Using Mobile Device Features to Reduce Problematic Mobile Device Usage
(Technical Topic)

Changing Cultural Norms Surrounding Excessive Device Usage
(STS Topic)

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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

As our daily lives become increasingly digitized, excessive amounts of screen time becomes increasingly common. Some are reporting daily averages as high as 7 hours per day, even while immersed in the fast paced environment of medical school (Liebig et al, 2023, p. 1). While this pastime has become increasingly normalized amongst the general population, many have overlooked the negative effects that arise with its adoption - excessive screen time has been found to be highly associated with negative mental outcomes such as depressive symptoms (Forte et al, 2023, p. 2313) and disrupted sleep (Liebig et al, 2023, p. 1), necessitating a clear need for change as more and more users are affected by this phenomenon. And yet, this issue is only becoming more problematic and prevalent as devices become more accessible and used by increasingly younger portions of the general population.

Increased screen time among children has been found to negatively impact sleep duration and parental control (Bertrandias et al, 2023, p. 280), stifling their development in ways that are measurable but also threatening their futures in ways not yet known. Promising results have emerged in studies where users addressed their problematic usage via device settings and screen time trackers (Holte et al, 2023, p. 6778), suggesting that developing a mobile application that manages the ways in which users interact with their mobile devices can reduce problematic usage and its associated negative effects (technical topic). Additionally, in order for users to take action towards reducing their screen time, they should understand what constitutes problematic device usage and its associated adverse effects (Forte et al, 2023, p. 2313). It is essential to disseminate this information (potentially via advertisements and campaigns) to help advise the general public towards developing better habits regarding the use of mobile devices (STS topic).

Technical Topic: Using Mobile Device Features to Reduce Problematic Mobile Device Usage

While the technology necessary to create an application that assists users in reducing their screen time already exists, it has yet to be fully taken advantage of. Apple and other device manufacturers already provide methods of tracking screen time use — via pre-installed software such as Screen Time (Zimmermann and Sobolev, 2023, p. 42) — in hopes of providing users with metrics with which they can use to reduce problematic usage. Apple also provides app developers with methods of blocking specific mobile applications through published apps, according to their online documentation for the Apple Developer API (Apple). However, Screen Time is not always a very effective method of combating problematic screen time, and the blocking feature offered by Apple's API is yet to be widely adopted by third-party applications. As such, there remains opportunity to develop a more restrictive application and promote its benefits in hopes of its adoption by those struggling with excessive screen time. Such an application would directly battle the current trend of developing technology and its associated problematic use, highlighted by the increasing number of screen addiction cases in recent years.

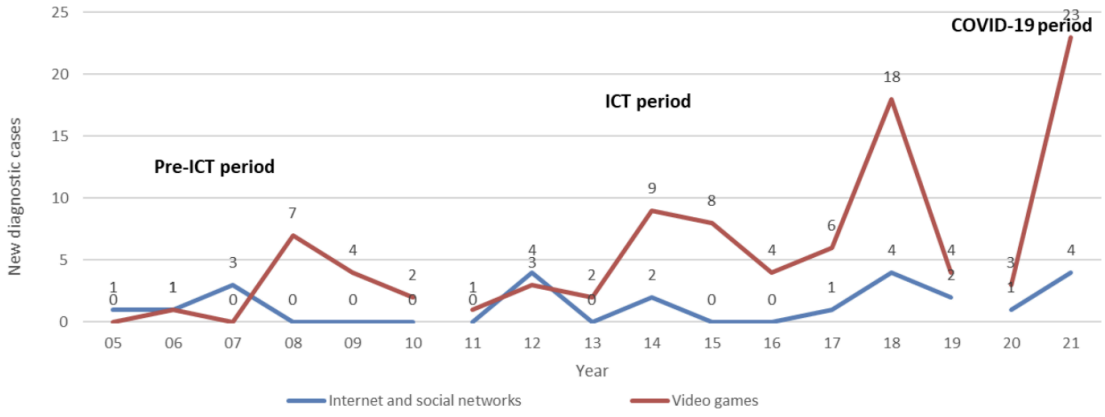

Figure 1: Evolution of Screen Addiction Cases Over Time. The number of new cases per year of screen addiction managed at a Behavioral Addictions Unit between 2005 and 2021 (Aragay et al, 2024, p. 5). ICT refers to information and communication technologies. The graph clearly indicates a rise in cases of screen addiction during the years when mobile devices became increasingly common amongst the public.

The development of mobile device technology, while providing social networking and mobile gaming to the general population, has steadily encouraged growing misuse. As mobile device technology has developed over time, the number of cases related to screen addiction has increased alongside it, as shown above (Aragay et al, 2024, p. 1). Daily screen time usage has become excessive (with some users experiencing averages near 7 hours a day), and this excessive use is taking a toll on the health of device users, particularly in sleep time and quality (Liebig et al, 2023, p. 1), which in itself has adverse health effects. Thus, more needs to be done to limit the development of problematic mobile device usage in order to reduce its adverse effects.

The work of developing a more restrictive application will build off the work of parental control software (Bertrandias et al, 2023, p. 280) and the altering of mobile device settings to reduce stimulating usage - such as the grayscale setting on mobile devices, a feature that forces the device to display everything in black & white instead of color - (Holte et al, 2023, p. 6778), alongside guidance surrounding screen time usage (Zalaznick, 2020, p. 24) with the goal of producing a mobile application that blocks addicting applications during specified hours and guides users towards healthy screen time habits. Parental control software provides a template for such an application - if daily time limits and designated blocking hours for certain applications work in reducing problematic use amongst the children of parents that have employed such systems, then similar systems could be used to self-regulate. Additionally, Holte (2023) found in his team's study that "Participants who had their phones in grayscale exhibited a significant decrease in PSU, anxiety, and screen time" (p. 6778). The adoption of the grayscale settings alongside the use of screen time tracking applications not only further suggests that the method of intervention can be housed on the problematic device, but also that a desire exists to

regulate problematic behavior as well. Furthermore, for users that are not aware of what constitutes problematic use, mobile advertising and other forms of guidance can be utilized to encourage the adoption of such an application, especially if the reduced risks and additional benefits of reducing problematic screen usage are properly communicated. Advertisements for such an application can model the U.S. Designated Driver Campaign (a successful attempt at popularizing the adoption of designated drivers amongst people that drink outside of their homes (Harvard School of Public Health, 2021)) in hopes of advocating for the application's potential benefits. The resulting application will allow users to specify which installed applications are problematic and during what hours of the day they should be blocked. The application will restrict users from accessing said apps during the specified hours, reducing problematic use via direct intervention by utilizing Apple's Developer API to block said apps during said hours (Apple). Additional features, such as screen time reports for those not on Apple devices can prove effective in helping users self monitor their change in habits. Ultimately, the application and its advertisements can utilize existing technologies and strategies to help reduce problematic device usage amongst the population at an individual level, though more research is needed to determine the best course of action for directly preventing such use.

STS Topic: Changing Cultural Norms Surrounding Excessive Device Usage

Like many users of the exciting technologies that have come before, a vast majority of today's mobile device users indulge in the technology's utility without considering the long term ramifications of such use. As stated earlier, higher levels of phone usage is associated with poor mental health outcomes, such as depressive symptoms (Forte et al, 2023, p. 2313). The lack of awareness surrounding these negative effects, alongside the increasing accessibility and affordability of this technology, has led to these devices finding their way into the hands of

children, not just adults. As such, excessive screen time is an issue that has become increasingly prevalent amongst the younger generation, and can be attributed to a number of factors. The integration of social media into pursuing social gain and the adoption of mobile devices to perform everyday tasks has led adolescents to get carried away and spend excessive amounts of time online, while also contributing to consequences such as addiction, depression, and anxiety (Al-Samarraie et al, 2022, p. 2315).

These negative consequences are not solely short term; specialists in the field are uncovering ways in which device usage impacts developing childrens' futures. Arising concern about the negative developmental effects of screen time use on children sparked recent studies revealing the negative impacts device use has on sleep quality and duration, parental control (Arai et al, 2023, p. 668-669), and especially the detrimental psychophysical effects of problematic use. One study in particular utilized MRI and cognitive testing to study the ways in which digital media affected brain development amongst pre-school children, uncovering underdevelopment amongst those that were more exposed to screens at a young age.

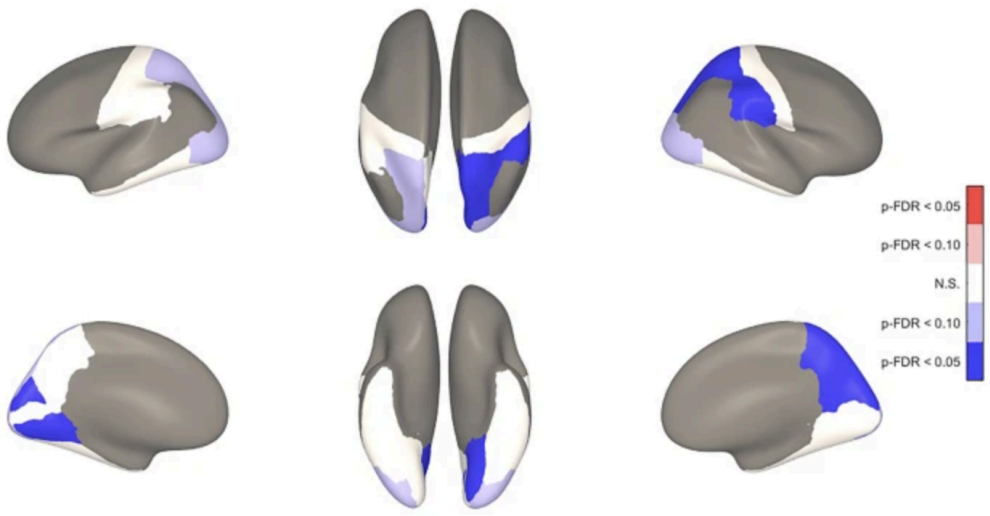

Figure 2: Brain Underdevelopment Amongst Mobile Device Users. Higher ScreenQ scores (higher levels of digital media use) correlate to lower cortical thickness (blue) amongst children exposed to digital media during development (Hutton et al, 2022, p. 8), showing clear underdevelopment amongst children using devices during development.

It is evident that knowledge surrounding the negative effects of screen use amongst children needs to be disseminated to the general population in order to promote change in social norms. In hopes of educating the public about the adverse effects of problematic device usage and how to develop healthy habits that avoid detrimental use, this project will build off of work related to the development of screen addiction (Al-Samarraie et al, 2022, p. 2315) guidance surrounding screen time usage (Zalaznick, 2020, p. 24), and the successful popularization of the idea of the "designated driver" via the U.S. Designated Driver Campaign (Harvard School of Public Health, 2021). In terms of altering social norms, the U.S. Designated Driver Campaign was a 1988 movement that sought to popularize the idea of the "designated driver" (which was already commonplace in Scandinavia) through dialogue in popular entertainment shows as well as public-service advertising. The movement highlighted the risks posed by problematic device usage (in this case, operating a motor vehicle while intoxicated) resulting in widespread acceptance and popularity of the new norm (with fatalities related to drunk driving declining by 30% (Harvard School of Public Health, 2021)) thus providing an intriguing blueprint for changing social norms surrounding problematic screen time usage. However, more work needs to be done to determine whether such methods would be as effective today, especially since the detrimental effects of screen time usage are long term negative mental health outcomes rather than direct fatalities. In terms of regulation, some educational institutions have already implemented policies encouraged to reduce students' screen time, with one institution reporting that "Students report feeling more content, focused and refreshed, and this led them to also reduce their use of phones and social media outside school" (Zalaznick, 2020, p. 24). Yet, more research can better uncover the effectiveness of these policies and whether or not the change in student habits will continue during the periods when they are no longer in school.

Furthermore, just as high levels of phone use are strongly correlated with depressive symptoms, physical activity is found to be inversely associated with said symptoms (Forte et al, 2023, p. 2313). Thus, encouraging the youth to spend time indulging in physical activity as opposed to digital surfing can help to prevent the negative mental health outcomes arising today. In fact, poor mental health contributes directly to the development of the chronic overuse of digital devices (Al-Samarraie et al, 2022, p. 2315), and thus by addressing the problem early on in one's lifetime, prevention techniques may produce compounding benefits over time. However, it remains unclear whether the time freed via reduced screen time will be filled with beneficial activities such as outdoor play, or whether it will be replaced by other problematic habits. Ultimately, more work needs to be done to discover the best course of action for shifting the cultural norms surrounding excessive screen time, though the previously mentioned studies provide exciting potential methods and effects of doing so.

Conclusion

This project aims at developing a mobile application that limits problematic device usage, and the accompanying STS research will provide insight into how to successfully disseminate the negative effects of excessive screen usage in hopes of changing cultural norms. The successful creation and implementation of this mobile application amongst people experiencing problematic use will ideally result in reduced mobile device usage, in turn reducing negative mental health outcomes and encouraging better habits amongst the populous and especially developing individuals. With the development of these deliverables and the proper disbursement of information surrounding the consequences of problematic mobile device usage, there is potential for societal norms to shift towards healthier screen time averages, protecting not only the wellbeing of the current populace but future generations as well. (2056 words)

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