Social Media Addiction: Effects on Users and How Companies Can Right Their Wrongs

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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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I.   Introduction

As we move through our lives, the most common complaint by people who try to pick up a hobby, read more books, or try to do a new skill is that they don't have enough time. In 2023, the average time spent on screens per day is 6 and a half hours (Binns & Dyson, 2023). The largest sector of these statistics was smartphone usage, encompassing nearly 60% of the total. The most common type of app people turn to on their phones tends to be social media. Whether it's Facebook, Instagram, TikTok, or YouTube, they always have us coming back. This overconsumption of social has dire consequences for people's mental health, especially adolescents and children in their developmental years. The companies themselves can reduce this harm by reducing the addictive effects of their applications.

To analyze this phenomenon, I will be using Actor-Network theory as a framework for my research. This theory looks at human and non-human actors and analyzes how they interact with each other(Crawford, 2020). One category is the users of the social media apps. We'll dive into the consequences of overconsumption of social media in the first section. The second actor we'll analyze is the social media companies themselves. I'll introduce you to the attention economy, which is the profit metric social media companies use to increase their revenue. The last actor is researchers and those who speak out against these companies, like Sean Parker, one of the first Presiden't of Facebook. We'll see how these individuals show us how social media companies keep people addicted to their product, their motives behind it, and possible ways to fix this issue.

II. Motivations and effects of digital addiction

Social media, in a broad context, involves anything online that involves some sort of social interaction to take place among individuals in a digital setting. Since the inception of social media platforms, they have been a tool for people to keep in touch with friends and family, advertise projects people had going on, and all sorts of things. These positive aspects of the platforms, however, have come with many downsides for the users involved. One downside has been labeled as digital addiction. This broad term also encompasses people spending too much time watching television or being on a computer, but the concern for this addiction arose from the widespread use of social media platforms, like Facebook, in 2013 and with the invention of the smartphone. As the name suggests, and as written in the DSM 5, an addiction is something that impairs the ability to perform major goals at your job or school and decreases the amount of time one spends doing recreational, social, or job activities(Association, 2013). The user's group, within Actor Network Theory are the ones facing the brunt of this social media addiction. They have become engrossed in their devices because of the companies running these platforms, but that will bediscussed later. Many studies have seen these negative effects occur wihtin their studies on social media use. One of which is a survey from Wolniewicz et al. ,where the participants have reported a large loss of productivity at their jobs due to their social media use(2017).Their overuse of the platforms is fueled by widespread feelings of the fear of missing out(FOMO) leading to large amounts of anxiety and higher levels of depression amongst the participants.

What is interesting is how an individual's personality traits relate to what platform they use for social media the most. Those who are high in introversion and have higher social anxiety gravitated towards YouTube, particularly because the vloggers and people posting videos fulfill the social needs of the user through a parasocial relationship(Berail et al., 2019). On the other hand, people who were high in extraversion drifted towards social networking sites like Instagram and

Facebook. People's motivation to use social media also had a drastic effect on whether or not their social media use had negative effects on the user.

In terms of productivity, smartphones have had a large contribution to its decrease in lots of individuals. In a study conducted by Duke and Montag, a website was created that had a questionnaire for people to answer questions about their social media use, smartphone ownership, the number of hours they spent on their phones during the week, and how their productivity has been affected by their phone usage(2017). At the conclusion of Duke and Montang's study, there was a negative correlation between smartphone usage and productivity, along with having a negative effect on their lives. The study was conducted through a survey, in which the researchers noted that the numbers that the participants who used their phones were probably skewed more towards the higher end. Either way, they concluded that despite this possibility, the correlation would still be present in the participants. This conclusion is backed by Wolniewicz et al., who found a high level of Fear of Missing Out (FOMO), which is described as the anxiety caused by the thought of potentially missing out on large events with those close to them, like family or friends (2017). With this increase in FOMO, there is a clear reason why people's productivity has plummeted. People's focus has moved from their work and pivoted into worry about social endeavors.

Similarly to excessive social media use bringing a loss in productivity, it also brings a lot of anxiety and depression along with it. A study conducted by Yon Sohn et. al conducted a literature review of over 9 databases of psychiatry studies and looked into the effects that social media had on the populace, particularly children and young adolescents(2019). The researchers found through their review that one in four children or young adolescents have a level of smartphone usage that falls under the definition of addictive behavior. The individuals with this elevated phone use also

had more symptoms of detrimental mental health, like anxiety, elevated levels of stress, and poor sleep (Yan Sohn et al., 2019). This further supports the notion of excessive social media use being detrimental to one's mental health and well-being, especially in the younger population.

When it comes to why users use social media, the motivations vary widely from person to person. In a study by Berail et al., a survey was disseminated among Facebook groups targeting French university students about their YouTube usage and their levels of social anxiety(2019). From the survey they gave, they found that there was a large correlation between those who had high social anxiety and those same people who spent more time on YouTube. The researchers discussed how the participants who had high social anxiety were forming strong parasocial relationships with the Youtubers that they viewed online, fulfilling their need for the social connection they were lacking otherwise. In contrast, those with high extroversion were drawn towards social networking sites (Seidman, 2013). This contrast makes sense, as those with high extroversion are trying to keep up with people they made connections with outside of social media, whereas those with high social anxiety need these connections to be formed. YouTube is a unique medium in this way, as people regularly share their thoughts and their lives in long-form content, whereas most social networking sites, like Instagram and Facebook, are small segments parsed together.

By far though, the most common motivation for people to use social media is to cure boredom. A study by Stockdale and Doyne asked how motivations to use social media changed over time and how it affected the participants in the long term(2020). The two main motivations for using social media were finding information and curing boredom. When it came to those who were seeking information, there were no negative psychological effects seen throughout the three years. Those who were using social media to cure boredom, on the other hand, saw several

negative psychological effects associated with social media: depression, increased anxiety, and poor self-image. As seen from this study, the results show that using social media to cure boredom is very likely the cause of negative symptoms. When you stop to consider how you use social media today, it would probably be to cure a mild amount of boredom. I'll admit it, while writing this paragraph, I've checked my phone about 4 times.

Social media use isn't all bad though. There is an anthropological study by Sutton, where a digital detox retreat in California was studied to analyze the socially constructed nature of these platforms(2020). The camp involved individuals not using technology for a weekend and did various activities in nature to focus on building relationships with those around them at this camp. This fostered camaraderie that continued after the retreat as the group kept in touch on Facebook and held each other accountable for the usage goals they set at the camp (Sutton, 2020). After the camp, Sutton saw very different ways the camper's approached their social media:

> "While one detoxer installed the iPhone lock screen asking 'Do you really need to check?', another stuck a printed out image of the Camp Grounded founder next to their laptop, to remind them to use the device 'with intention' as opposed to 'mindlessly scrolling' and forgetting their own goals"(Sutton, 2020).

The common thread between these approaches is the reminder in motivation in using their app. Behind both approaches is to become more mindful in their approach to social media and move away from the mindless scrolling to cure boredom seen by Stockdale and Doyne.

III. How Companies and Programmers can help

In the year 2024, it is evident to most individuals that social media has an addictive quality. Everyone, at one point, has caught themselves "doom scrolling" on Instagram or TikTok so much that when they do check the time tens of minutes to potentially hours have passed. Within Actor Network Theory, these companies are the ones with all the influence on how these apps are made, and decisions with its design.They have a direct influence on the user's on these apps through their

design decisions, like Infinite Scroll, content recommendations, and notification timing. If anecdotal evidence doesn't convince people of the addictive quality of social media, they can turn to Sean Parker. Parker was the first president of Facebook and is quoted in an interview with Axios, an online news website, as saying the thought process behind the creation and model of Facebook is, "How do we consume as much of your time and conscious attention as possible"(2017). Sean says they achieved this through, a "little dopamine hit every once in a while because someone liked or commented on a photo or a post"(2017). He doesn't go in-depth on how Facebook specifically timed these notifications or how they constructed the code of the site to achieve their goal, but he does acknowledge Facebook was aware they were using people's attention as a commodity.

One physical implementation that one can find on Facebook and many other social media sites is the invention of Infinite Scroll. Infinite Scroll utilizes Javascript in the webpage that detects when the user reaches the bottom of the screen. When the website detects this, it triggers an event in the code and adds more data from a preloaded data object. Afterward, it adds new elements to the screen, like more posts or potential profiles, making it seem like new content spontaneously disappeared (Interactive Design Foundation,2023). Similar to how Sean Parker talked about the little hits of dopamine, this feature gives consistent novelty to the user, keeping them on the site for longer, which the Interaction Design Foundation, a 17-year-old organization dedicated to providing open-access education to UI/UX design, acknowledges in their article on how Infinite Scroll works: "While infinite scrolling increases time spent on sites, it is also responsible for creating addictive experiences"(2023). Youtube has a similar property where the next video will play automatically, and give recommended videos based on what you are watching. The combination of these two features operates the same as infinite scroll, where the amount of time to continuously

get novel content is decreased,creating more engagement with the applicaiton. Other tactics used by these apps to keep people engaged in viewing more content include snap streaks on Snapchat, where the number for a "streak" shows how many days you've gone communicating with a particular person. Other strategies include notifications on the app, like if your profile got tagged in a post or if someone sent you a message through the built-in messenger. When it comes to notifications, experts believe that they use the same concept they use for slot machines in Las Vegas: variable rewards (Brooks, 2018). Variable rewards are small sporadic rewards given after not having one for a long time, to get a hit of dopamine for the brain and keep the person coming back to seek out this reward. In terms of the apps themselves, they hold notifications on likes from recent posts, someone tagging your profile, or a message and send it out in calculated bursts so you continuously come back to the app (Brooks, 2018).

With all these features that companies have added to keep people addicted to the app, what are ways companies can right their wrongs? The first, and most obvious one, is to have a setting to limit the daily activity for the app. Both Instagram and YouTube provide this ability, but it is buried away from the normal flow of the app and is not advertised to the user ever. When searching the Internet, users can find tutorials to find out how to limit their usage of the apps using their proprietary in-app settings (Baxter, 2022). The need to dive into the internet to find the solution on how to use these settings defeats the purpose of having these settings. But as Sean Parker said before, these companies operate as one's attention is their main commodity(2017). To better utilize these settings, these apps should include them within the tutorial on how to use the app when one first downloads it and to current users so they are aware of their current settings.

To tackle the issue of Infinite Scroll, the companies should implement the option to have a paginated feed as opposed to one with Infinite Scroll. Pagination is the way pages are laid out in

Google, where the results have a set height for the page and there are multiple pages one has to flip through to find all their results (Interaction Design Foundation, 2023). As described by the Interaction Design Foundation, a downside of pagination requires more clicks and interaction to move through than infinite scroll does, but this is precisely why social media sites should give users this option. Flipd is a productivity app that allows users to pause the timer they have within the app, but it stops the timer when they open another app without pausing the timer first. If an app is to be launched from the lock screen, your session is paused, and you must manually resume it. When describing the app, a writer from WIRED described the process, "Flipd's pause feature introduces friction and mindfulness to an otherwise mindless and friction-free reflex, giving users a moment to consider what they're doing and why"(Gonzalez, 2018). Introducing this mindfulness and interruption of doom scrolling to social media apps is the reasoning behind paginating the content. Adding more clicks to view more content can discourage continual usage of the app.

A potential third way companies can contribute is by making a widget that gives feedback on users within the app. Two researchers from Italy, Roffarello and Russia (2023), conducted a study using an app they developed called TheNudge. This app keeps track of the amount of screen refreshes one would have on Facebook or Instagram where the Javascript for Infinite Scroll would take place (2023). The image for the widget was a gauge, similar to a speedometer, except there were three color-coded sections. Green was to denote you haven't refreshed the page, or maybe once. Yellow showed multiple refreshes, and the red section showed you refreshed a lot, and probably should take a break(Roffarello & Russia, 2023). The users within the study showed that this app gave them the sense they had more self-control and conscious use of their social media use. The development of this app for the study shows that this is entirely possible to include within the large code set for these social media sites. The gauge doesn't

necessarily have to be the metric used by these companies, but some visible display of their activity on the screen would give users this sense of control over their usage, instead of being held hostage by the dopamine-prone features these companies have developed.

IV. Conclusion

Through Actor-Network theory, we can see the drastic effect social media companies have had on the general populace. Companies' design choices in their applications, like Inifinte scroll, notification timing, and recommending new content. These decisions has led to a populace with higher rates of depression, FOMO, and lower rating of self-image. This lays directly on the company and how they operate on the "attention economy" as their primary business model. Moving forward, companies need to give options to turn off these addictive features on their apps by introducing pagination, or adding a feature give the user feedback for their activity for that current session within the app. For the users, they need to gather together and petition these companies to alter their apps, or go to their local representatives to propose legislation limiting what addictive properties can be within these apps. This seems like a drastic decision mirroring that of prohibition in the early 1920's, but there isn't any incentive for these companies to change unless they are forced.

In further research in this area, one should look into more feature oriented ways to decrease the consumption of social media. Most of the research on social media addiction focus on the effects consumption of social media has on the user group, and doesn't turn to ways to try to break this cycle of usage form an application perspective. The only example I found is that of TheNudge, where feedback of the user is displayed in the corner of their screen. Other than this, all the focus is on the psychological effects of this usage.

References

Adam, J. M., Angeline. (n.d.). *Table 3, DSM-5 Diagnostic Criteria for Diagnosing and Classifying Substance Use Disorders [abc] - Substance Use Screening and Risk Assessment in Adults - NCBI Bookshelf*. National Center for Biotechnology Information. Retrieved March 25, 2024, from https://www.ncbi.nlm.nih.gov/books/NBK565474/table/nycgsubuse.tab9/

Allen, M. (2017, December 15). *Sean Parker unloads on Facebook: "God only knows what it's doing to our children's brains."* Axios; Axios. https://www.axios.com/2017/12/15/sean-parker-unloads-on-facebook-god-only-knows-what-its-doing-to-our-childrens-brains-1513306792

Al-Samarraie, H., Bello, K.-A., Alzahrani, A. I., Smith, A. P., & Emele, C. (2021). Young users' social media addiction: causes, consequences and preventions. *Information Technology & People*, *7*, 2314–2343. https://doi.org/10.1108/itp-11-2020-0753

Andersson, H. (2018, July 3). *Social media apps are "deliberately" addictive to users*. BBC News. https://www.bbc.com/news/technology-44640959

Association, A. P. (2013). *Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)*. American Psychiatric Pub.

badges, W. 58022. (n.d.). *firefox - Can I disable infinite scroll on Facebook? - Super User*. Super User. Retrieved March 25, 2024, from https://superuser.com/questions/1442437/can-i-disable-infinite-scroll-on-facebook

Baxter, D. (2022, February 23). *How to limit your Instagram usage on iOS and Android | TechRadar*. TechRadar; TechRadar. https://www.techradar.com/how-to/how-to-limit-your-instagram-usage-on-ios-and-android

Becker, S. P., & Lienesch, J. A. (2018). Nighttime media use in adolescents with ADHD: links to sleep problems and internalizing symptoms. *Sleep Medicine*, 171–178. https://doi.org/10.1016/j.sleep.2018.06.021

Bekalu, M. A., McCloud, R. F., & Viswanath, K. (2019). Association of Social Media Use With Social Well-Being, Positive Mental Health, and Self-Rated Health: Disentangling Routine Use From Emotional Connection to Use. *Health Education & Behavior*, *2_suppl*, 69S-80S. https://doi.org/10.1177/1090198119863768

Binns, R., & Dyson, M. (2023, September 5). *Screen time statistics 2024 | The Independent*. The Independent | Latest News and Features from US, UK and Worldwide; Independent Advisor. https://www.independent.co.uk/advisor/vpn/screen-time-statistics

Brooks, J. (n.d.). *7 Specific Tactics Social Media Companies Use to Keep You Hooked | KQED*. KQED | News, Radio, Podcasts, TV | Public Media for Northern California. Retrieved March 25, 2024, from

https://www.kqed.org/futureofyou/397018/7-specific-ways-social-media-companies-have-you-hooked

Busch, P. A., & McCarthy, S. (2021). Antecedents and consequences of problematic smartphone use: A systematic literature review of an emerging research area. *Computers in Human Behavior*, 106414. https://doi.org/10.1016/j.chb.2020.106414

de Bérail, P., Guillon, M., & Bungener, C. (2019). The relations between YouTube addiction, social anxiety and parasocial relationships with YouTubers: A moderated-mediation model based on a cognitive-behavioral framework. *Computers in Human Behavior*, 190–204. https://doi.org/10.1016/j.chb.2019.05.007

Crawford, T. H. (2020). Actor-Network Theory. *Oxford Research Encyclopedia of Literature*. https://doi.org/10.1093/acrefore/9780190201098.013.965

Duke, É., & Montag, C. (2017). Smartphone addiction, daily interruptions and self-reported productivity. *Addictive Behaviors Reports*, 90–95. https://doi.org/10.1016/j.abrep.2017.07.002

Griffiths, M. D., Pontes, H. M., & Kuss, D. J. (2016). Online Addictions: Conceptualizations, Debates, and Controversies. *Addicta: The Turkish Journal on Addictions*. https://doi.org/10.15805/addicta.2016.3.0101

How to set daily time limit for Instagram app - India Today. (n.d.). India Today; India Today. Retrieved March 25, 2024, from https://www.indiatoday.in/technology/tech-tips/story/how-to-set-daily-time-limit-for-instagram-app-detailed-guide-1927710-2022-03-21

Jovicic, S. (2020). Scrolling and the In‑Between Spaces of Boredom: Marginalized Youths on the Periphery of Vienna. *Ethos*, *4*, 498–516. https://doi.org/10.1111/etho.12294

Marketing, S. (2017, March 10). *How to growth hack social media algorithms | by Skyscanner Marketing | Medium*. Medium; Medium. https://medium.com/@Skyscanner/how-to-growth-hack-social-media-algorithms-7b334161ad04

Nast, C. (n.d.). *WIRED - The Latest in Technology, Science, Culture and Business | WIRED*. WIRED. Retrieved March 25, 2024, from https://www.wired.com/auth/refresh-redirect?redirectURL=https%3A%2F%2Fwww.wired.com%2Fstory%2Ftristan-harris-tech-is-downgrading-humans-time-to-fight-back%2F

Patterson, D. (2016). Design for Happiness - Positive Psychology Through Social Media Games. In *Serious Games* (pp. 134–139). Springer International Publishing. http://dx.doi.org/10.1007/978-3-319-45841-0_12

Roffarello, A. M., & De Russis, L. (2023). Nudging Users Towards Conscious Social Media Use. *MobileHCI '23 Companion: Proceedings of the 25th International Conference on Mobile Human-Computer Interaction*. https://doi.org/https://doi.org/10.1145/3565066.3608703

Schivinski, B., Brzozowska-Woś, M., Stansbury, E., Satel, J., Montag, C., & Pontes, H. M. (2020). Exploring the Role of Social Media Use Motives, Psychological Well-Being, Self-Esteem, and Affect in Problematic Social Media Use. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2020.617140

School, E. B. & L. (2020, February 10). *Should Social Media Platforms Be Regulated?* Forbes; Forbes.
https://www.forbes.com/sites/esade/2020/02/10/should-social-media-platforms-be-regulated/?sh=3eb5d6c33703

Shabahang, R., Zsila, Á., Aruguete, M. S., Huynh, H. P., & Orosz, G. (2024). Embrace the Moment Using Social Media: A Cross-Cultural Study of Mindful Use of Social Media. *Mindfulness*, *1*, 157–173. https://doi.org/10.1007/s12671-023-02271-9

Sohn, S. Y., Rees, P., Wildridge, B., Kalk, N. J., & Carter, B. (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: a systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry*, *1*.
https://doi.org/10.1186/s12888-019-2350-x

Stockdale, L. A., & Coyne, S. M. (2020). Bored and online: Reasons for using social media, problematic social networking site use, and behavioral outcomes across the transition from adolescence to emerging adulthood. *Journal of Adolescence*, *1*, 173–183.
https://doi.org/10.1016/j.adolescence.2020.01.010

Sutton, T. (2020). Digital harm and addiction: An anthropological view. *Anthropology Today*, *1*, 17–22. https://doi.org/10.1111/1467-8322.12553

Throuvala, M. A., Griffiths, M. D., Rennoldson, M., & Kuss, D. J. (2021). Perceived Challenges and Online Harms from Social Media Use on a Severity Continuum: A Qualitative Psychological Stakeholder Perspective. *International Journal of Environmental Research and Public Health*, *6*, 3227. https://doi.org/10.3390/ijerph18063227

What is Infinite Scrolling? | IxDF. (2023, December 28). The Interaction Design Foundation; Interaction Design Foundation.
https://www.interaction-design.org/literature/topics/infinite-scrolling

Wolniewicz, C. A., Tiamiyu, M. F., Weeks, J. W., & Elhai, J. D. (2018). Problematic smartphone use and relations with negative affect, fear of missing out, and fear of negative and positive evaluation. *Psychiatry Research*, 618–623. https://doi.org/10.1016/j.psychres.2017.09.058