant concern in recent years. The rise of smartphones and other portable devices has made it easier for people to access social media, resulting in a growing number of individuals who spend an excessive amount of time on these platforms.

The addictive nature of screen-based technology is a growing problem, and social media is at the forefront of this issue. Social media platforms, such as Facebook and Instagram, have been found to utilize behavioral engineering strategies to keep users addicted to their apps (Tanega and Downs, 2020). Countless engineers are at work behind different apps trying to maximize their addictive properties. College students switch between social media apps an average of 27 times an hour, a little less than once every two minutes. These strategies tap into society's innate need to belong and seek validation from others. The addictive use of social media can also correlate with several indicators of psychological distress, such as depression and anxiety (Tanega and Downs, 2020). Moreover, Tanega and Downs (2020) suggest that social media addiction can be attributed to a range of factors, including boredom, social isolation, and the desire for social validation.

Malik et al. (2016) also explore the impact of social media on society, focusing on the factors that influence users' intentions to share photos on Facebook. The authors suggest that a users' willingness to share photos on the platform can contribute to the

development of addiction to social media, as users may feel pressure to share content in order to maintain social connections.

One of the ways social media platforms keep users engaged is by using artificial intelligence to curate timelines that maximize a user's interests (Tanega and Downs, 2020). Every time a user posts on social media, they are taking a gamble of how others will react, much like the addictive behavior of coin slot machines in casinos (Mendoza Ovando, 2019). The goal of every post is to receive likes and comments, which positively reinforces posting on social media.

This constant seeking of validation leads to little spikes of dopamine every time a user receives a notification (*The Social Dilemma*, 2020). This is why every time a person checks their phone, it feels like gambling to see if they have received any notifications. Users start chasing the feeling of being seen and acknowledged on social media. The film also explores the ways in which social media companies use algorithms to keep users engaged and how this can contribute to addiction and other negative outcomes. However, unlike the real world, social media focuses on only sharing the best parts of a user's life (Mendoza Ovando, 2019). Because of the positive association with posting on social media, users only see an unrealistic portrayal of everyone's lives. This curated image users create of themselves on social media leads to unfair comparisons and an assortment of negative mental health impacts.

Overall, the addiction to screen-based technology and social media is a growing concern in modern society. Studies have highlighted the potential negative impact of addiction to technology, particularly social media, on social relationships. The use of behavioral engineering strategies and the constant seeking of validation through likes

and comments can lead to addictive behavior and psychological distress. The addictive nature of social media, combined with factors such as social validation and boredom, can contribute to problematic use and addiction. As screen-based technology continues to advance, it is important for individuals to be aware of these negative impacts and take steps to limit their use of technology.

Mental Health Impacts

The mental health impacts of technology are becoming increasingly evident and a more researched topic in recent years. While screen-based technology has been lauded for increasing communication and connectivity, it has also been associated with various negative mental health outcomes, including depression, anxiety, and sleep disorders.

The constant use of digital technologies can lead to an increase in anxiety and fear of the future, particularly among young people (Mendoza Ovando, 2019). The more time individuals spend on Instagram, the more people they follow, and the more active they are on social media, the higher their levels of dissatisfaction and body dysmorphia. This dissatisfaction can lead to an overall decrease in mental health over time (Tanega and Downs, 2020). Conversely, people who abstained from social media for a week felt a higher level of satisfaction and overall well being than people who did not. From these relations, we see that screen-based technology causes a myriad of negative mental impacts.

Depression and anxiety are commonly associated with screen-based technology use, particularly social media. The constant comparison to others on social media can

lead to feelings of inadequacy and low self-esteem. Additionally, social media can increase feelings of loneliness and social isolation, particularly in younger users who may rely on technology for social interaction rather than face-to-face communication.

Research shows that individuals who abstain from social media for a week feel a higher level of satisfaction and overall well-being than those who do not (Tanega and Downs, 2020). Additionally, college students who are at risk for problematic social media use have higher scores for eating problems, substance problems, anxiety symptoms, and depressive symptoms, and a lower overall well-being score than students who are not at risk (Tanega and Downs, 2020). This suggests that social media, which was intended to benefit users, paradoxically has a negative effect on them instead.

One possible explanation for these negative effects is the self-comparison that is inherent in the structure of social media. Individuals tend to compare themselves to others on social media, which can lead to feelings of inadequacy and a decline in mental health (Mendoza Ovando, 2019). Moreover, social media often portrays a curated image of one's life, leading to unrealistic expectations and unfair comparisons.

College students who were at risk for problematic social media use had a higher mean score for eating problems, substance problems, anxiety symptoms, and depressive symptoms than students who were not at risk (Tanega and Downs, 2020). The at risk students also had a lower overall well-being score. With these scores, social media that was created to help benefit the lives of users paradoxically has a negative effect on them instead. This could be due to the self comparisons between a user and others that are ingrained in the structure of social media.

Furthermore, technology use has also been associated with negative impacts on cognitive function and memory. While technology has made it easier to access information, it has also resulted in decreased attention span and reduced ability to retain information. Studies have found that excessive technology use can result in a decrease in overall cognitive function, including decreased problem-solving ability and reduced creativity.

Interestingly, with the rise of fast-paced screen-based technology, attention spans have decreased over the past two decades. In 2000, the average attention span of adults was around 18 seconds, whereas by 2013, it had fallen by more than half to 8 seconds (Mendoza Ovando, 2019). Our use of screen-based technology is only reinforcing our shortening attention spans, with apps like Snapchat, Vine, and TikTok designed to provide as much content to the user in as little time as possible.

Despite these negative mental health outcomes associated with technology use, there are also potential benefits. Technology has made it easier to access mental health resources and support. Mental health apps and teletherapy have become increasingly popular, allowing individuals to access support from the comfort of their own home. Additionally, social media can provide a platform for individuals to share their experiences with mental illness and connect with others who may be experiencing similar issues.

In summary, while technology has had many positive impacts on society, including increased connectivity and access to information, it has also resulted in negative mental health impacts. Overall, the mental health impacts of technology should not be overlooked. Social media and other digital technologies have the potential to

negatively impact an individual's mental well-being, with addiction, self-comparison, and a decrease in attention span being among the main concerns. Depression, anxiety, and reduced cognitive function are all associated with screen-based technology use. It is important for individuals to be mindful of their technology use and to take steps to reduce negative impacts, such as setting boundaries around screen-based technology and engaging in face-to-face social interaction.

Physical Impacts

Our use of screen-based technology has also had significant physical impacts on our bodies. The increased use in technology and changing school start times has had a notable impact on the sleep pattern of teenagers (Borlase et al., 2016). Sleep loss in teens results in lower academic performance, lower self-esteem, and has an association with being overweight. Furthermore, increased fatigue in teens leads to them being more injury prone and can cause car accidents.

Moreover, our constant use of technology has also increased our risk of accidents and injuries. The use of mobile devices while driving or walking can lead to distraction and decreased awareness of one's surroundings, resulting in accidents (Borlase et al., 2016). Tanega and Downs (2020) point out that problematic social media use has been linked to increased risk-taking behaviors, which can lead to physical harm.

In terms of technology, in 1999, 80.7% of teenagers had at least one source of technology in their bedroom (Borlase et al., 2016). By 2008, that number had increased to 96.4%. Some bedrooms had between 4 and 6 different technology sources. As one

can see, there isn't a separation between sleep and technology. Oftentimes, a person stares at a screen until they fall asleep and immediately looks at another screen once they wake up. This relationship with technologies causes restricted sleep patterns in teens and increased fatigue.

One way communities can help set students up for success in school and diminish the other negative impacts that lack of sleep causes is by breaking the cycle of using technology. Individuals can help redirect the time they spend on their phone to other, more beneficial pass times. By breaking our cyclical use of technology, we as a society can hopefully minimize the addictive qualities of technology and the negative mental and physical impacts it has on users.

It is important to note that the negative physical impacts of technology overuse are not limited to teenagers. Adults who work on computers for extended periods may also experience eye strain, headaches, and musculoskeletal disorders. Employers are increasingly implementing ergonomic measures in the workplace to reduce the risk of these physical health problems.

Ultimately, the physical impacts of technology overuse are vast and can have serious consequences on an individual's health. From sleep deprivation to accident-prone behavior, technology use can lead to a variety of negative physical health outcomes. It is crucial that as a community we take steps to minimize our use of technology and implement ergonomic measures in the workplace to mitigate these effects.

Methods

For my thesis, I analyzed the relationship of technology and people over time. In particular, I focused on how our addiction to screen-based technology began and how that has impacted society as a whole. From this research, I coded an app that will help people break their dependency on their phones. In order to do this, I compiled research papers on each of the different topics I wanted to focus on. Through this method of research, I was able to analyze a broader scope of topics than I would have been able to if I collected the data myself. Furthermore, by utilizing existing research, I was able to find overarching themes across all of the papers. Since I am not conducting research myself, I am able to add on more readings as I find useful as the thesis progresses. This is something I would be unable to do if I was having people fill out surveys myself.

The papers cover the rise of technology addiction, the toll that it takes on our mental health, and how it affects our physical health and sleep patterns. With how big of an impact that technology has on our overall well being, I am able to justify the importance of the creation of this app, PhonePause, that helps to break the cycle. With my skills in coding and knowledge of social media and marketing, I was able to formulate an app that helps combat the negative impact screen-based technology has on the users.

From the research papers, I was able to synthesize these recurring observations about our relationship with screen-based technology and the mental and physical impact that it leaves on the users. I examined the data collected to formulate an app layout that will be the most effective possible based on the differing needs displayed in my research.

The Process

As a culmination of my research, I set out to create PhonePause, an app that will help users break their dependency on their phones. This required me to learn Swift, the programming language used to develop iOS apps, and familiarize myself with Xcode, the integrated development environment (IDE) for building Apple applications. The basic premise of PhonePause is to track the amount of continuous time a user is on their phone and send a notification once a certain threshold is reached to break the user's cycle of endless scrolling. The notification will redirect the user to the PhonePause app which will then provide resources on how to break the user's phone dependency and suggest options of what to redirect their time towards.

After creating the initial version of PhonePause, I realized I would need to create an Apple Developer account. This brought me to my first hurdle, setting up an Apple Developer account, which is necessary to enable push notification and publish apps on the App Store. This process involved submitting personal information, verifying my identity, and paying an annual fee. It took a few weeks for my account to be approved, but once it was, I could begin the process of extending the function of my app. Until this point, I had a very basic working version of PhonePause that would only work within the app itself and could not extend its functionality outside of that.

With my newly gained Apple Developer account abilities, I decided to use local notifications to prompt users to take a break, and began researching how to implement this feature in my app. This led me to learn about the User Notifications framework, which is used to schedule and manage notifications in iOS. As seen in figure 1.1, I created a function that would be triggered once a threshold of 2700 seconds (45

minutes). Once the trigger was sent, PhonePause would send the notification to the user, alerting them of their time usage and helping redirect their attention to a different activity.

```swift
func sendReminderNotification() {
    let content = UNMutableNotificationContent()
    content.title = "Time limit reached"
    content.body = "It's time to take a break! Go outside, drink some water, more
        resources in the app"
    content.sound = .default

    let trigger = UNTimeIntervalNotificationTrigger(timeInterval: 0.1, repeats: false)
    let request = UNNotificationRequest(identifier: "reminder", content: content,
        trigger: trigger)

    notificationCenter.add(request) { error in
        if let error = error {
            print("Error adding notification request: \(error.localizedDescription)")
        } else {
            print("Notification request added successfully!")
        }
    }
}
```

Figure 1.1 Setting the Reminder Notification

After setting up the basic notification functionality, I encountered several issues with debugging my code. I had to familiarize myself with Xcode's debugging tools, which included setting breakpoints, inspecting variables, and using the console to print out messages. Through trial and error, I was able to fix the bugs in my code and get the notifications working properly.

Figure 1.2 and 1.3 Using the XCode Simulator

I become well versed in using the XCode Simulator to visually test my code. With the simulator, I was able to build my app on different versions of iPhones and iOS platforms. This capability was helpful because I could ensure my code wasn't coupled with just one iPhone and iOS version and could work across different platforms. Through the simulator, I was also able to see my app in action and make changes to the user interface as I saw fit.

With each iteration of PhonePause, I was able to implement more functionality and gain a better understanding of both Swift and XCode. As my research has shown, the population needs to work on their dependence to screen-based technology. As a society, we suffer mentally, physically, and as a whole culture due to this overuse. Utilizing the knowledge I gained about how screen-based technology has become so addicting, I was able to curate PhonePause to a normal user's needs. While PhonePause won't be a perfect implementation of breaking the addictive cycle people have all fallen into, it is a first step in that direction.

Testing Development

At different points of app progression, I needed to ensure that the app functioned as intended. To do this, I ran a series of tests to identify potential issues or bugs and make improvements to the app. For each version of the app that I developed, I would test the app at different stages to ensure I could successfully build and run the app and see my desired app interface and functionality. I would run this test across different IPhone versions on the simulator as well.

When I first began implementing the notifications, I built and ran the app to check that PhonePause was successfully asking the user to enable push notifications. After that, I built out the code to be more robust and started developing the trigger to send the push notifications.

The first testing strategy I employed was altering the time threshold to shorter increments between 10-60 seconds. To carry out this test, I utilized the XCode simulator to run the app on a virtual IPhone device. I then built the app and executed the modified version of the app, with the new time thresholds in place. During the test, I had the app print to the console when the notification trigger was hit.

One of the struggles I faced while testing was receiving notifications within the simulator. I was able to receive notifications a handful of times, either through Firebase Cloud Messaging, a third party vendor owned by Google to assist with cloud messaging APIs, or through the trigger being hit. It is important to note that FCM is used for remote notifications while local notifications can be handled within the code itself without third party help. I originally set up notifications to be sent through FCM and quickly realized I should use local notifications instead since the app has no need to depend on outside variables. However, every time the notification successfully sent through the app, it was delayed by minutes—if it was able to be received at all. The frustrating part of this setback was that the time threshold trigger was setting off the successful message to be printed in the console, so I knew that it was a problem with the code, but rather a problem with the simulator receiving notifications.

Due to this issue, I redirected my testing strategies to be based on the print statements that I made to the console. This way, I didn't have to depend on the faulty

notification interactions with the simulator and rather focus on the output I was able to continuously receive.

Overall, testing the app was a crucial part of the development process. Through testing, I was able to identify issues and make improvements to the app's functionality and performance. While setbacks and challenges arose during testing, the iterative process allowed me to continue making progress and ultimately achieve the desired outcome.

PhonePause

There is a simple flow of operations that PhonePause follows. To begin, the user must have PhonePause open in either the foreground or the background. During this time, the user is able to continue normal use of their phone. The app has a continuous timer running with a trigger set at 2700 seconds (or 45 minutes). Once the trigger is hit, two action items are set off. First, a notification gets sent out to the user alerting them of their time use on their phone and redirecting their attention to different activities they could turn their attention to. Second, there is a refresh of the suggested activities displayed on the app's main screen. In PhonePause's code, there is a list of 56 activities that the user could spend time doing instead that rotates along with the 45 minute trigger and displays 7 new hobbies at a time.

Similar App Comparisons

Within iPhones, there is functionality built in trying to deter users from staying on one app for too long. A user is able to set a time limit for any particular app. Once the user has been on that app, either continuously or over increments of time, the user is locked out of the app. All the user has to do to ignore or extend the timer is to enter a password. This functionality was originally intended for Parents to be able to control their child's screen time.

This approach is similar to PhonePause's functionality. However, the main difference is that Phone Pause tracks continuous time across the entire device rather than increments of time in one particular app. One of the main issues found with iPhone's approach is that a user would be able to hop from app to app as the time limits set in. PhonePause prevents this work around by tracking all apps usage rather than one particular app.

Another similar app is Forest: Focus for Productivity. Forest's approach is to provide incentives to the user to stay off of their device. The user can grow trees or plants which turn into entire forests and parks with enough phone break sessions. The user only gets to keep the plant if they successfully stay off of their phone for a set time goal. If the user goes back onto their phone during that time period, they lose their plant. Contrasting to PhonePause, instead of keeping track of device usage and then telling the user to take a break, Forest attempts to keep the user off the phone for extended periods of time.

Together, these two apps could create a huge impact on the user's relationship with their phone. PhonePause allows the user to be on their device for a set amount of

time and then redirects the user's attention and Forest then helps encourage the user to stay off of their phone and try out one of the activities that PhonePause suggested. Screen-based technology is only growing in accessibility and it's important to develop a healthy balance between utilizing devices and taking breaks from them. Together, PhonePause and Forest could achieve just that.

Results

While I was unable to test the actual implementation of PhonePause, over the past year I have integrated the premise of the app into how I use my phone. I set timers for myself to track how long I had been on my phone and alert myself when I should take a break. By implementing this method I was able to hold myself accountable and it kept me grounded in my device usage. I'm very familiar with falling down a social media rabbit hole and losing track of time. With the timer going in the background, I was able to enjoy being on my phone as a destresser without wasting my day away on it.

Over the summer, this method was particularly helpful. Without a set routine like while in school, it's easy for students to spend absurd amounts of time on screen-based technology. On the other hand, I was able to bring my screen time down from an average of nine hours a day to around five hours, almost a 50% decrease. I utilized my new found free time to focus on hobbies that I didn't have time for during the school year. I felt productive all summer long while still being able to use my phone and other screen-based technology in a healthy manner.

However, there was a lapse in effectiveness when school started back up again. With the added stress of classes and work, I found myself turning to technology as a

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destresser or outlet when I needed a break. I had to reframe my mind set, once again, and set up a system where I was able to use my phone in a methodical way. I continued setting timers for myself which helped me consume content in a mindful way. From this experience, implementing an option to reset the timer in a "snooze" fashion would be a good addition. In the future, I would also like to implement an option for users to choose what time increment they want for their notification trigger.

Conclusion

In conclusion, screen-based technology has undoubtedly had a significant impact on society, both positive and negative. On the positive side, technology has made many tasks easier and more efficient, and has allowed for greater connectivity and communication. However, there are also negative consequences associated with technology use.

In terms of societal impact, screen-based technology has led to increased isolation, a decrease in face-to-face communication, and a growing addiction to technology. The addiction to technology has had a profound effect on individuals, leading to mental health issues such as depression, anxiety, and sleep disturbances. Moreover, technology use has also had physical impacts on individuals, particularly on the younger generation, who are experiencing negative impacts on their eyesight and posture.

Despite these concerns, screen-based technology continues to play an increasingly prominent role in society, and it is unlikely that this trend will reverse. As

such it is crucial that individuals, educators, and policymakers alike recognize the potential consequences of technology use and work towards finding ways to mitigate these negative effects. The creation of PhonePause was geared towards breaking our cyclical use of screen-based technology. It acts as a reminder that there are other more beneficial and worthy activities to spend our time on rather than our endless days of screen staring.

Overall, the impact of technology on society is complex and multifaceted, and will continue to evolve as technology itself advances. It is essential that as a society, we remain aware of the potential risks and benefits of technology, and work together to find ways to maximize the positive impacts while minimizing the negative consequences. Hopefully, PhonePause lives up to its name and allows its user to pause from their phones and break the cycle.

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