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Apple's Screen Time: The Utility of Digital Wellness Software in Curbing Smartphone Dependency

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We the undersigned committee hereby approves the attached thesis, "Apple's *Screen Time:* The Utility of Digital Wellness Software in Curbing Smartphone Dependency" by Ebubechukwu Onyekachi Aham Ubochi

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Abstract

Apple's *Screen Time*: The Utility of Digital Wellness Software in Curbing Smartphone Dependency

By Ebubechukwu Onyekachi Aham Ubochi

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This study investigated the effectiveness of digital wellness software by attempting to measure the utility of Apple's *Screen Time* as a means of curbing smartphone dependency. It involved following the activities of eight iPhone users who were encouraged to use and pay attention to *Screen Time* over the course of a week. They were interviewed at the start of the process to get a feel of how they use their phones as well as what knowledge they had about Screen Time, and then at the end of the process to measure any changes that might have emerged. Each participant's S*creen Time* data was also recorded with screenshots and taken into account as part of the analysis. The findings showed overall that focused attention to *Screen Time* is capable of affecting smartphone usage patterns and helping iPhone users take control of the way and extent to which they use their devices.

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Acknowledgments

This entire process has been filled with ironies. Ironies like the fact that this is the first thing you're reading but the last thing I'm writing. More importantly though, this process has resulted in a body of work that I'm very proud of; work that I could not possibly have completed without some very special people, of whom I am equally proud. It's incredible to have made it this far and I sincerely thank God for that, but I also thank the people who taught me to believe in God as well as how to properly thank people: my parents. I love you and I wouldn't be here without you. It's very ideal for me to say that here, but its a fact; one that I truly appreciate. I'll go ahead and thank my siblings too because why not?

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Introduction and Rationale

With society's increased reliance on personal computing and the concentration of personal computing into smaller and more accessible devices, the issue of time well spent and smartphone addiction have become pressing concerns. This issue pertains mostly to youth, as the generation currently aged 25 and younger, fits the term "Digital Natives" more than any before it. Studies have been conducted to test the effects of technological dependency on long term mental health and concentration levels, looking into things like focus, sharpness of the mind, and even sleep (Hale & Guan, 2015). Results have shown that in general, higher smartphone and technology usage translates to less sleep in youth, as the brain is residually stimulated by interactions with devices used at late hours, whether they result in connection with another human being or not (Hale & Guan, 2015).

Real world health and productivity implications have prompted software developers and device manufacturers to implement tools for users to track their device usage and ensure a healthier or at least more controlled relationship with their technology. Apple, manufacturer of the iPhone and the operating system it runs — iOS — calls its application "Screen Time" and integrates the feature into the system settings in the newest version of the software on compatible devices.

Google has created a similar feature for Android devices in Android 9 Pie called Digital Wellbeing.

Smartphone dependency is at an all-time high due to the increasingly more digital nature of socialization (Santy, 2017). The number of worldwide mobile phone users is expected to pass the 5 billion mark and smartphone users are projected to grow from 2.1 billion in 2016 to 2.5 billion in 2019, which would see the percentage of people in the world with smartphones rise to 36% from 2011's 10% (Statista, 2019). While research has been done on the effects of this digitization of human interaction and the long term effects it could have on the way society functions, not much has been done to address it on the part of manufacturers. This is starting to change, as industry leaders like Apple and Google are starting to respond in their own way by taking the approach of empowering the user. Over the second half of 2018, software was implemented to provide users with tools for keeping their digital presence in check. The software applications provide analytical data of various interaction parameters such as notification counts, pick-up counts, and exact amounts of time spent on each app used, as well as averages that can give users a general overview of their general app usage and activity (Apple Support, 2019). These tools enable analysts and users to ponder questions pertaining to the fundamental things that define the way humans interact with technology in its most personal form. What are the things

that keep people addicted to their smartphones other than social stimuli? Are there any? And in that same vein, is social interaction more potent or dopaminergically rewarding when facilitated digitally? As far as the tools go, what are the core components of "digital wellness"? What are the features of Apple's *Screen Time* that address these components/parameters? On the part of the average user, what is the general awareness level? Do people know about *Screen Time*? How much do they know about the way it works? Do they understand the information it reports, and does it make a difference in the way they try to use their phones?

Taking a step back back to consider relevant communication theories, Media Ecology comes to mind. As the study of media environments, it is inherently an endeavor to assess the role of information and communication in human life (Strate, 2017). Marshall McLuhan's earliest remarks about the medium being the message are rooted in this school of thought, and provide insights useful to examination of the parameters on which this study focuses. Media Ecology could inform the exploration of questions this research will bring up, such as whether device usage is changing the way we interact as much as some researchers claim, and whether interpersonal communication is in danger of being jeopardized if smartphone users do not become more self aware and make an effort to ensure that they control their devices and not the other way around.

Long term analysis of the use/usefulness of these software features could help in determining whether users really can take a more focused approach to their screen time. They might be able to discover how best to monitor aspects of their digital life that they may be concerned about, tracking changes as they go along. Findings from this study will help researchers develop a set of recommendations for how best to use the data provided and make the most of the usage analytics features included in modern smartphones.

The following literature review details previous research and applicable theories guiding the study. It culminates in specific research questions and is followed by an explanation of methods used to answer the questions.

Literature Review

This literature review examines the rationale behind studies already carried out in similar research relating to smartphone dependency, human-computer interaction, media ecology and more, as well as official documentation that states the purpose of Apple's Screen Time feature as stated by the company. The literature review approaches this by looking at both the advantages and disadvantages of smartphone use in the context of real life scenarios.

A Brief Overview of Smartphone Dependency

The overuse of mobile handheld technology generally constitutes people spending so much time on their smartphones that it affects their lives negatively; smartphone addiction is considered a form of internet addiction, and perhaps even an extension of the latter and its arguably more extensive problems (Ding & Lee, 2017).

To understand the true effects of dependency and the extent of it in any individual, a step back is required in order to gauge response to two stimuli: the presence of the item in question and the absence of it. A study by Twenge, Joiner, Rogers and Martin (2018) looked at the rise in depression and suicide in teenagers in recent years and its links to increased new media screen time and discovered a tight relationship between mental health issues and "new media screen activities" (Walton, 2018, 1). In another study, researchers discovered that roughly 48% of those who used their phones for more than five hours daily had suicidal thoughts or plans, as opposed to 28% who had used their phones for an hour a day (Twenge et. al., 2017). The same study purported that teenagers who devoted more of their time to sports, homework, real life socializing and going to church had lower risk levels for depression and suicide.

The burning need for digital interaction is fueled in part by the endless quest for social feedback that pushes individuals to check their smartphones compulsively for mentions, notifications, and likes — validation that exists mainly on the superficial plane — and the dopamine that comes from receiving feedback (Appaloosa Store, 2018). Social media sites and the people who run them are not just aware of this craving, but have capitalized on it for years (Parkin, 2018). Facebook founding president Sean Parker admitted in early 2018 that the social network was founded with distraction as the goal rather than unity: "How do we consume as much of your time and conscious attention as possible?" (Parkin, 2018, p.1). Facebook and online ecosystems it owns such as Instagram have now implemented tools for monitoring usage of their apps in their newest versions, but the effectiveness of these tools remains to be seen in the long run and at a large scale.

Further fueling the desire for social feedback is the way social stimuli are processed in the reward system of the brain. Krach, Paulus, Bodden, and Kircher (2010) explored this in their paper on the rewarding nature of social interactions. They found evidence that "the dopaminergic reward circuits in the basal ganglia form the primary neural system for processing reward of various social stimuli which could motivate social behaviour" (Krach et. al., 2010, p.1). It is hyperactivity in this aspect that gives rise to worries of addiction, especially in

young people. Questions on the immediate effects on the brain as well as the potential long-term results of smartphone-related habits were explored by Korean neuroradiology professor Hyung Suk Seo and his colleagues, in a study where they used magnetic resonance spectroscopy to gain insight into brain activity during smartphone use (Jeong et. al., 2017). They used standardized internet and smartphone addiction tests to measure addiction severity in 19 young people diagnosed with internet or smartphone addiction. The questions focused on how much parameters like daily routines, social lives, productivity, sleep and feelings were affected by smartphone usage. Results showed that the addicted teenagers monitored in the study alongside an equal number of age-matched healthy controls, displayed significantly higher scores in depression, anxiety, insomnia and impulsivity (Jeong et. al., 2017).

Much of this anxiety stems from a deep desire for belonging and validation, which has become increasingly quantifiable in popular culture in recent years thanks to the "Like" button that was first implemented by Facebook (Parham, 2017). The Like button serves not just as a measure of one's validation online, but as a means of asserting endorsement or interest on the part of the individual. A group of researchers investigated in 2016 the power wielded by the button in the influence of responses to social media and online interaction (Sherman et. al., 2016). They simulated the Instagram experience with a novel functional MRI to

measure behavioral and neural responses to likes, and found that adolescents were more likely to *like* photos with more likes, which lends credence to theories pertaining to a desire for belonging on social media and the influence of virtual peer endorsement on the actions of individuals online even at the subconscious level.

Media Ecology and Computer Interaction

While Marshall McLuhan's take on the medium being the message comes up every time the concept of media ecology is mentioned, it bears note that the tendency for media that is new both conceptually and iteratively to herald a change in the cognitive process that governs interaction and other functions, is not all there is to the argument. Neil Postman (2007) famously pointed out that regardless of whether it can be proven that new media and human interaction with it is indicative of changes in cognition, it is definitely an agent for the reinvention of discourse (Postman, 2007). According to Postman, new media achieves this by encouraging and propagating certain uses of intellect, favoring specific schools of thought and demanding certain types of content. Social media is an excellent indicator of this, as while interaction is constant on a variety of platforms, the type and frequency of the interaction as well as the content shared, is specific to the

medium that is favored on the platform in question. A great example of this is the contrast Instagram's lasting photo and video posts to Snapchat's disappearing messages — the easily re-shareable content on Instagram is a massive part of what makes the platform thrive, while Snapchat's focus on privacy and the fleeting exchanges it provides affords it a different but still appealing role in users' digital communication arsenals.

These digital environments are crucial because any understanding of socio-cultural change and the way it is reported is hardly possible without knowledge of the way media work as environments (Griffin et. al., 2019). McLuhan believed in the invisibility of the environments, in that the new technology should not be the focus or at the forefront of our minds. He asserted that the experience of the technology as it is integrated into our lives is the key — a medium shapes us because we partake of it repeatedly until it becomes an extension of our very being (Griffin et. al., 2019).

It is fitting that human-computer interaction comes into play here because it embodies these philosophies in the way smartphone technology has revolutionized human interaction both visibly and subtly, and this is why users' ability to take control of their smartphone use is worth evaluating.

Dangers of Smartphone Overuse

One of the more obvious and rampant effects of smartphone overuse is its effect on individuals' ability to focus, both on their work and their surroundings. Numerous incidents have been reported in recent years involving smartphone users becoming so distracted that they put themselves in danger that resulted in serious injuries or even death. In early 2017, a man in Southern China was hit by a truck as he crossed the street and a video was found playing on his phone on the pavement next to him as he lay in a pool of is own blood (Ding & Lee, 2017). Studies have shown that excessive smartphone use can be linked to anxiety disorders and even depression, as seen in patients dealing with nomophobia, which is defined as the fear of losing access to one's phone, but tends to be more accurately described as a variant of anxiety rather than fear (Demirci et. al., 2015).

Some issues in smartphone dependency have also been linked to the illusion of satisfaction. A study on bottomless bowls tested the influence of visual cues of portion size on food intake volume (Wansink et. al., 2005). Fifty-four participants were divided into two groups eating soup from two different kinds of bowls with two different kinds of visibility levels. The first group had normal bowls with accurate visual cues of portions, and the second had a self-refilling bowl with a biased visual cue — unknown to the participants, the bowls refilled as the contents were consumed. Results showed that the participants who ate from

the self-refilling bowls ate more soup than those using normal bowls but did not believe they had done so despite their consuming 73% more, and they did not consider themselves more satisfied than participants eating from normal bowls either (Wansink et. al., 2005). The lesson here is that the participants in the second group ate more because the amount of food on a plate increases intake due to its lessening of one's reliance on self monitoring. This shows the importance of having relevant visual cues in preventing overconsumption of food, and this could apply to smartphones as well in that a lack of self-monitoring and self-regulation is likely one major cause of overuse.

In addition, physical health problems also tend to accompany the psychological ones, as smartphone overuse has been known to bring about not just ocular issues, but neck pain and manual problems such as carpal tunnel syndrome and other musculoskeletal issues (Kim & Kim, 2015). Perhaps the most easily overlooked adverse effect of smartphone overuse is its tendency to eat away time without the user being fully aware that it is doing so, even going so far as to inadvertently rob individuals of time that could potentially have been spent on self improvement or physical activity (Thompson, 2017). Other notable problems associated with time and focus include slowed reaction times and higher distraction rates, which lead to accidents like the one previously mentioned.

Before discussing potential solutions to these problems and avenues that have already been explored, it is worth looking at the advantages of smartphone usage and the potential they hold to become invaluable additions to people's lives, rather than just a glorified distraction.

Advantages of Smartphone Use

One of the clearest advantages of owning a modern smartphone, by way of being arguably the most prominent use of modern smartphones, is the possession of a high quality camera that is accessible almost instantly at all times. With more than 2 billion active smartphone owners smartphone photography is at the hands of more people than ever, and it shows. Flickr, one of the world's largest image hosting sites and creative networks for photographers, ranked the iPhone as the most used camera in 2017 — more than any other camera combined — falling in line with Apple's research crowning the iPhone as the most popular camera in the world (Gottsegen, 2017). As such, software that utilizes smartphone camera technology and/or handles photo editing constitutes a large fraction of the time users spend on their devices, and while this could be detrimental when viewed through the lens of raw screen time, the utility is undeniable, as easy access to a

camera creates opportunities for capturing moments regardless of photographic skill.

Smartphones connect users across time zones irrespective of location and proximity, provided an internet connection is available, and smartphone manufacturers take this a step further with modern devices with accessibility features that tackle the restrictions to device usage — and everyday life in some cases — that are faced by people with disabilities. Voice enabled AI personal assistants like Apple's Siri, Amazon's Alexa and the Google Assistant, make it much easier to do activities that once required several steps, some of which were not always obvious to the user. Additionally, haptic feedback adds a new layer of interaction and understanding in most devices, and gives users more information to enhance their experience. In the case of iOS, Apple provides numerous features to help people with a variety of special needs, such as hearing aid support, and visual enhancements like the ability to resize the text on the device system-wide, the inclusion of a magnifier, and even a screen colour inversion feature (Apple, 2019). Going even further, Sesame Enable has created the world's first entirely touch-free smartphone, designed for and by people with disabilities. The device's main features are operated by a camera that can track users' head moments to carry out essential tasks (Jarvis, 2017).

One other way that smartphone technology has empowered humanity is the way it almost singlehandedly brought out the obsolescence of physical maps. Despite the privacy issues that users admittedly need to be savvy enough to navigate competently to ensure their safety, the advent of GPS and location tracking has brought the world closer, both physically and literally.

Research Questions

While the disadvantages of extensive mobile device usage are real and rampant in society's current state, middle ground exists between the advantages and disadvantages discussed. The goal of the research covered in this paper is to circumnavigate the dangers presented in order to see how feasibly the advantages can be salvaged to their greatest potential, and to determine whether digital wellness tracking software like Apple's Screen Time can help people find the balance necessary to achieve this. With this direction in mind and Apple's recently implemented solution serving as a case study and focus, the research aims to answer the following questions:

RQ1: What meaning do users give to their smartphone usage?

RQ2: What meaning do smartphone users assign to the data provided by Apple's *Screen Time*?

RQ3: How does attention to Screen Time affect the meaning users give to their smartphone use?

CHAPTER 2

Methodology

The nature of the subject matter in this study is mostly intangible, as it aims to appraise the value of a service/tool as a means of managing a different tool. Since this leaves much to be desired in the area of measurable parameters, a qualitative analysis is best suited to the data worth studying in the course of this research.

Although the study will only focus on iOS users in order to assess Screen Time as an exclusive feature and its usefulness in the practical sense, neither the iPhones themselves nor the operating system they run are the focus here, and iOS users cannot be lumped together so simply as one large group despite their preference for iPhones being a common factor among them. A case study is therefore impractical in this research, as it would be difficult and perhaps even confusing to determine what the relevant “case” is, and responses from what essentially amounts to a multicultural environment cannot be easily categorized. Noting that ethnographic research is the most widely used and generally applicable qualitative method (Sauro, 2015), it seems like a good choice for an attempt at understanding the human reactions to smartphone use and the way this device category has redefined what it means to interact on a human level, both

individually and in groups (Sauro, 2015). It is worth noting, however, that ethnography involves immersion into the world of the participants to understand the cultural landscapes at work and how it affects the motivations and lifestyle of the people in it, in order to ascertain the overarching — or even underlying — themes. While this is useful when trying to understand the human aspect, this study's focus is more on the product and its utility as a feature designed to improve human life, than the humans themselves; it is more about the phenomenon (Sauro, 2015). This is why a phenomenological study is appropriate.

A phenomenological study makes sense here because this research isn't launching with a well formed hypothesis or any pre-conceived notions. It involves careful observation through avenues like interviews and visits to gain the perspectives of the participants on the phenomenon in question, rather than drawing conclusions from the beginning and allowing them to influence the questions being asked. The goal is to compile a sufficient qualitative dataset that can facilitate the search for emergent themes and validate findings.

Approved by the IRB, this study will focuses on college students at a small private technical university who own iPhones and are willing to participate in the research after having been approached with the topic and requirements — purposeful sampling is the recruitment method of choice here. Participants were between 18 and 25 in age and not required to have extensive knowledge of Apple's

Screen Time feature, as their level of knowledge constitutes part of the assessment. They were chosen semi-randomly — strangers were approached and a call for participation was sent out on the university forum; however, most participants ended up being recruited through purposeful sampling and snowball sampling.

The process began with an attempt to obtain a general overview of how participants use their iPhones and interact with Screen Time and its weekly report. This was done through semi-structured interviews of eight iOS users running iOS 12 on the iPhones. Eight was chosen as the number of participants because it is the smallest number of people that can be monitored while maintaining diversity of the sample, and it should be the ideal amount of people for a forum if one became necessary or the logical next step. The interviews were conducted in locations of the participants' choosing and featured discussion based on an interview guide starting with the question, "Tell me what you typical day of smartphone usage looks like," followed by questions about participants' favourite applications, how they use their phones, how important they think their phones are in their daily lives. This was then followed by questions about their familiarity with S*creen Time* and how they use information provided in the app. For the full interview guide, see Appendix A.

The interview guide was designed with the cognitive process of Human-Computer Interaction (HCI) research in mind. HCI is a school of thought and

multidisciplinary field of study that focuses on the design of computer technology and specifically, how humans interact with it (Lorenzi, 2005). Screen Time is a tool that has been created with the intention of giving users the power to negate factors of engagement that have been considered in the HCI research and testing that informed the creation of the iPhone and the apps it runs. The questions were meant to assess Screen Time's effectiveness in actually doing this. This study could serve to answer the question of whether the things that users learn about smartphones and about themselves as they actively use ScreenTime, can sufficiently equip them to understand, overcome and regain control from the engaging factors that have been designed to lock them in to begin with.

The participants returned a week later for a follow-up interview that consisted of questions that built on information they provided in their answers to the first meeting's questions, as well as their experience of their phones and *Screen Time* over the course of the week. This allowed for a cumulative analysis of the utility of *Screen Time* that is hopefully both helpful to future users and Apple, and accurate. Their confidentiality was maintained as part of the process, and they were assured of this in order to encourage full transparency on their part.

Notes from the follow-up interviews and statistics from phone use of each participant were recorded and each interview was transcribed for analysis and

coding in order to parse the prevalence of themes that represent the meaning / significance of Screen Time from the view point of the users.

The week-long monitoring period was implemented in order to explore the capability of the second research question to bring about a transformation in the first. The goal was to see if the priming that occurred during the initial interviews would bring about any increase — or decrease — in the attention participants paid to *Screen Time*. Their follow-up interviews were then used to examine if changes were evident in how they expressed their feelings.

To ensure uniformity among participant data and allow for more reliability among comparisons, each participant was given the following instructions with accompanying examples:

1. *Take a screenshot of the notification, in both its basic and expanded forms* — Screen Time provides a weekly push notification that arrives on Sunday mornings with a statistical overview of the user's interaction with their device in the format "Your screen time was up/down x% last week, for an average of y hours z minutes a day," and collection of this information from the participants helped with understanding the state of affairs at a glance for each of them.

2. *Take a screenshot of the Screen Time landing page* — The landing page expands on the brief statistics shown in the notification by showing the average time spent, along with a graph that illustrates the user's areas of focus as well as the differences between the current week and the previous one. It is arguably the most important screenshot, as it is the most representative one. The report of the average of time spent on the device over the course of the week also includes an individual app — categories as well — breakdown, with daily averages for each.

3. *Take another screenshot, after having tapped "Show Categories"* — This performs the same function as the second instruction, but breaks down the time spent with a focus on app categories rather than individual applications.

4. *Take screenshots of the pickup and notification counts* — This metric was collected to aid in estimating the balance between how often the device called for the users attention (interactions out of the user's control) and how often they actually engaged (interactions within the user's control). *Screen Time* includes a count of the notifications received on the device in question over the course of the week, as well as the number of times the device was picked up, with daily averages for each. The notification count breaks the numbers down according to apps and ranks them in decreasing order in a fashion similar to the approach of the total and average time records. The pickups

counts ranks the apps in decreasing order of how often they were first used after the phone was picked up.

In order to explore the idea of growth and its implications in the most straightforward manner, focus was placed on the participant whose weekly averages displayed the highest range and the one whose showed the lowest. By pitting these side by side, they were analyzed based on the participant profiles that had been built up to this point with their initial interviews and where they had fallen on the Tool-Extension spectrum.

To add a secondary layer of exploration to this analysis, one of the other metrics was dissected; however, it had to be one that was directly influenced by the actions of the users, so the number of pickups was chosen. The term “Pickup” here refers to any instance in which a device is picked up and interacted with. The pickups metric is especially insightful, because it goes on to identify which apps the user first opened each time the device was unlocked and rank them in decreasing order. The same style of comparison as the weekly averages was implemented here to see if insights could be drawn based on what has already been established about the participants and their usage patterns.

The combination of these two comparisons should lead to a reliable answer on the extent to which smartphone usage or one's attitude toward it can be altered by focused attention to *Screen Time* and its data.

While a great deal of time was spent in preparation beforehand crafting the methods and solidifying the rationale, the actual execution of the methods was hectic and prone to a fair amount of unpredictable factors, such as participant availability, attitudes of participants toward the study and the instructions they were given, and even the extent to which the final participant pool would be diverse.

In order to ensure diversity, an invitation to participate was sent out on the university forum but this only yielded one member of the group: Emily. Everyone else came on board through purposeful and snowball sampling — Dolores, Logan, William, Bernard, Teresa and Elsie were all directly approached and educated about the study and its goals on a one on one basis. Maeve is Emily's best friend who happened to be present at Emily's official recruitment and decided to take part in the study as well. One or two other people had agreed to participate in the research but did not end up doing so due to scheduling conflicts or a lack of commitment. To keep the project moving forward, some potential participants were dismissed and replaced after their willingness or availability had remained unclear for too long — Logan was actually a replacement and was the last member

of the group to be recruited. In fact, in order to ensure that any other potential cancellations would not disrupt the flow of the study, an additional participant was recruited, interviewed and monitored in the exact same way as everyone else. Her codename is Juliet.

Table 1: *Participant Overview*

Participant	Gender	Age	Nationality	Discipline
Bernard	Male	21	American	Engineering
Dolores	Female	20	American	Engineering
Elsie	Female	21	Jamaican	Mathematics
Emily	Female	19	Honduran	Engineering
Logan	Male	20	Nigerian	Business
Maeve	Female	19	Serbian	Engineering
Teresa	Female	21	American	Engineering
William	Male	19	Ethiopian	Engineering
Juliet	Female	19	Nigerian	Engineering

Having said that however, the interview process was arduous in a lot of ways. The conversations were fun and meaningful for the most part, but they made for tiring days and long transcriptions. A few kind assistants volunteered to help with the transcriptions and while this made the process smoother, protecting the identity of the participants was still a priority so all transcribers were given

instructions that ensured they focused more on the content than the personalities and directed them toward a specific style of formatting to keep things uniform.

Participants were encouraged to explore and take advantage of the tools and toggles included within Screen Time in any way they saw fit. Each toggle offers assistance in controlling a specific aspect of iPhone usage

- *"Downtime":* A low interaction state users can schedule, during which phone calls and apps that have been chosen are the only things available on the device.
- *"App Limits":* Daily limits that can be set for specific app categories such as social networking, games, entertainment, productivity, etc.
- *"Always Allowed":* A list of apps determined by the user that are always accessible regardless of Downtime or predetermined App Limits.
- Content & Privacy Restrictions: These make it easier to decide the type of content that appears on users' iPhones and include blocking and privacy tools.

CHAPTER 3

Data Analysis and Results

The original line of questioning was updated to allow for more meaningful conversations with participants and gave them more opportunities to elaborate on their experiences.

Participants' responses to the initial interview questions were scanned for emphasis in order to decipher what mattered most to them — getting a sense of what they prioritize and value was crucial to answering the first research question — what meaning users attribute to their smartphone use. Below is an inventory of the feelings each user expressed toward smartphone use, both in terms of how it affects them and in terms of how it affects society. Each research question is discussed in turn, touching on topics relevant to their core concepts while leaving space for elaboration, so as to capture the essence of related matters that are important to the participant.

First, a quick look at the participants. Numbering eight in total, each individual in this diverse set has been assigned codenames in order to protect his or her identity: Bernard, Dolores, Elsie, Emily, Logan, Maeve, Teresa and William. All are collegiate and between the ages of 18 and 25.

Research Question I

"What meaning do users give to their smartphone usage?"

The answer to the first research question can be answered by viewing the responses of the participants through the lens / filter of a few overarching themes and using them to evaluate the participants on a spectrum. These themes explore different aspects of smartphone functionality implemented by the participants in order to highlight some of the ways smartphones can be significant to their users. The main ones that emerged here were smartphones as a window to the world, as a means of escape, or as a tool or extension of oneself.

Outlet: Window to the World

Although sometimes indirectly, some participants described situations where their iPhones bridged their different worlds or connected them to new landscapes altogether.

William expressed that while most things he does on his phone do not affect how present he is, he does feel that the device tends to distract him from experiencing the fullness of person to person interaction overall. He did say however, that he appreciates its capacity for keeping him connected, especially to the aspect of his life he leaves in his home country when he comes to school.

"I kind of grew up in uh… Ethiopia. So social media and stuff wasn't that huge… You know, just coming here is when I really realized how big of a… How big it was and you know uh, spending my whole childhood to high school years there, I was forced to do…face to face interactions and what not. So that's what… So like, right now I only talk… Everything using like Instagram, FaceTime, everything, is just to talk to friends I can't physically interact with right now. But everybody else here is more physical than it is over social media." — William

According to William, a great deal of his smartphone usage involves connection with actual human beings; he prioritizes connection:

"Oh! I guess the majority of it. Cause Instagram it's for the memes, and right after the memes it would just be conversation and umm browsing through Instagram." — William

Escape

One other conversation thread that stood out with some of the participants was the idea that their iPhones could represent an escape route from their daily routines. While similar to the outlet theme, what makes this different is the heightened level of immersion here.

In Maeve's case, it manifested almost in the form of a vice. And this vice was reading.

> *Almost always I'll have something. And it's really bad cause it just distracts me from studying and it's like… I procrastinate too much when I read. But anyways, I'll read, then class then maybe like, if I'm sitting by myself at lunch it's either… It's either I'll read or I'll...look at like, Instagram and like look at the feed where I like scroll and like view stuff and then… I might use it on like Safari to like Google a recipe…" — Maeve*

She cites it as the one thing that always happens on her iPhone; the staple of her usage in a sense.

> *"Like, the first time is always throughout the morning. And then reading… Like I'll always read every single day. Like, iBooks specifically. Probably early afternoon, first time afternoon...and then throughout the night. Usually like I'll use… I'll read my books, you'll see, mostly… Like continuously nights through early morning, like one or two a.m., like I'll just read. And then email, like checking emails like every morning and then throughout the day. Yeah." — Maeve*

Emily took this even a step further. For her, it was video streaming despite her also being an avid reader.

"…As I said it's mainly I use my phone a lot for watching videos… So I would say most of that is spent either in you know, Hulu, Prime." — Emily

She does feel remorse though, and expressed a desire to change.

"Uh, I would say yeah yeah it wasn't until I actually realized I was using my phone a lot and it wasn't until I was probably the day that it died that I realized how much I actually use it and that really upset me" — Emily

One interesting thing evident here is the fact that in many cases, the escape from normalcy ended up becoming normalcy itself, thus adding the means of escape to the individual's routine, usually unknowingly.

Importance: Tools and Extensions

As seen in the data shown in the appendix, the themes emphasized by each participant reflect their stance — consciously or subconsciously — on the matter of what their smartphones represent. Once participants take about their relationships with their phones, they were asked whether they saw their phones as tools or as extensions of themselves. Such categorization is consistent with other research on how people use their smartphones (Pew Research Center, 2015).

It is worth noting that although each participant's feelings are represented here in black and white terms, most of them were more in the middle and slightly leaning toward one stance. For example, some of the participants said they were in one camp, or that they ideally wanted to be, but went on to reveal information that suggested otherwise.

Bernard, for example, was well aware of this discrepancy and clearly went through a degree of cognitive dissonance influenced by his apparent belief regarding what his phone usage *should* healthily reflect. While he said he saw the phone as a tool, his extended answer suggested otherwise:

> *"I feel like I see the phone more as a tool but at the same time it's like uh… Umm… I don't know, like almost as if someone has like a leatherman you know? Like they always wanna carry it with them 'cause they're like, you never know when you're gonna need it. I feel like that's more… Like I don't feel like it's like an extension of myself, I don't think… But I feel like… I do feel like strangely attached to it I think but not like… I don't feel like uh… It still feels like something I could use to accomplish tasks… I guess." — Bernard*

Cognitive dissonance here refers to internal turmoil caused by a discrepancy between the actions a person feels he or she needs to take, and the

core beliefs the person holds dear. In Bernards's case, he has an opinion on what the situation is, rather than an assessment of what it actually is, and he is not sure where he stands as a result. Meanwhile, his habitual, somewhat mechanical relationship with Instagram indicates a more natural and subconsciously connected relationship with his iPhone:

> *"Cause like that's the weirdest thing 'cause I feel like… I'm like… I'll subconsciously open up Instagram without even thinking about it. And it's not even like I'm trying to check Instagram — it just kinda happens. It's kinda weird." — Bernard*

On the other hand, someone like Logan presents differently because he is more sure of what his iPhone represents to him. He not only considers it essential to his life and the centerpiece of his daily routine, but believes it can only have that level of importance because it is an iPhone as opposed to any other kind of smartphone running any operating system other than iOS.

> *"See like… It's quite valuable to me. Like… It's part of me… I can't do without my iPhone. I can do without… I've been doing without other phones but I can't do without my iPhone. Like umm I remember growing up when I had like… I can't remember what phone it was… I think it was an Android phone but like… Yeah..when*

it got messed up I was happy. I didn't stress about it… And then like when I got my iPhone, I was back to life and then like anytime my iPhone gets messed up I try to like, you know, get it fixed in like the next day or two." — Logan

On Logan's part, this is an especially interesting self-assessment since he considers smartphone dependency to be a plague and the above statement almost functions as an inadvertent admission to his having succumbed to it.

"Let me know if I'm deviating though but I feel like this phone...like the phone in general has destroyed, umm-- What's it called?… Socializing in general… Even bringing it into the school setting, I feel like this affects public speaking and presentations because people are not able to like, face crowds… They aren't able to properly communicate their opinions and what not with other people because you know, they spend so much time on social media, never spend time practicing how to communicate and all that… A bunch of people don't even realize this, like they don't know this is what's happening." — Logan

While this could be considered a fundamental discrepancy between his beliefs and his actions, it actually makes sense that he would think this way, as he

is so close to his iPhone and his relationship with it in general, that he might not be quick to realize his situation or to change it once he does.

> *"It's kind of hard to like you know..be conscious about what's it called..how much time you spend on your phone...because at some point no matter how much you keep..try to keep track of your screen time, you always feel yourself failing or like lagging behind in everything because it's already a part of you and like you're trying to like develop a new habit. It just isn't necessarily easy." — Logan*

One interesting trend among participants who viewed their devises more as tools than as extensions of their being, was the tendency to revert to it more often than not for the same tasks for set of tasks. This task usually turned out to be the thing they used their phone for the most, other than basic communication functions. Maeve, for example, uses her phone to read books primarily, as this is her favorite pastime.

> *"Almost always I'll have something. And it's really bad cause it just distracts me from studying and it's like… I procrastinate too much when I read. But anyways, I'll read, then class then maybe like if I'm sitting by myself at lunch, it's either… It's either I'll read or I'll… look at like Instagram and like look at the feed where I like scroll*

and like view stuff and then… I might use it on like Safari to like Google a recipe… Or download a book." — Maeve

She admits that it is is the activity she always reverts to:

"And then… I'll mostly read. If I get bored I might YouTube or like Hulu sometimes. But… (sighs)." — Maeve

"Like, I think a lot of it is communication… Maybe like the second thing I do the most. I use it mostly for reading when I think about it" — Maeve

A notable exception to this is however seen in Emily. This is because despite the fact that her iPhone serves very specific functions in moving her along in her daily routine — including reading, just like Maeve — she uses it so much and so thoughtlessly that she ends up admitting to herself that the device is more of an extension of herself :

"I'm just too... I use it a little too much and that honestly bothers me. If you'd like…have done this a month ago, that would have been different… I embraced my phone fully and I wasn't caring about how much time I was spending on it at all" — Emily

Deep down, she does not consider herself ready to live without it, even though she goes on to say she believes herself capable of doing so.

> *"I have done it once, I know I can… I was out for a month and then… Yeah, that was forced. It was forced at first but after a while, I just didn't want it back." — Emily*

What is perhaps most notable though, is her clear desire to make a change and move toward what *she* considers a healthier relationship with the technology in her life. In fact, a cross reference was done to see if there was any relationship between the participants' identification of their iPhones as tools or extensions of themselves, the model of iPhone they owned, and their desire to change their level of reliance on it; however, no relevant trends were observed at this level.

Table 2: *Participant iPhone Model Cross-Reference*

Participant	Perceived Significance	Model	Desire for Change
Bernard	Tool	7 Plus	Yes
Dolores	Extension	6 Plus	No
Elsie	Tool	XR	No
Emily	Extension	6	Yes
Logan	Extension	7 Plus	Yes
Maeve	Tool	6	No
Teresa	Tool	XS Max	No
William	Tool	XS Max	Yes

Research Question II

"What meaning do smartphone users assign to the data provided by Apple's* Screen Time*?"

To understand participants' feelings on *Screen Time* as a feature and its capability to make a difference in their lives, as well as their attitude to the data it provides, the search for emphasis spanned the initial interviews in their entirety, but focused mostly on the follow-up questions that probed for opinions on *Screen Time,* how participants became acquainted with it, and whether they use or understand it.

One interesting theme that stems from RQ II is the value of Screen Time and features like it to society, but the major theme governing the responses that constitute the answer to this research question is "potential" on the individual — how useful participants believe *Screen Time* to be at face value.

Potential: Indifference vs Intrigue

Some participants had been familiar with the feature to an extent prior to choosing to participate in the study, but on the surface level, each participant presented a disposition toward *Screen Time* that was more or less clear. Overall,

these feelings could be characterized by either indifference to the *Screen Time* — the technology behind it and what it may or may not be able to reveal about the participants' usage — or intrigue, which in this represents a palpable curiosity about the feature itself, how it works and what it could tell users about themselves. This intrigue was rooted either in a desire to know more about *Screen Time* or a desire to know more about oneself, and prompted the secondary question of whether there was any connection between participants' disposition toward the feature and whether they considered their iPhones more as tools or as extensions of themselves.

Table 3: *Perceived Significance Compared to Feelings toward* Screen Time

Participant	Perceived Significance	Feelings
Bernard	Tool	Intrigue
Dolores	Extension	Indifference
Elsie	Tool	Indifference
Emily	Extension	Intrigue
Logan	Extension	Intrigue
Maeve	Tool	Intrigue
Teresa	Tool	Intrigue
William	Tool	Intrigue

In Logan's case, although he presented more on the side of intrigue, he showed initial dissatisfaction with *Screen time,* as it was not working the way he expected it to:

"So for some reason… I decided to look at that umm the Apple Screen Time *whatever and what it says..the statistics and… Yeah I don't necessarily… I don't 100%… I don't agree to a 100%. — Logan*

He believed his *Screen Time* data was contradictory to his actual activity:

"I know that there are times I spent more time on certain apps and like, it was just the other way round on their stuff… On their end and I don't know… I have… Well I'll like to say that… well it makes no… I don't know but like, I just don't agree with their statistics." — Logan

The two participants who were indifferent happen to be on opposite ends of the Tool-Extension spectrum and use iPhones that are generations apart from one another, but they do have some things in common.

First, they both prioritize person to person interaction and mostly use their phone on a secondary level as a means of augmenting the face to face interaction that they prefer. Elsie, in particular, considers calls and texts important, because she wants to make sure she is reachable at all times by anyone who might need her, but she does not believe her iPhone distracts her from person to person

interaction, because the apps that would cause that have been removed from her device.

> *"Used to but not anymore, because I came off Snap. Snap wasn't the issue, I came off Instagram." — Elsie*

She looked for and accepted the root of what she considered to be her problem in order to mitigate the situation. She wants to avoid mindless scrolling, which she admits to being quite prone to, and makes up for the communication she restricts herself from on social media by ensuring she is available via text.

> *"Like I do text people a lot; message people a lot. I don't FaceTime as much as you might think. I have like 20 [total] calls on FaceTime?…" — Elsie*

Similarly, Dolores values the ability to reach and be reached via text; however, she tends to take and make phone calls more than Elsie.

> *"Yeah texting and FaceTime and calling. Like, I even talk to my sister sometimes through social media, through Instagram DMs so we do do that." — Dolores*

Conversely though, as seen above, Dolores embraces communication through social media more than Elsie. This could be be due to the indifference that

Dolores displays, or even the tighter restrictions Elsie places on herself in order to maintain her focus on other things; however, Elsie's lower FaceTime numbers might be because the possession of her iPhone makes her a minority in her social circles:

> *"Most of the people that I really talk to don't have iPhones. So I did not get Skype.[1] If anything, we use WhatsApp video call and I WhatsApp call a lot. I use it a lot. I WhatsApp call people back home. Yeah." — Elsie*

In any case, her overall indifference is clearly a factor in her lower phone usage and general overall screen time.

> *"In my life right now, I don't really feel like talking to people… Yeah, I just don't really feel like using my phone. Just right now this is very bad but like, I could care less. And I used to be like that with my other phone too." — Elsie*

Interestingly, both Elsie and Dolores are prone to and efficient at compartmentalizing and have no trouble putting away their iPhones to focus on more pressing matters:

[1] Skype is not a native iOS application. It is possible that Elsie lumped it together with FaceTime in her assessment

"I don't listen to music in that class because I need to focus so that's why, then I put off my phone… Then I eat… Have lunch. I don't use my phone because I am always eating with my friend. And then he leaves… Then my sister comes. So I'm not using my phone at lunch if anything." — Elsie

This is interesting because it is in line with Elsie's focus on using phone primarily to supplement the in-person communication scenarios she has in her life; she doesn't allow it to take center stage, which confirms its status as a tool to her. Dolores similarly prioritized focusing on the moment while using her iPhone as a tool in the context of the situation in which she found herself.

"Cause when I went to Halloween Horror Nights, we took… I used my phone to take a picture like the first… When we first got to like the entrance or whatever, and then other than that I just kept it in my bag or something." — Dolores

Research Question III

How does attention to* Screen Time *affect the meaning users give to their smartphone use?

The third research question deals with change, or more accurately, growth. It essentially attempts to see if the answer to the second research question can bring about a transformation in the answer to the first.

The following tables provide the *Screen Time* data for each participant, focusing on their total time spent engaging with the devices over the course of a week as well the frequency at which they did so, represented by the "Pickups" metric. Since *Screen* Time provides users with weekly averages, there is a table with totals for both time spent and pickups, as well as one with averages.

Each table features a column that shows the numerical range of each parameter as a means of highlighting any changes in participants' smartphone use that was evident at the time of his or her second interview. The "Week 1" numbers are the reference point for this, and show the data for each participant at the time of his or her first interview. Notably, Teresa has no range data because *Screen Time* had not been activated on her iPhone by default — she turned it on in order to participate. Since the reasons for this are unknown, it is hard to determine whether this is due to indifference on Teresa's part or a malfunction of *Screen Time.*

Table 4: Total Time Spent on iPhone During Monitoring Period

Participant	Week 1	Week 2	Range
Bernard	29h 21m	29h 40m	0h 19m
Dolores	32h 18m	32h 57m	0h 39m
Elsie	21h 11m	20h 41m	- 0h 30m
Emily	25h 56m	26h 58m	1h 2m
Logan	41h 38m	46h 14m	4h 36m
Maeve	43h 52m	38h 14m	- 5h 38m
Teresa	NA	25h 9m	NA
William	36h 41m	29h 26m	- 7h 15m

Table 5: *Average Time Spent on iPhone During Monitoring Period*

Participant	Week 1	Week 2	Range
Bernard	4h 11m	4h 14m	0h 3m
Dolores	4h 36m	4h 42m	0h 6m
Elsie	3h 1m	2h 57m	- 0h 4m
Emily	3h 42m	3h 51m	0h 9m
Logan	5h 56m	6h 36m	0h 40m
Maeve	6h 16m	5h 32m	- 0h 44m
Teresa	NA	3h 35m	NA
William	5h 14m	4h 12m	- 1h 2m

Table 6: Total Pickups

Participant	Week 1	Week 2	Range
Bernard	662	824	162
Dolores	1300	1076	-224
Elsie	611	1062	451
Emily	856	881	25
Logan	1292	1175	-117
Maeve	496	554	58
Teresa	NA	636	NA
William	1016	1093	77

Table 7: *Average Pickups*

Participant	Week 1	Week 2	Range
Bernard	95	118	23
Dolores	185	153	-32
Elsie	87	152	65
Emily	122	126	4
Logan	185	168	-17
Maeve	71	79	8
Teresa	NA	91	NA
William	145	156	11

Time and Change

One thing to consider when reviewing the weekly averages is the fact that most of the participants went through a variety of circumstances over the course of the monitoring period, which directly or indirectly affected their device usage. For example, Bernard had to present at the university's senior design showcase and spent his week preparing for the event while remaining in prolonged and frequent correspondence, so his total time spent on his iPhone went up. Particularly noteworthy, however, is the fact that this increase to his total was only by 19 minutes, which saw his weekly average go from 4h 11m to 4h 14 minutes — a relatively minor change. This is likely due to his focus on his work limiting the time he spent using the phone for leisure, which implies that his extended correspondence with his teammates filled that gap, and corroborates his account of how he used his phone over the course of the week.

> *"Uhh I still think I can live without it, I just...it , it still just seems like, like especially in this last week trying to organize things, it is incredibly useful. Like if I didn't have my phone on Saturday, umm, like I probably would have just gotten my ass up and went over to the, to the Clemente Center for the showcase." — Bernard*

This is further backed up by the rise in his notifications and pickups compared to the previous week. His pickup counts showed that he engaged with his iPhone 824 times — significantly higher than the previous week's 662 — bringing his average from 95 to 118 pickups per day. Thus Bernard spent roughly the same amount of time on his phone, but engaged with it more frequently.

Similarly, Elsie attended a conference over the weekend following her first interview and spent a significant amount of time contacting people for logistical and networking purposes. The total time she spent on her phone went down, but her pickups almost doubled, rising from 611 to 1062. In fact, Elsie's pickups ranged the highest over the course of the monitoring period.

Bernard and Elsie's weekly averages changed the least from one week to the next, however the changes to their routines make true changes difficult to determine.

Excluding Bernard and Elsie, Dolores saw the least change in her screen time, and this corresponds with the indifference she expressed toward the feature, which was in turn backed up by her actions and inadvertent attitude toward the data. In addition to the data review enabled by the weekly screenshots, a change log was created to map trends in participant value allocations toward *Screen Time.*

A summarized version of it is shown below, qualifying each user's answers to three questions:

Table 8: *Participant Awareness Change Log*

Participant	Difference in screen time?	More Conscious of device usage?	Did *Screen Time* help facilitate?
Bernard	Yes	Yes	Yes
Dolores	No	No	No
Elsie	Yes	No	No
Emily	No	Yes	Yes
Logan	No	Yes	No
Maeve	Yes	Yes	Yes
Teresa	Yes	Yes	Yes
William	Yes	Yes	Yes

As seen in the log, Dolores is the only participant who reported a lack of change in all the areas, and this corresponds with the relative indifference she expressed having felt over the course of the week. When asked if she felt her Screen Time might be different the second time around, she said it probably wasn't because she hadn't really changed anything. As a result, she remained far less conscious of her device usage.

> *"I don't know, I haven't really changed anything. Like… I still do the same routine, I guess. I honestly don't know… I just… I just pick it up when I pick it up. I don't really think about it when I'm on it." — Dolores*

Dolores mused that she picked the phone a lot over the course of the week during the second interview and that she probably used it more than before, but her numbers actually show otherwise, recording a drop in pickups from 1300 to 1076. At 224, this is the highest drop for any participant. Only one other participant showed a drop in pickups — Logan — and he did experience a change in his device usage and his approach toward it, but did not attribute any of this to *Screen Time;* however, his new approach it is corroborated by the reduction in the number of pickups over the course of the monitoring period.

Time Well Spent

On the other end of the spectrum is the participant whose numbers reflect the greatest change: William.

William showed an undeniable zeal to change the way he uses his iPhone, and this is highlighted by the concern he repeatedly expressed in his interviews, both for himself and for society at large. He made an active effort to change his approach to using his device and his numbers tell the story.

At the time of his first interview, William's weekly total was 36h 41m (an average of 5h 14 m) and this saw a drastic drop of over seven hours to 29h 26m — the most in any participant. There are a number of things that could take credit for

this but the most prominent are probably a re-consideration of the way he used his apps, a re-evaluation of the way he nurtured his relationships, and his determination to re-calibrate his focus.

When it came to apps, William cited compartmentalization as one of the main aspects of his re-definition strategy. He talked about a separation of necessities that helped him come to terms with what he actually needed.

> *"Like when using my phone? I see it in like, two different categories. You have social media which is you know, just using your phone for… Facebook, Instagram, just enjoying yourself; and then you have the… You know, the essentials like things that make everyday life a lot easier. So… Apple Pay, GPS, searching something up, and you know… Just like… Even the calculator! Like… I end up using that more that WhatsApp these days. Yeah so like… If it's based off those two things together, then my phone is really important to me because I need those tools; but then if those tools had never existed, I don't see the point of me having a phone… It wouldn't be as important… Because [then] it's just… For entertainment purposes."*
>
> *— William*

He said that he believed that the reason why his phone is very important to him is because of those "tools that make life easier," which is an interesting

departure from the way he prioritized FaceTime as at his first interview. FaceTime is something he still uses, but his newfound consciousness of his device usage inspired him to look for those interactions with his loved ones in more tangible places and communicate more with the people around him.

> *"Whenever I'm not using my phone, I'm more productive. And since I'm more productive, I'll have more time on my hands. And during that free time I'll barely use my phone; I go out, see some friends and stuff. I guess* Screen Time *actually helped with was telling me… 'Oh you're wasting two hours of your day on social media' and its like… 'Wow… I could be doing so many things with that… ' That whole time I'm on my phone, I could probably be watching YouTube videos to help me with my statics test or anything like that." — William*

Additionally, he felt it would be helpful to redirect his attention to his schoolwork since the end of the semester was approaching.

> *"And now it's more of like… Shorter FaceTime calls, less time I guess… I think I use Instagram a bit more… But like just a lot less YouTube and FaceTime, but also finals has…a huge part with it too." — William*

This was what spearheaded his desire to make sure he was focused on school and gave himself a chance to learn outside of the classroom. He admitted

that this was something he would hardly be capable of doing if he was “wasting time on his phone all the time.”

Time Will Tell

There are a couple of things worth noticing from William and Dolores’ smartphone usage patterns and their approach toward change. The first is that while it may seem at first glance that the participants’ desire to reduce their smartphone dependency is determined by the numbers, it is the numbers that are determined by the participants’ will to change. The change log table shows clearly that William was not the only one who answered yes to all three questions about device usage awareness and whether *Screen Time* played a role in any changes in usage over the course of the monitoring period — Maeve and Teresa did as well. What got William to the point where he could see the level of change he did was a determination to re-invent his situation. He reported a focused approach to the data that *Screen Time* presented him with; more so than Dolores or any other participant. In fact, his momentum continued after the primary monitoring period and led him to even lower numbers with a total screen time of 17h 20m and 733 pickups — averages of 2h 28m per day and 105 pickups per day. This translates to a 29% drop in pickups from the previous week and the lowest screen time

recorded for any participant any point in the study. He had challenged himself and was quick to point out what he felt was a triumphant attainment of goals he had set for himself.

"Look at that 46% decrease!" — William

The second thing to note about the differences between William and Dolores is the opposite nature of their goals, in that while William had set some, Dolores hardly had any. This is not necessarily a negative thing, as she has the right to choose how she uses her phone, and the main goal here is not to evaluate participants' life choices but to see if iOS 12's *Screen Time* feature is equipped with tools that can help facilitate change in smartphone usage patterns for users who desire it. The results here simply show that Dolores did not desire any such change. William did, however, and the results show that *Screen Time* did help him achieve it, and assisted Maeve and Teresa — Bernard on some level — to do the same to varying degrees.

Thus, focused attention to *Screen Time* and the data it provides can in fact bring about a change in smartphone users' feelings and approaches toward their device usage.

CHAPTER 4

Discussion

By showing that the meaning and attention iPhone users assign to Apple's *Screen Time* feature is capable of influencing the meaning they attach to their iPhones, the findings of this study ostensibly show that Screen Time is capable of bringing about more focused smartphone usage through self re-evaluation for people who pay attention to the data it provides. While the feature itself could potentially be improved with the inclusion of options for stricter enforcement of the restrictions users can implement to manager their usage, *Screen Time* does a fairly good job of outlining the most salient aspects of smartphone usage for users in the simplest of terms, with summaries that help with the tracking of progress both overall and in a variety of areas.

The participants of this study all reported having enjoyed being a part of the study and had a lot to say about themselves, the potential of a study of this nature, and even about the influence of smartphones on the world in general. While the positive potential of smartphones and personal computing technology was recognized across the board by the participants, there was also an underlying concern for the dangers that could result from unchecked growth in this sector as smartphones become more and more of a necessity in human society.

Societal Implications

A few of the participants noted that they felt the world needs a change and should be wary of smartphone technology's potential to become the centerpiece of human lifestyle; a few participants expressed concern that it already has. Logan seemed disenfranchised with the idea that smartphones in an ever connected world truly promote connection and foster interaction between people, especially when the people in question would not have initiated such contact on their own. He expressed poignant concern about the over-reliance on smartphones he observes in the people around him, and the long term laziness it is conditioning people to have:

> *"It doesn't necessarily bring everyone in the world together. I remember growing up… My friends and I always had to, you know… Always had to like… We were always meeting…in person to you know, play, communicate, do whatever we wanted to do. It was never over the phone kind of stuff but right now like you know everything is over the phone, people are not able to properly socialize and what not." — Logan*

Similarly, William's candor showed a deep seated albeit passive concern regarding the paradigm shift brought about by social media, and the corrosion of societal values that he believes are likely to occur as a result.

> *" I know one person that has tried to become a social media star. I saw like, all the struggles she went through, and like everything she had done to get to where she's at right now. And me personally I don't think that was worth her wasting all that time and I believe, it's just… You know it's wrong cause the new generation, they're gonna grow up with this; with social media already established, so they're gonna be growing up seeing all these people making money off social media and stuff. You know when you grow up seeing all of this, why would you wanna be a doctor? Why would you wanna be an engineer? when you could be traveling around the world and having fun." — William*

While it is left to be seen just how the existence of smartphones and their increasingly prominent role in society will affect humanity, the presence of these worries in the minds of the participants is signifiant, as highlights a key aspect of the meaning they attach not only to their phones, but the way they are used. They seemed hopeful that the existence of software like *Screen Time* would point society in the right direction or at least provide the tools for it to do so on its own,

and this is an indication of the meaning they attach to *Screen Time* and everything it could be capable of in the long run.

Apps and Lifestyles

One other factor that could potentially have affected the results of the study and participants' approaches to *Screen Time* in any capacity, is the apps they use. As stated in the section on recruitment in the methodology chapter, each participant is a unique individual, and this is reflected in their goals and choices. Although Dolores and William are both engineering students, they hail from different backgrounds and have two different personalities. Although to an extent that is hard to pinpoint due to its intangible nature, this could potentially have been a cause for the difference in their attitudes to *Screen Time* and their phone usage in general.

Limitations and Future Research

The research conducted in this study is done with full knowledge that this is new terrain, examining newly implemented technology that addresses digital wellness in a way that is more direct than anything that has come before it. While

the study builds on the findings of already established research, the limitations of it are clear in that only a fraction to the full picture can be drawn with the resources available here. This study sough to understand the meaning users give to their smartphone use and was able to evaluate the utility of *Screen Time* as a tool. Wider conclusions on smartphone addiction, its implications on mental health, academic and professional quality of life and productivity are beyond the scope of the analysis carried out here. Having said that however, this research will provide a framework or the very least, a stepping stone for both users and technologists to understand the practical and unstructured human response to features like Screen Time, and perhaps inform the process of improving it over time in order to maximize user engagement for optimal results.

The participants themselves had interesting quirks of their own that may have affected the results to varying degrees. For example, Teresa was initially difficult to schedule and this affected the flow of the process to a certain degree at the beginning. Also, *Screen Time* was not enabled on her device by default prior to the monitoring period and the cause of this is unclear. This is the reason for the lack of initial data in her section of the change log. Participant control over *Screen Time* is understandably out of the study's control and this should be noted in any future attempts to study both *Screen Time* — or any future iteration of it — and any aspect of user engagement when in comes to smartphones.

Another important point is the effect of participation on the participants themselves, in terms of both overall influence and priming. What is perhaps most interesting about William as a participant is his status as the one with the most fervent desire to change. Throughout the process, he expressed concern for his smartphone usage and the overall effect of smartphones on society in a way that bordered on existential, and it made for a great deal of comic relief in the interviews, which paved the way for elaboration on topics that were sometimes unexpected. Conversations with him had a way of capturing the essence of seeking meaning, that qualitative research embodies at its core. He monitored things so closely however, and this was likely an effect of his being hyper-aware of the study and what it may or may not require of him. His actions taken in that vein might have actually skewed the results of what would have been more natural usage. This is not easy to determine in concrete terms however, as awareness is something that was encouraged in all participants, and it is difficult to define what "too aware" truly means.

For the most part, a lot of the patterns shown in the participants' data ended up supporting the keywords assigned to the themes they emphasized in their initial interview, which lends further credence to the profiles that were created for them in the process. Dolores saw her phone as a tool, but had a level of attachment common with individuals who view their phones as extensions. Logan's struggle

to describe his relationship with his iPhone is a prime example of this. So there was a bit of a discrepancy there and this could be because of her lack of attention to her usage, which could be bringing about a tendency in her to not her her device usage for the way it really is.

Her goals are her goals however, and each participant was made to understand this freedom in the same way. Going into all this, it came up in discussion with each of the participants that this entire venture is less about crunching numbers and more about analyzing how the implications of the numbers can aid anyone with goals for their smartphone usage in achieving them.

One final thing worth noting about participant engagement is that while Screen Time proved helpful for a considerable number of the participants, most of them did not use the controls it provided to aid in their quests to change their approach, so it is unclear how helpful those are on their own.

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APPENDIX A

Interview Guides

Initial Interview

1. Tell me what your typical day of phone usage looks like
    - Walk me through it
    - Are there any specific scenarios of note?
    - Is there anything that tends to cause a notable deviation from this pattern?
2. What apps take the most of your time?
    - Off the top of your head, what do you think these might be?
    - Would Screen Time agree with you? What do its records say?
    - Are there any differences? Are you surprised?
3. Do you ever think your phone might be distracting you from experiencing the fullness of person to person interaction?
4. How much of your smartphone usage would you say actually involves communication with actual people?
    - How much do you use phone apps to make calls?
    - How much do you text?
    - Are there any other avenues? FaceTime?
5. Do you think the type of phone you have influences the state of affairs here or any of the answers you've been given so far?
    - Would things perhaps be different if you were an Android user?

6. How important would you say your iPhone is to your life in the grand scheme of things?
    - Could you live without it? For how long?
    - Is there anything you can't live without? Why?
7. So do you see your iPhone more as a tool or as an extension of yourself?
    - Would you have the same answer if you were using a different kind of phone?
8. Any additional thoughts?

This then led into a follow-up inquiry to connect the participants' initial answers to *Screen Time* and establish context:

1. How did you become aware of Screen Time?
2. Do you notice the weekly notification with the usage report?
    - Do you check it?
    - What does it tell you?
3. Has it made you conscious of your smartphone usage?
4. Do you understand what it's trying to tell you?
5. Do you think it can be helpful to you going forward?
    - Are there any improvements you've made to its functionality?
    - Do you think it's capable of making a difference in your life?

Follow-Up Interview

1. Would you say your Screen Time has been different this past week?
    - How so? What's changed this week?
2. Has your typical day changed?
    - Walk me through it?
3. Have you become more or less conscious of your screen time?
    - What are you doing differently?
    - Same apps?
4. How much person to person interaction did you have this week?
    - Was any of it hindered by the use of your phone?
    - How much of it was helped by the use of your phone?
5. Was there any situation this week where your phone truly came in handy?
    - What was that? How was that?
    - How did it affect your typical workflow and phone usage?
6. Were there any external factors that contributed to the change in your screen time?
    - Did it increase or decrease?
    - Friends using the phone perhaps?
    - New circumstances or anomalies?
    - How did that work out for you? How did you deal with it?
7. What would you do in a situation where you didn't have the phone?

- Panic?
- Alternate device?

8. With all this in mind, would your answer to the question of how important your iPhone is to your life and whether you can live without it be the same?
9. How much has Screen Time helped you implement all these changes to your lifestyle?
    - Especially in the past week
10. Did you try any of the toggles within *Screen Time* or the Do Not Disturb feature?
11. Any additional thoughts?

APPENDIX B

Unabridged Change Log

	Screen Time different?	**More/Less Conscious?**	**Screen Time helped?**
Bernard	Yes but showcase	Yes	Increased awareness but didn't really change much because of all the schoolwork
Dolores	"Probably not". Haven't really changed anything	Didn't think about it at all. "Pick it up when I pick it up" (01:00)	Didn't use it, but thinks it could help if she tried (15:42). Has no particular use case goals. Just thinks maybe it could help her"be on it less". Her mindset toward her phone has not changed
Elsie	Yes but conference	Not really	Not on the phone less, but just aware of change. Didn't check the data at all, except to update researcher (25:34)
Emily	No, not really. A lot of it in the past week was concentrated on one night	Yes	Used downtime and had it set for certain apps, but wasn't fully satisfied with the level of control she had over it. (02:00) *Screen Time* has helped quite a bit though (25:30)
Logan	"Not necessarily". Had to do a lot of schoolwork-related things on his phone. Couldn't use his laptop	YES — Tries to be more conscious, but it's been hard because of all the work he had to do during the week. (05:40)	Not necessarily (28:52)
Maeve	Yes	Yes	Yes (36:30). Activated Downtime (00:40).
Teresa	Yes	Yes (6:16)	It helped. Showed her the way she's using Instagram — seven hours — and is making her think about other ways she could be spending that time (27:30)
William	Yes	Yes	Yes. 7 on a scale of 1 - 10 (II-03:10).

APPENDIX C

RQ I Theme Mines

Logan

Keywords	Quotes
Distracting; anti-social; restrictive; social awkwardness	“Let me know if I’m deviating though but I feel like this phone...like the phone in general has destroyed, umm… What’s it called?…Socializing in general…”
	“Yeah and it’s also affected like… Alright, even bringing it into the school setting, I feel like this affects public speaking and presentations because people are not able to like face crowds.”
	"They aren’t able to properly communicate their opinions and what not with other people because you know, they spend so much time on social media, never spend time practicing how to communicate and all that.”
Mindlessness	“A bunch of people don’t even realize this, like they don’t know this is what’s happening.”
Laziness; Over-reliance	“It doesn’t necessarily bring everyone in the world together. I remember growing up… My friends and I always had to, you know… Always had to like… We were always meeting…in person to you know, play, communicate, do whatever we wanted to do. It was never over the phone kind of stuff but right now like you know everything is over the phone, people are not able to properly socialize and what not.”
Necessity	“I can’t do without my iPhone. I can do without… I’ve been doing without other phones but I can’t do without my iPhone. Like umm I remember growing up when I had like… I can’t remember what phone it was… I think it was an Android phone but like… Yeah..when it got messed up I was happy. I didn’t stress about it… And then like when I got my iPhone, I was back to life and then like anytime my iPhone gets messed up I try to like, you know, get it fixed in like the next day or two."
Essential	“Subconsciously when I wake up I just look for my iPhone. Like that’s the first thing I look for like… So yeah.

Keywords	Quotes
Asset; Self-extension	“See like… It’s quite valuable to me. Like… It’s part of me.”

Dolores

Keywords	Quotes
Self-control; Attention; Mindfulness	“If I’m talking to people like I won’t be on my phone. Cause I just feel like that’s disrespectful.”
Communication; Instant	“Yeah texting and FaceTime and calling. Like I even talk to my sister sometimes through social media, through Instagram DMs so we do do that.”
Memes	“We send..I don’t even remember how many we send but we send so many. And like I got a few other friends that are always sending some too “
Routine	I mean I’ve had [an Android] before, but it was… I don’t know… It was pretty much the same; like I was… ‘Cause you could still do the same things, like I’d still get on social media, check the weather, text people, call people, so…"
Important; Vital; Self-extension; Necessity	Like if I leave my phone..I’m going back to go get it (laughs). Like even I just leave it at home… Like I can’t just… I have to go back and get it… I need it with me. Not because of like..not because of like the social media stuff just because I like communicate a lot...with my phone with people. I talk to my mother, my family, my grandparents like… How am I gon’ do that without my phone?”
FOMO	“I need… I need something to let people know like… I’m okay or what I’m doing… But then like, I would need to have my phone to let them know like… Okay hey yeah… Like where y’all at or I’m bout to pull up or something.”
Apple	“I don’t know but Apple products are very good products though”

Keywords	Quotes
Bed; Rest; Relaxation; Sleep	“I’m pretty...I think I use my phone the most when...when I’m in the bed and like… Umm probably about to sleep or I’m just being lazy just still waiting in there.”
Boredom	“Yeah it happens during the times where I’m like..the most bored. Like if I’m bored then Imma pick up my phone and try to…”
Compartmentalization	“Cause when I went to Halloween Horror Nights we took..I used my phone to take a picture like the first…when we first got to like the entrance or whatever, and then other than that I just kept it in my bag or something.”

Bernard

Keywords	Quotes
Updates	“I wake up, I use my phone as an alarm..so I wake up and umm..I think typically I would check my phone to see if I got any like texts or notifications overnight and then..if I got any texts I’d probably answer them..this is probably around like 8:00am or something…”
Impulse	“Yeah. And then uhh …I'll get on Instagram umm I don’t have Facebook or Twitter. I have Instagram and Snapchat though so I don’t really get on Snapchat unless somebody sends something to me..I think but then uh I check Instagram..like pretty frequently. Like sometimes I’ll have my phone in my hand and like not even notice I have it and I’m like..refreshing Instagram.”
Routine: Correspondence	“So… I mean every single day, regardless of where I’m at… I’ll start by, I’ll check my emails, I’ll check my Instagram”
	“And then..uhhh check my emails..and then I’d put on a podcast, I pretty much have podcasts playing like throughout the day.”
	“So yeah it’s definitely emails, Instagram in the morning and podcasts in the morning. That’s… That's an everyday thing. Like regardless of where I’m at”

Keywords	Quotes
Media; Consumption	“Every once in a while I’ll go on like a YouTube rabbit hole…”
Habit; Instagram; Browsing; Mindlessness	“Cause like that’s the weirdest thing ‘cause I feel like… I’m like… I’ll subconsciously open up Instagram without even thinking about it. And it’s not even like I’m trying to check Instagram — it just kinda happens. It’s kinda weird. Umm I mean Instagram’s… the least that I’m actively looking at my phone while I’m using…I think Instagram’s gotta be my top app. Maybe Safari..cause I search a lot of stuff too.”
Communication; Memes	“I think I’m… I might… I think I might mostly use it for communication ‘cause like… most of the time when I’m getting like Instagram notifications and stuff… Or like I’ll go through Instagram… I’ll like send memes to friends and stuff.”
Brief; Intervals	“I’m surprised that it was that long on text cause I feel like whenever I get a text message… I’ll like open up my phone, I’ll reply real quick and then… Just like shut my phone off…”
Brand; Loyalty	“I kinda like get cringy about texting people who don’t have iPhones… I don’t like the green bubbles”
Calling; FaceTime	“I don’t even think I really FaceTime people..like until..until Comfort started FaceTiming me 24/7. And then like..that’s my new mode of…calling. Normally when I call somebody, I FaceTime first now.”
Necessity; Conflict; Dissonance	“Umm..like I don’t really like think it’s that important. I… I find it weird that like… I feel the need to use it so much.”
Tool; Preparedness; Handiness; Attachment; Completion	“Umm..I mean I see the..I feel like I see the phone more as a tool but at the same time it’s like uh..umm..I don’t know, like almost if someone has like uh leatherman you know? Like they always wanna carry it with them ‘cause they’re like, you never know when you’re gonna need it. I feel like that’s more… Like I don’t feel like it’s like an extension of myself, I don’t think… But I feel like… I do feel like strangely attached to it I think but not like… I don’t feel like uh… It still feels like something I could use to accomplish tasks… I guess.”

Keywords	Quotes
Replaceable; Inconsequential	“So that’s..it’s useful for sure but I feel like I could go… I could go off grid I think. I don’t think I need like my phone or the internet.”

Emily

Keywords	Quotes
Tool; Routine	“On an average day, I would say I wake up I and have multiple alarms but my phone is usually the first thing I see and I usually like, wake up and start uh… Watching a YouTube video or just checking the most important messages or emails”
Updates; Notifications; Emails	“I’m constantly checking my mailbox especially because I get a lot of emails and I hate it and I also get text notifications so I keep checking it all the time”
Instagram; Snapchat	"Whilst I had umm… Insta, umm… And Snap, I realized I would go on one hour tangents or thirty minute tangents for no reason, so that happened very often during class.”
Distraction	“And I do think it’s taking it’s taking over a lot of people and there are a lot of people that are really not enjoying things”
	“Realized a while ago that I will check even if I was doing absolutely nothing I will lift my phone check it around once every minute even if nothing had happened before that, and even if nothing… Even if I was doing the exact same thing, I’ll just stop and grab it and I wouldn’t even realize why, which drove to just stop and just try to change my little phone habits a while ago.”
Spontaneity	“Umm various times I’ve just simply been with my friends or my boyfriend or his friends or anyone honestly, and I just stop and look up and I know that my friend will be taking pictures in this moment cause they always take pictures of like everyone on their phones”
	“At honestly at any given moment I use YouTube a lot”

Keywords	Quotes
Video; Streaming	“I do watch YouTube while I’m cooking and cleaning and or if if not YouTube then my series undoubtedly umm well Im eating I also tend to watch something I usually eat by myself when I go to PDH”
Reading	"Yeah I really like reading as you can see”
Secondary	“If I'm hanging out with friends then I probably won't check my phone as much as I normally do, so if there's any special occasion my phone usage will decrease a lot. Umm… If I am traveling as well, I tend to not look at it often from the moment I leave until the moment I get there. That's pretty much it umm except for like music I guess”
Extension	“I’d say on a normal basis, an extension of myself.”
	“I’m just too... I use it a little too much and that honestly bothers me. If you’d like…have done this a month ago, that would have been different… I embraced my phone fully and I wasn’t caring about how much time I was spending on it at all”

Elsie

Keywords	Quotes
Music	“And I’m always playing music. In classes, I still use my phone. I listen to music while I’m learning. So I’m always playing music”
	“Mondays, my first class is at 10 so, I would listen to music throughout that session that 10 to 10:50 then walk to my next class which starts at 11 then I turn off the music because that class is differential… Honours Diff-EQ.”
	“Live without my phone… No, but I need do music. That’s one thing I need. I need my music. If you give me an iPod, like good iPod, and I can get my music, maybe I can live without my phone.”

Keywords	Quotes
	“I don’t listen to music in that class because I need to focus so that’s why, then I put off my phone… Then I eat… Have lunch. I don’t use my phone because I am always eating with my friend. And then he leaves… Then my sister comes. So I’m not using my phone lunch if anything.”
Secondary; Priorities; Compartmentalization	
Archive	“I don’t have Instagram anymore, and I came on snap. I’ve been feeling very nostalgic so I spend a lot of time looking at old photos, videos… I mean photos a lot.”
Games	“Oh I play this game a lot: Woody. I forgot… It’s like Tetris”
Distraction	“And I used to back in the days for twitter, but now, I really just got back to see people because I don’t tweet. So um no. Snapchat is cool. Came off because I feel like I was on it for the wrong reasons. “
Indifference	“I wanted the Note 9. That’s what I wanted. And then Angela wanted the iPhone. So I was like, “Ok, fine let’s try iPhone.” I’d Switch to an android any day. I would. I barely use the iMessage. Only with you. I’m very sure we could talk somewhere else.”
	“No, because in my life right now, I don’t really feel like talking to people… Yeah, I just don’t really feel like using my phone. Just right now this is very bad but like, I could care less. And I used to be like that with my other phone too.”
Tool	“No, I see it as a tool. It’s not an extension of myself, for sure … They can find out a lot about me but it’s not an extension of myself. It’s a tool where I keep my memories. It’s where I communicate people with, and it’s where I get knowledge from because I use it to study, so, it’s a tool.”