[Module 2] Deliverable A
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Step One: Identify 6 mobile applications based on the following criteria.

- The application should be popular among your peers
- The application should be data-driven (meaning it should use data to make a decision)

Gmail, YouTube, Instagram, Pinterest, TikTok, ChatGPT

Step Two: Pick 3 applications from your list. For each application:

- Describe how it uses data to make decisions (1 paragraph).
- Describe at least one challenge with how the application uses data (1 paragraph).

1. Gmail

Gmail makes decisions in the communication it prioritizes for users. It does this by analyzing the content of an email and the sender. It also analyzes user response to such emails in the past. For example, it automatically filters for mail categories such as Primary, Promotions, Social, and Spam. This can decide whether or not the user sees a message and the amount of focus a user gives a message. In order to make these distinctions, Gmail needs to assume what users want to see and what is important to them. Although Gmail is able to generally follow a trend in filtering, sometimes incorrect categorizations can lead to dangers in user security or important information being hidden from users. For example, there can be cases where Gmail puts important messages into spam or allows real spam messages to go into the inbox. In addition, Gmail needs to make decisions about user priorities which may or may not align with actual user intentions. For example, emails from brands tend to be categorized under promotions, which are less visible than emails in inbox. Gmail is making the assumption that shopping-related emails or emails from brands users are subscribed to are less important. This may be a challenge to users who do not think the same way that the algorithm is designed.

2. YouTube

YouTube makes decisions about content to recommend to users depending on content they have viewed previously, likes, comments, views, subscribed channels, time spent viewing content, and other similar metrics. The application also likely makes demographic assumptions about the user based on these metrics. Advertisements that YouTube shows also depend on these metrics as well as the current content users are viewing which the advertisement is embedded in. This could be problematic because YouTube is making assumptions about users which may or may not be true. It also makes recommendations based on accounts, but multiple users could be accessing one device, such as a television.

3. Instagram

Instagram makes a lot of different decisions about the content it shows to users. This can depend on content that users have paid attention to in the past, overall popularity of content on the platform (likes, comments, saves, shares), and other factors. Using this data, Instagram will recommend posts, reels, and accounts. This can be problematic because controlling what users are able to see can have a significant impact on people's beliefs and viewpoints. It can shape social trends and patterns. On a less broad scale, Instagram may show users content that they

don't want to see or it shows users content that they gravitate towards, but the content itself doesn't positively impact users' lives.

Step Three: Convert each challenge into a one-sentence research question

1. Gmail
    a. How can we understand if Gmail is prioritizing emails in the same way that individuals prioritize emails?
2. YouTube
    a. How can we understand if there is a misalignment between demographic assumptions that YouTube makes about the user and the user?
3. Instagram
    a. How can we understand what direction Instagram shifts user emotions through different forms of content and amount of time spent on the app?

Step Four: Pick one research question

- **How might we understand how Instagram influences user emotions?**
- ~~How can we understand what direction Instagram shifts user emotions through different forms of content and amount of time spent on the app?~~

Step Five: Using the background research framework provided in class, conduct background research on your selected research question.

The psychophysiology of Instagram – Brief bouts of Instagram use elicit appetitive arousal and attentional immersion followed by aversive arousal when use is stopped (https://www.sciencedirect.com/science/article/pii/S0747563225000445#:~:text=The%20psychophysiology%20of%20Instagram%20%E2%80%93%20Brief,when%20use%20is%20stopped%20%2D%20ScienceDirect)

- Heart rate and skin conductance were recorded during 15-min phases of baseline, Instagram exposure and Instagram cessation. Instagram exposure resulted in a large decrease in heart rate and increase in skin conductance compared to baseline.
- Instagram cessation resulted in an increase in heart rate and GSR compared to exposure, indicating increased aversive (stress-related) arousal.
- Our findings indicate that brief engagement with SNSs elicits reward-driven arousal and attentional immersion while ending such states can induce aversive physiological and subjective stress in both problematic and regular SNS users.
- Fifty-four participants (44 females and 10 males) aged 18–30 (M = 20.98, SD = 2.59) who reported using Instagram regularly (at least once per day) were recruited from the Durham University student population.
- Single item measures were used to assess state anxiety ("I feel anxious right now"), stress ("I feel stressed right now") and cravings ("I want to use/check social media right now"). Participants responded to each statement using a 7-item Likert scale (1 = Strongly disagree, 7 = Strongly agree).

Does anybody get anxiety from watching instagram reels/social media in general? (https://www.reddit.com/r/CPTSD/comments/1fejq3f/does_anybody_get_anxiety_from_watching_instagram/)

- Reels just often make me feel bad about myself and give me anxiety
- I noticed I started zoning out in waking life. For no reason, no thoughts, empty head, and just a 1000 yard stare.

"You Go Through So Many Emotions Scrolling Through Instagram": How Teens Use Instagram To Regulate Their Emotions
(https://dl.acm.org/doi/10.1145/3706598.3713844)

- We conducted a diary study to investigate how teens (N=57, Mage= 16.3 years) used Instagram to regulate their emotions.
- We used a Mood Meter (see Figure 1) to aid participants in identifying their emotions. A Mood Meter is a tool designed to help with eliciting and identifying one's emotions [21, 41].
- We identified three kinds of emotionally-salient drivers that brought teens to Instagram: escape, engage, and manage the demands of the platform.
- We identified two types of behaviors that impacted teens' emotional experiences on Instagram: mindless diversions and deliberate acts.
- Although teens reported many positive emotional responses, the variety, unpredictability, and habitual nature of their experiences revealed Instagram to be an unreliable tool for emotion regulation.

Why Instagram Is the Worst Social Media for Mental Health
(https://time.com/4793331/instagram-social-media-mental-health/)

- Out of five social networks included in the survey, YouTube received the highest marks for health and wellbeing and was the only site that received a net positive score by respondents. Twitter came in second, followed by Facebook and then Snapchat—with Instagram bringing up the rear.
- Social media posts can also set unrealistic expectations and create feelings of inadequacy and low self-esteem
- Other research has found that the more social networks a young adult uses, the more likely he or she is to report depression and anxiety.

The Effect of Deactivating Facebook and Instagram on Users' Emotional State
(https://web.stanford.edu/~gentzkow/research/emotional_state.pdf)

- We estimate that users in the Facebook deactivation group reported a 0.060 standard deviation improvement in an index of happiness, anxiety, and depression, relative to control users.
- We estimate that users in the Instagram deactivation group reported a 0.041 standard deviation improvement in the emotional state index relative to control.
- Facebook deactivation improved the underlying happy, depressed x (-1), and anxious x (-1) outcomes by 0.064, 0.039, and 0.028 standard deviations, respectively, with p-values of ¡0.001, 0.018, and 0.110. Instagram deactivation improved those outcomes by 0.044, 0.026, and 0.024 standard deviations, respectively, with p-values of 0.030, 0.156, and 0.205. All four point estimates are smaller for Instagram than for Facebook. In both experiments, the point estimate is largest for happy and smallest for anxious x (-1).
- Similarly, Instagram deactivation improved happiness, depression, and anxiety in those original units by 0.037, 0.031, and 0.027, respectively. The average of these six effects is

0.038. This is equivalent to 3.8 percent of people saying they feel happy “often” instead of “sometimes.”

Emotional responses to likes and comments regulate posting frequency and content change behaviour on social media: An experimental study and mediation model (https://www.sciencedirect.com/science/article/abs/pii/S0747563221002636)

- According to the results of our study, emotions mediate the effects of social media engagement on posting frequency and content change.
- Specifically, we found that users felt excited and enthusiastic after receiving more engagement than expected, and sad and upset after receiving less engagement than expected.
- With regards to posting frequency, the pause between posts was shorter if users felt excited and enthusiastic after receiving more likes and comments than expected. In contrast, the pause

The Effect of Social Media Consumption on Emotion and Executive Functioning in College Students: an fNIRS Study in Natural Environment (https://pmc.ncbi.nlm.nih.gov/articles/PMC11703342/)

- Emerging evidence suggests that social media use may transiently alter neurotransmitter activity, particularly dopamine, due to its rewarding and reinforcing nature.
- In our study, high levels of social media engagement was associated with performance differences on Go/No-Go tasks. Specifically, participants in the social media group exhibited lower accuracy compared to the control group. These findings suggest that prolonged social media consumption may affect cognitive functions like working memory and inhibitory control, although further analysis is required to confirm the extent of these associations

The effect of short-form video addiction on undergraduates’ academic procrastination: a moderated mediation model (https://pmc.ncbi.nlm.nih.gov/articles/PMC10756502/)

- Due to the technological design, short-form videos are prone to excessive use and addiction, especially for students and adolescents (Wang et al., 2023).
- Since short-form video addiction is a type of specific internet addiction, short-form video addition might have similar effects as internet addiction on academic procrastination
- Moreover, short-form video addiction has been shown to be positively associated with various mental health problems, such as symptoms of depression, anxiety, and stress
- Compared to other specific internet addictions, considering the design and traits of short-form video, individuals with short-form video addiction are vulnerable to cognitive impairment, which could negatively impact their academic outcomes.
- Boredom proneness is a personality trait that encompasses emotions such as boredom, unhappiness, restlessness, a lack of enthusiasm, and a sense of meaninglessness (van Tilburg et al., 2013). According to Eastwood et al. (2012), boredom proneness can be defined as an aversive state of wanting to, but being unable to, engage in satisfied activities (Eastwood et al., 2012).
- It was found that short-form video addiction is positively associated with academic procrastination, confirming our hypothesis H1.

Undergraduates short form video addiction and learning burnout association involving anxiety symptoms and coping styles moderation (https://www.nature.com/articles/s41598-025-09656-x)

- Learning burnout may be one of the most significant negative effects of short-form video addiction on college students. Learning burnout refers to the emotional exhaustion, academic alienation, and a low sense of achievement caused by excessive learning demands.
- Algorithm-driven short-form video platforms, characterized by instant reward feedback mechanisms and highly fragmented content presentation, continuously deplete users' temporal and cognitive resources
- Results showed that short-form video addiction was positively associated with learning burnout, confirming hypothesis H1

How Short Form Media Is Killing Your Motivation (https://www.reddit.com/r/productivity/comments/1jc0qeb/how_short_form_media_is_killing_your_motivation/)

- Think of the last time you closed a short form media app like reels or shorts. Did you feel happy? No, you probably didn't. I guarantee you felt drained, unfocused, or maybe sometimes empty. Trust me - you aren't alone. I felt this way countless times. I'm trying to share my experience and knowledge.
- The problem is that these short form media platforms is that it gives you more dopamine in 30 seconds than the whole 1 hour process of doing something like cooking or solving a complex problem or going to the gym. This is why you can't seem to get off your phone - it's much more enjoyable.

United States adults' social media use and digital emotion regulation in everyday life: The potential of social media to be harnessed for mental health (https://www.sciencedirect.com/science/article/pii/S0191886925001011)

- There is an emerging and more sophisticated field of research on digital ER, when people use digital media, including SM, with the goal of impacting their emotions (Smith et al., 2022; Wadley et al., 2020).
- For example, among three studies using daily diary techniques, more time on SM was associated with lower daily mood in adolescents in Barthorpe et al. (2020) but greater daily emotional wellbeing in Wenninger et al. (2019).
- We examined how adult SMU and digital ER goals were related to two demographic characteristics, age and gender (Aim 2)

Digital Emotion Regulation in Everyday Life (https://dl.acm.org/doi/10.1145/3491102.3517573)

- Researchers have investigated the relationship between technology and emotional experience in several distinct ways. It has been established that positive emotions can arise from the successful use of technology to achieve a goal [19], or from an aesthetically pleasing user interface design
- In recent years, a growing body of research has turned attention to the use of digital technology to manage emotions and moods.

- Failures of emotion regulation have been recognised by psychologists with a distinction made between ‘failing to regulate’ at all, and ‘mis-regulation’ through the unsuccessful application of a technique

“Instant Happiness”: Smartphones as tools for everyday emotion regulation (https://www.sciencedirect.com/science/article/abs/pii/S1071581922001732)

- Smartphones are used to regulate boredom, stress, loneliness, tiredness, and sadness.
- The ever-growing ubiquity of smartphones is fuelling concern about whether overuse of these devices impacts user wellbeing (Monge Roffarello and De Russis, 2019). A large body of research has documented the psychological consequences of smartphone use, revealing a mixture of salutary and detrimental effects.
- This study suggests that people may spend a significant amount of time using smartphones for emotion regulation, especially when experiencing negative emotions such as boredom and stress. People perceive their smartphone-based emotion regulation efforts as being effective for reaching desired emotional states; however, these effects are likely short-lasting and may sometimes lead to negative outcomes.

Problematic Internet Use and Emotional Dysregulation Among Young People: A Literature Review (https://pmc.ncbi.nlm.nih.gov/articles/PMC8629046/)

- Overall, the present review showed that problematic Internet use might represent a coping strategy to compensate for emotional regulation deficits. The lack of social support and the lack of a good parent-adolescent relationship seem to negatively affect emotional regulation abilities, which in turn increase the risk of developing PIU.
- Several reviewed studies found a strong association between emotion dysregulation and both PIU and problematic social networking with controversial gender-based findings.
- Within this contemporary research field, difficulties in regulating emotions have been increasingly explored in association with problematic Internet use (PIU).

Emotion trajectories in smartphone use: Towards recognizing emotion regulation in-the-wild (https://www.sciencedirect.com/science/article/abs/pii/S1071581922000982)

- Smartphones’ “anytime, anyplace” access to information has made them constant companions to humans (Dey et al., 2011). Consequently, it would be surprising if they were not used to also proactively modify our emotions.
- Prior research has provided evidence for the use of smartphones for Emotion Regulation, but this has usually relied on self-reports, e.g., Hoffner and Lee (2015). There are no guidelines on how to automatically and objectively identify and quantify instances and patterns of Digital Emotion Regulation on smartphones.

Impact of the global pandemic upon young people's use of technology for emotion regulation (https://www.sciencedirect.com/science/article/pii/S2451958822000264)

- For example, Eschler, Burgess, Reddy, and Mohr (2020) studied the use of smartphones and social media for emotion by people with depression, while Kelly, Cheng, McKay, Wadley, and Buchanan (2021) observed university students' use of technologies to alleviate feelings of homesickness.

- Our participants lean towards strong agreement that emotions can be controlled and changed through personal effort, and that this belief was not affected by the onset of the pandemic.
- Our findings show clear evidence for the importance of digital devices in people's emotional lives. In times of social isolation and restricted movements, digital devices become increasingly vital to serving people's emotional needs, such as through receiving support from others.

Sub-questions to consider:

- What types of content cause what emotional reactions?
- Short form video content can provide instant gratification. At what time point (5 minutes, 10 minutes, 30 minutes) on the app does this wear off?
- Can social media be used for positive emotional regulation in the short term?

Insights:

Emotional Patterns

- A lot of research will talk about the mental health impacts of Instagram and other social media sites, but focus less on the short-term immediate emotional impacts of Instagram.
- Instagram use lowers heart rate (calming) but raises skin conductance (reward/arousal)
- Ending use sharply increases heart rate and stress signals
- Users often report excitement, enthusiasm, or relief when engaging. Disengagement is linked to emptiness, anxiety, and stress
- Curve
    - Onset: Positive, arousing, immersive (dopamine-driven)
    - During use: Emotional highs depend on content type (funny clips, engagement, beauty posts, etc.), but exposure can trigger anxiety from comparisons
    - Offset (minutes after stopping): Stress, anxiety, emptiness
    - Habitual cycle: Users re-open apps to escape these negative states, reinforcing loop of dependency

Content-Specific

- Short-form video (Reels, TikTok, Shorts):
    - Provides strong, fast dopamine hits, instant gratification. Quickly wears off, leaving users feeling drained, anxious, or unfocused.
    - Associated with academic procrastination, learning burnout, depression, and anxiety.
- Likes and comments:
    - More engagement leads to excitement, enthusiasm, shorter pauses before posting again. Less engagement leads to sadness, discouragement, posting less.
- Curated content:
    - Unrealistic comparisons leading to inadequacy, low self-esteem, and anxiety.

Emotional Regulation and Dysregulation

- Use Instagram for escape, engagement, and managing social demands.
- Both mindless (scrolling) and deliberate (messaging, seeking content) strategies exist.
- Emotional outcomes are unpredictable meaning instagram is not a reliable emotion regulation tool.
- Use social media/smartphones for emotion regulation (boredom, stress, loneliness).

- Sometimes effective in the moment, but effects are short-lived, crash and burn

Social Media Cleanse

- Deactivating Facebook/Instagram can provide small but significant improvements in happiness, lower depression, and less anxiety.

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