

THESIS

EXPLORING APP USERS' EXPERIENCES WITH APP NOTIFICATIONS

Submitted by

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In partial fulfillment of the requirements

For the Degree of Master of Science

Colorado State University

Fort Collins, Colorado

Summer 2017

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ABSTRACT

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There is a cultural tendency towards technological consumption that leads many people to spend an abundant amount of time interacting with technological devices. These interactions can at times make users feel stressed, annoyed, distracted, or left with feelings of constant pressure to 'check-in' with their online environments. Since such feelings are undesirable, their occurrence is likewise problematic. An important solution to one part of this problem lies with implementing better interface design for user experiences. When web designers, project managers, marketers, app developers and publishers, actively elicit and listen to reports of consumers' experiences with their products, both parties benefit from mutual guidance. The following research explored app users' experiences with, feelings towards, and overall impressions of app notifications to understand and unveil the individual differences that lead users to have different experiences and emotional responses to app notifications. Using the phenomenological approach, the researcher conducted ten in-depth, semi-structured interviews to provide a rich examination of users' experiences with app notifications by way of discussing their specific experiences in an attempt to understand what contributes to a positive or negative app notification experience. Thematic analysis was used to organize the collected data and identify possible themes. The study conclusion posits that users have negative experiences and harbor negative feelings towards app notifications because they lack additional control over their settings which helps users filter out online information that is deemed unimportant or received at undesired or inopportune times.

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CHAPTER 1. INTRODUCTION

Overview

The emergence of applications on smartphone devices has dramatically impacted how people socialize, communicate, and play. Many applications include notifications. A notification is a message informing users of an impending update; an essential design element created to facilitate the effective use of applications or apps by capturing the users' attention and to encourage them to engage and interact with their devices. However, there may be differences in the effects notifications have on users: some notifications may excite, while others may be seen as annoying intrusions in the course of daily life. These differences may simply be a matter of whether or not particular notifications are welcome or unwelcome. Nevertheless, understanding users' experiences with notifications is needed in order to understand the role notifications play in user engagement and satisfaction. This understanding can assist application developers to customize applications to improve users' experiences, and in turn engagement.

A key difference determining whether or not app notifications are welcomed may be whether or not they are perceived as rewarding or satisfying. In the context of this study, a rewarding notification will be understood as one that generates a positive emotion. Research on how and why certain types of media experiences generate positive emotions suggests that specific features of app notifications can influence the type experiences app users have. Although, when users download an app, they can decide whether or not they want to receive notifications, there may be cases where a user chooses to receive notifications, but do not experience a positive emotion from the notification stimulus at the time it is delivered. Such cases may result from a variety of conditions.

Need for Study

The present study will explore app users' experiences, perceptions, and feelings towards notifications to understand better why some notifications are liked, disliked, or are regarded indifferently. The cultural tendency for technological consumption leads many people to spend an abundant amount of time interacting with technological devices, which often results in interactions that leave the user to with negative experiences. Since such feelings are undesirable, their occurrence is likewise problematic. Understanding and addressing this problem lies with implementing better interface design for user experiences. When web designers, project managers, marketers, app developers and publishers, actively elicit and listen to reports of consumers' experiences with their products, both parties benefit from mutual guidance. In the course of this exploratory study, the researcher will examine app users experiences with notifications to better understand in which situations app notifications are described in negative, positive, or neutral terms in an effort to advance the development of more user-friendly notifications. A consideration of five areas of investigation will guide the literature review: (a) uses and gratifications, (b) behavioral conditioning, (c) hierarchy of needs and desires, (d) notification association, and (e) context of receipt.

Research Design

The research design will be guided by the hermeneutic (interpretative) phenomenological approach, often used in qualitative studies. The scope of the study will examine the phenomenon of app users' experiences with app notifications. As guided by the hermeneutic phenomenological approach, the researcher will bracket (or set aside) her experiences with, knowledge of, and theories about app notifications. This 'detached position' affords the data garnered to be fresh and precise and necessarily not predetermined. The researcher stays open-

minded to any new or even contradictory themes that may emerge in the analysis stage, and does not make assumptions about the participants' experiences, nor attribute these experiences to an unwarranted conclusion.

The analysis and results of semi-structured interviews with a purposive and convenient sample will aim to define the "essence" of the phenomenon in question based on key themes/classifications found in the participants' responses. To achieve successful bracketing the researcher is aware of her inherent biases towards the phenomenon of users' experiences with app notifications. The following steps will be taken to provide more credibility to results obtained: mental preparation and assessment of the researcher's personality, engaging in reflexivity, asking broad, open-ended question, adopting a 'not-knowing stand' in the interview so as not to make faulty interpretations, keeping a decision trail, and using thematic analysis to understand the content and complexity in meaning of respondents' responses (Chan, Fung, & Chien, 2013). This will entail using many direct quotes in the analysis and results section to allow the participants' experiences draw conclusions.

Theoretical Framework

The theoretical framework for this study combines uses and gratifications theory, literature from the field of neuroscience, key concepts from behavioral psychology including: Pavlovian cues, variable-rewards, and learning theory, Maslow's hierarchy of needs from social psychology, and literature surrounding computer-mediated engagement and information design.

Uses and Gratifications

Uses and gratifications theorists discuss the varied uses of media by media consumers, the impact of media on motivations for engaging in media consumption, and the differing gratification or enjoyment that media consumer's experience (Blumler & Katz, 1974).

Smartphone users are typically engaged in a broad spectrum of media activities, ranging from social networking to financial management to turn-by-turn navigation (Shirazi et al, 2014; Iqbal & Horvitz, 2010; Smith, 2015). The basic use of these technologies is often to communicate with others, to seek information, or to entertain (Park & Lee, 2012; Ebiye, 2015). The perceived impact of these motivations and activities also varies from individual to individual, where some find the smartphone to be a useful and welcome tool, while others find the technology burdensome and distracting (Smith, 2015). These attitudes towards smartphones are likely to impact the perceived feelings generated by app notifications.

Neuroscience

Drawing on literature from neuroscience, it is important to recognize that app notifications can serve as stimuli leading to chemical releases in the brain. The behavior of checking one's app notifications is capable of increasing 'reward-motivated behaviors' (Arias-Carrión & Pöppel, 2007), which increases the chemically enhanced desire to repeat the behavior. This aspect helps clarify the biological basis whereby notifications can make an app user feel rewarded on some occasions and not on others. Neuroscience provides a useful approach to understanding how biological mechanisms impact media experiences. However, these are descriptive explanations that do not inform researchers as to *why* a particular notification in a particular situation is perceived as rewarding, nor the social or cultural context in play.

Behavioral Psychology

The behavior of checking and interacting with notifications creates a cognitive reward system, and this behavior is likely to be adopted into the user's routine life (Roberts, Yaya, & Manolis, 2014). That is to say, application notifications can act as Pavlovian cues (Pavlov, 1960). When an app user looks forward to opening an application, responding to the notification

can generate a cognitive reward. Pleasure pathways in the brain release various chemicals that make individuals feel happy when they receive some level of satisfaction when exposed to a stimulus. This chemical release increases ‘reward-motivated behaviors’ (Arias-Carrión & Pöppel, 2007), which in turn results in more persistent engagement with the stimulus. Learning theory adds both clarity and evidence in this context by demonstrating how specific reward-reinforced behaviors are incorporated into users’ habits (Roberts, Yaya, & Manolis, 2014). Engagement with an application activity can result from positive or negative reinforcement (e.g. enjoyment from texting or avoiding social situations).

Additionally, variable-rewards research from the field of psychology demonstrates that users receive a stronger infusion of dopamine when the reward is unexpected, as compared to a scheduled or expected reward structure (Ferster & Skinner, 1957). Drawing from this line of research, users can be expected to experience a stronger pleasure response after receiving randomized welcomed app notifications than after receiving expected ones, and will therefore be more likely to perceive such randomized notifications as rewarding. Behavioral conditioning is thus a significant factor that can account for differences between rewarding or unrewarding experiences when users receive app notifications. While behavioral psychology is accordingly an important lens to utilize in the analysis of notification rewards, this approach, like that derived from neuroscience, provides a mechanical description of the stimulus-response patterns involved in notification behavior, but does not attempt to explain *why* certain notifications but not others are perceived as enjoyable.

Hierarchy of Needs

In addition to behavioral conditioning, social psychology literature demonstrates that people organize and prioritize their internal and external needs (Maslow, 1954), which can

impact how and when notifications activate reward-responses. Through examining the hierarchy of needs, this study will explore how app users describe their experiences with prioritizing notification messages based on the situational context of receipt.

The degree to which app users perceive themselves as having control over the content (Sundar, Xu, & Bellur, 2010) as well as the frequency of incoming app notifications can impact the characteristics of their experiences. An app alert will notify a user that there is an update in the app. App users can, however, control which notifications for specific apps they wish to see. This allows users to identify what they want to be reminded of, to accept the randomization of an alert, and to create a customized hierarchy of which apps matter most. Hierarchy of needs literature suggests that people categorize and prioritize their needs as if constructing a pyramid, where the most fundamental needs (survival) are at the bottom and self-actualization (self-potential) is at the top (Maslow, 1954). This framework has two advantages: on the one hand, it provides a useful vocabulary for describing how and when app notifications may function as stimuli that activate cognitive rewards, and on the other hand, it affords an effective way to understand how app users might organize and prioritize notification messages based on the situational context of receipt.

Computer-Mediated Engagement

Literature surrounding the concept of computer-mediated user engagement shows that app users are more likely to engage with notifications that are relevant, time-sensitive, and valuable (Kahuna, 2015). This suggests that notification messages themselves (that is, their contents) impact a user's experience.

It is likely that app users create associations between a notification and its source. If the source does not meet a certain level of individually perceived importance or significance, then

the notification will not be given further attention, and the user is unlikely enjoy the app experience. In fact, if the notification is undesired, it can create a boomerang effect where the individual rejects the notification, becomes frustrated by it, and possibly deletes the app.

Information Design

Finally, information design literature suggests that the (spatial and temporal) location, as well as the category, type, or genre of the app notification, may impact how and when the app user will respond to the notification.

It is important to mention, that these areas of investigation help the researcher understand some of the features or conditions that contribute to an app user's experiences with, and feelings towards, app notifications. Accordingly, these areas of research will aid in the analysis stage of this qualitative study, helping the researcher to construct concepts, themes, and patterns based on participants' responses. The research questions and interview procedures will therefore address the general phenomenon of users' experiences with app notifications; rather than specific and detailed questions that only examine portions of the phenomenon in question. This approach will allow participants to describe their experiences with, and feelings towards, app notifications, thus allowing the researcher to advance current understanding by way of probing the general phenomenon of experiences with app notifications.

Rationale

The rationale for proposing and executing this study begins with identifying the societal trends that warrant raising the question: How do users describe their experiences with app notifications? Among these trends lies a general cultural pressure to consume, and in this case, with specific reference to technological consumption. In their everyday efforts to consume technological mediums (e.g. the purchasing of phones, televisions, personal computers), people

also begin to also consume and rely on interactive processes (which may also be understood as the processes whereby users interact with one another in mediated spaces) (Stromer-Galley, 2004). And in our effort to continue our consumption of these processes, we inevitably, even if inadvertently, consume interactive products (which may also be understood as users' interactions with technological features such as share, post buttons or app notifications). This cultural tendency towards technological consumption leads many people to spend an abundant amount of time interacting with technological devices at school, work, and home. These interactions can at times make users feel stressed, annoyed, distracted, or left with feelings of constant pressure to 'check-in' with their online environments. Since such feelings are undesirable, their occurrence is likewise problematic.

An important solution to one part of this problem lies with implementing better interface design for user experiences. When web designers, project managers, marketers, app developers and publishers, actively elicit and listen to reports of consumers' experiences with their products, both parties benefit from mutual guidance. After all, the reason to build an app in the first place is for people to use it. When user experience becomes an essential factor in developing a visionary product, a better relationship between the user and the interface will emerge than otherwise would. On the one hand, it is likely that this improved relationship will produce more money for the creator, but on the other hand, it also creates more than just a good experience for the user; it creates a mentality. Highly satisfying user experience with an interface creates, shapes, and fosters a relationship that goes beyond efficiency. It creates an expectation and psychological mindset of control in a sea of mediated chaos. The updates provided by app notifications are similar to the notices and announcements we receive in our offline environments, except that we have not yet developed an effective means to filter these updates.

Understanding what makes a notification rewarding brings us a step closer to creating an extended sensory filter for ourselves in online environments. Furthermore, since expectations of control may themselves be culturally influenced, in the effort to survive and thrive amidst the cultural pressures of living online, we may need to use cultural counter-pressures (i.e. improved user control) to help create solutions.

Goal and Research Questions

The purpose of this study is to achieve a deeper understand of app users' experiences with app notifications in order to evaluate what factors contribute to a positive, negative and indifferent notification experience. The following research will explore app users' experiences with, and feelings towards, app notifications in order to understand and unveil the individual differences that lead users to have different experiences and emotional responses to app notifications. Understanding users' experiences with app notifications in general, and, in particular, understanding the characteristics of those interactions that increased a pleasurable experiences after receiving a notification can be expected to assist application developers when customizing applications to serve individual users' needs and desires, and for users to engage with various applications more effectively than they otherwise would.

Research Question 1: How do app users' describe their experiences with app notifications?

Research Question 2: How do app users' describe their feelings toward app notifications?

Research Question 3: How do these experiences and feelings inform or shape the overall app-user experience?

To examine these questions, this project will involve conducting a series of in-depth interviews. Using thematic analysis, I will examine participants' responses to identify possible themes, which may in turn reveal possible patterns of reactions to notification rewards.

Organization of Proposal

This study will explore app users' experiences with, and feelings towards, app notifications. Chapter 2 outlines the technical aspects of app notifications, including: a comprehensive definition of app notifications, the distinction between push and pull notifications, a brief history of app notifications, and a discussion of app notification categories.

Chapter 3 discusses the theoretical framework that informs and supports the study. Media use will describe the types of activities in which app users are engaged. Uses and gratifications will discuss the broader patterns of media use and attitudes toward smartphone apps to demonstrate the impact app attitudes have on notifications. Literature from neuroscience helps to make plain the underlying biological processes that differentiate occasions when notifications are perceived as rewarding and when not. The theory of hierarchy of human needs provides a framework that has a useful vocabulary for describing how and when app users may organize and prioritize notification messages based on the situational context of receipt. Smartphone user engagement literature suggests that notification messages are likely to impact the quality of a user's experience. Finally, information design literature suggests that the location and category of the app notification is likely to impact how and when the app user will respond to the notification.

Chapter 4 is the methods section, which includes cited background for the methodological use of hermeneutic (interpretive) phenomenology, in-depth interviews, recruitment and participants, procedures and thematic analysis. Chapter 5 explains how the analysis will be conducted, and provides a detailed timeline. Finally, Chapter 6 provides conclusions, including a critical analysis of the project, which incorporates limitations and potential problems that could be encountered, as well as proposed solutions where possible.

CHAPTER 2. TECHNICAL ASPECTS OF APP NOTIFICATIONS

Defining App Notifications

Before discussing the definition and features of app notifications, an understanding of apps themselves needs to be considered. According to the *Oxford Dictionary*, the definition of application, within the context of computing, is specified as “a self-contained program or piece of software designed to fulfill a particular purpose”. Applications, also commonly known as apps, are intended to be downloaded by users onto computer-mediated mobile devices, such as smartphones and tablets (Olmstead & Atkinson, 2015). An app is a self-contained piece of software that connects users to the Internet. When clicked on, the app acts as portal that the user enters to access the apps advertised content.

Apps are a common feature used by mobile device users; in fact, 68% of Americans that own a smartphone access roughly 26 apps per month, spending approximately 37 total hours in apps per month, a tally that continues to increase each year (Nielsen, 2015). A study conducted in 2016 found that app users spent 89% of their time on media in mobile apps, while only 11% of their time was spent on the mobile web (Nielsen). One of the key features that encourages mobile device users to open and view apps is the implementation of app notifications.

App notifications are visual, auditory, or haptic/somatic alerts generated from an app that communicate new messages, new incoming emails, social network updates, game related messages, and signals indicating the availability of any new updates within a given app (Pielot, Church, & de Oliveria, 2016). The overarching purpose of an app notification is to notify or alert an app user of new events and messages upon their immediate arrival. The category, or genre, of the app will determine the type of message that app users will receive (see further discussion in 2.1.2).

Push vs. Pull Notifications

App notifications are elicited in two ways: push notifications and pull notifications. As their names suggest, push notifications are messages sent to app users' mobile devices. Push notifications appear on the lock screen, the main home screen of a mobile device, or appear when web-browsing or in other apps in the form of message boxes (see 2.1.2 for visuals) (Martin-Flatin, 1999). Push notifications are the direct push of information to the app user by a web server that houses information for a given app. App publishers are able to send messages at any time and can create any message they desire. Pull or poll notifications, on the hand, are updates requested by an app user (Martin-Flatin, 1999). Pull notifications occur when an app user is searching for new information within the app and requests an update. The new information will appear in varying design layouts within the app itself; typically the new content is highlighted in some way (see 2.1.1 for visuals). Unlike push notifications, pull notifications do not have pop up message boxes or badges. The use of push notifications is a more popular method for sending updates to app users than the use of pull notification methods (Martin-Flatin, 1999). Push notifications remind users to engage in activities with the app, rather than relying on the app user to remember to use the app, and ask for updates on their own time and terms.

Receiving push notifications without providing any customization opportunities for the app user can be viewed by some as burdensome (Westermann, Möller, & Wechsung, 2015). Control over computer-mediated features is an important aspect for users (Sundar, Xu, & Bellur, 2010). Allowing app users to have customization-control over their notifications can increase perceived preference for an app. iOS and Android launched push notification systems (Apple Push Notification Service and Google Cloud Messaging) in 2009 and 2010, respectively (Urban

Airship, 2016). Each push notification system provides a few features within the operating system that allow users to customize the receipt of notifications.

iOS users are provided an immediate option after downloading an app to turn on notifications or turn off notifications. iOS users have the option to change their notification preferences at any time in the System app that is a permanent app on every iOS device (see Figure 1).

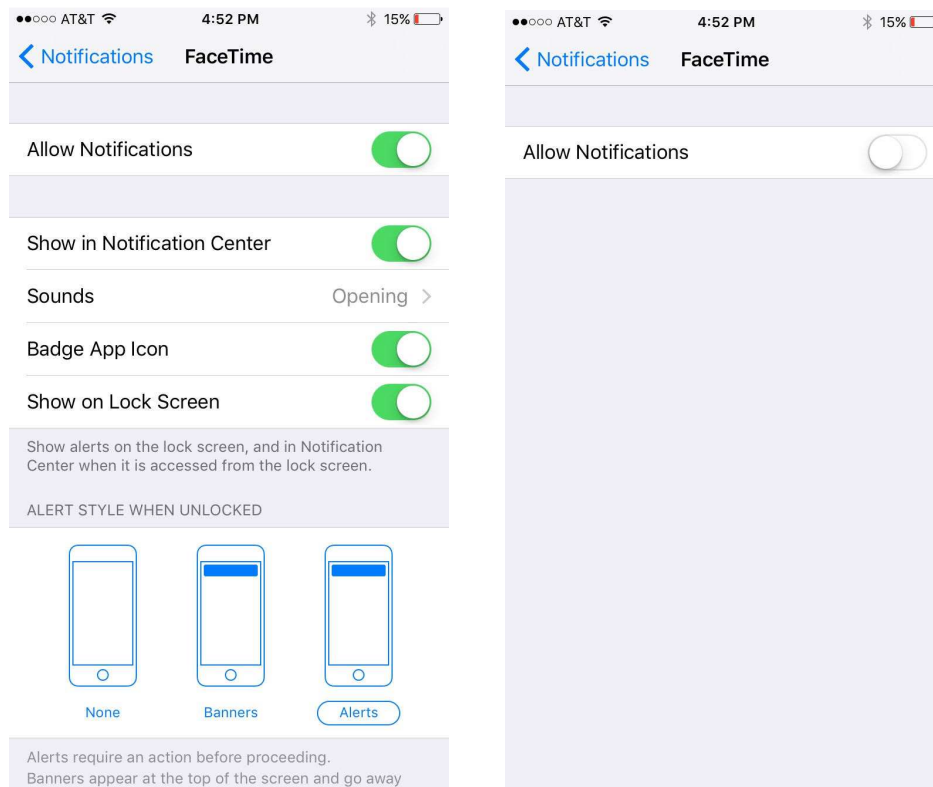


Figure 1. Notification Customization Features for iPhone

These features provide the app user with the option to control and customize whether they wish to receive notifications for any given app, where notifications will be displayed on their screens, and whether the notification will generate any sound and/or vibration when received.

Android users, however, are not provided an immediate opportunity to opt-out of notifications at the time they download an app. Android users will automatically receive app

notifications unless they change their notification settings for a given app. Android users, like iPhone users, are able to customize where they wish to receive app notifications on their screens, and if they wish to be notified by sound and/or vibration (see Figure 2).

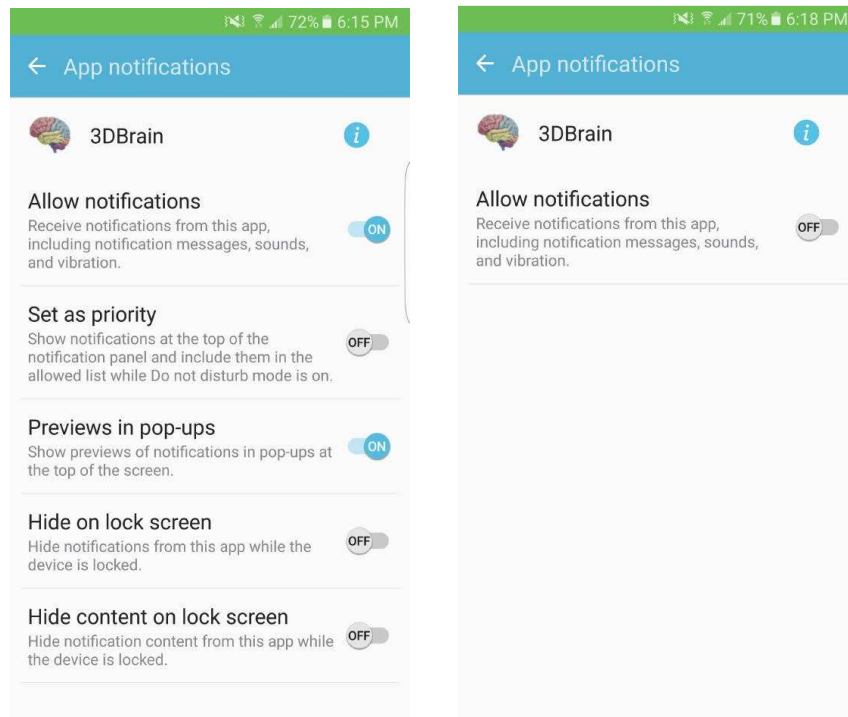


Figure 2. Notification Customization Features for Android

These customization features provide app users with a degree of control over how they will receive notifications, and are likely to contribute to a perceived sense of customization power over, and preference for, app notifications.

Screen Location of App Notifications

Notifications are displayed in a variety of places on smartphone devices as previously demonstrated. Notifications can appear in differing locations for iPhones and Androids.

Notifications can be found on both operating systems in following places: in the middle of the lock screen, in the middle of the home screen, the top right hand corner of an app, at the top or lower portion of the screen when another application is open and being viewed, or in the

notification center (a separate screen view just for notifications); see Figure 3 for iPhones and Figure 4 for Android. Some Androids, however, are able to display notifications along the side of the screen. Notifications that are shown in the top right hand corner of an app are called badges. Badges house the number of notification received, but not yet viewed, for a particular app. Notifications can be displayed on the lock screen of the mobile device, and will remain there until opened or until the user unlocks the home screen. However, app users can unlock the home screen without opening any notifications presented on the lock screen. Smartphone app users are able to view an app notification briefly if the app is delivered when the user is on the home screen. A full view of the notification is accessible when the app user opens the app or app notification.

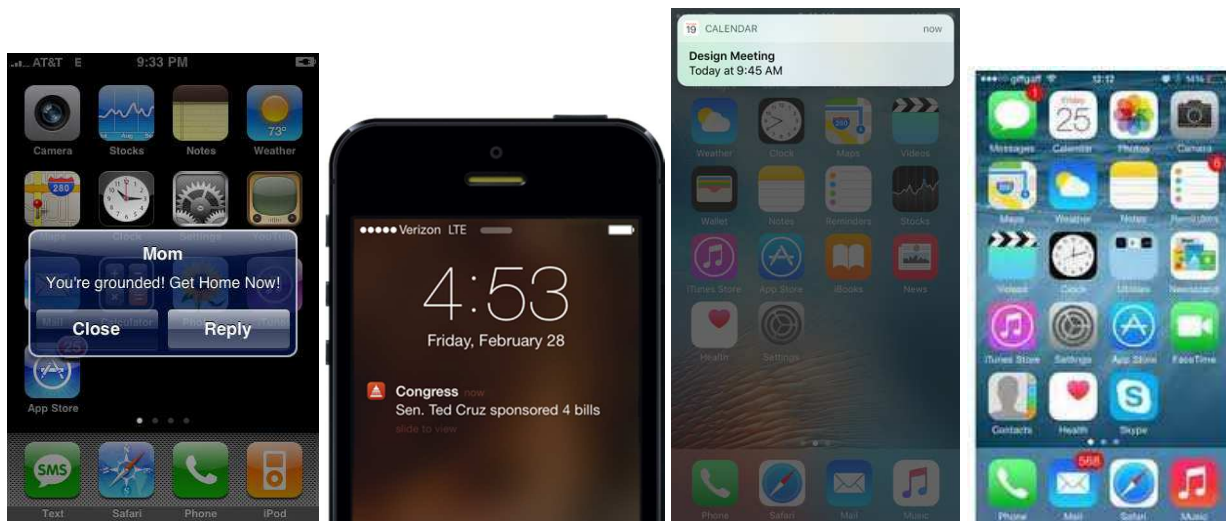


Figure 3. Locations of Notifications on iPhones



Figure 4. Locations of Notifications on Androids

The informational design of notification locations on computer screens can impact a user's experience. The location of the notification and the hierarchy of needs of the user can determine if an app user finds the notification enjoyable. For example, if a user experiences a health notification at the top portion of the screen, disrupting the user's game, the individual may have a positive experience because the notification is reminding them of a lower-level, basic need. Conversely, if the app user receives a notification while he or she is in a health communication conversation with an authority figure, and a notification encouraging the user to play the next move in a game app appears, the app user may have a negative experience with the notification, and ignore the notification because the health communication task is of greater importance. The badges (red circles located "on top of" an app) and banners (rectangular boxes that appear on the lock screen/home screen/in app) used by notifications may also impact how a user experiences an app notification.

App Categories

The category to which a notification belongs can impact a user's experience. After the development of apps on mobile phones in 2008 for iPhones and 2009 for Androids, the number

of types, or genres, of apps has increased dramatically (Nielsen, 2014). The categories of apps, as listed in current iPhone and Android app stores, include the following: books, business, catalogs, education, entertainment, finance, food and drink, games, health and fitness, kids, lifestyle, magazines and newspapers, medical, music, navigation, news, photo and video, productivity, reference, social networking, sports, travel, utilities, and weather.

A recent study conducted in 2015 stated that the most common apps were: utilities, entertainment, games, news, productivity, lifestyle, and social networking (Kahuna). This shows that apps that connect individuals with their social circles, entertain them, update them on relevant and important information, and aid in lifestyle and productivity are likely to have notifications turned on by app users because users may find them more enjoyable (Kahuna, 2015).

However, the most common iOS push notification opt-in rates for 2015 were: ride sharing, food and beverage, betting, sports, online services, ecommerce, travel, news media, and social media (Kahuna, 2015). This shows that app users are finding notifications that are relevant, time-sensitive, and informative are important, worth receiving, and thus rewarding, enjoyable, or otherwise appreciated. The hierarchy of needs is present in these preferences, showing that an app must first fill a functional role consistent with the hierarchy before it proves likely to be considered among the top five apps used on a regular basis (Maslow, 1954).

The Alert of a Notification

As previously discussed, notifications are visual, auditory, and/or haptic alerts generated from an app that signal any new updates from within the app. They are inherently attention-grabbing methods, designed to distract, persuade, and encourage the app user to open and engage

in a particular activity. The sensory signal produced by notification alerts (visual, auditory, and/or haptic) attracts an app user's attention in different ways.

A notification "box" is a visual stimulus containing information about a new app update message that is processed by the occipital lobe at about 0.25 seconds after exposure; whereas a notification sound, ring, or beep is an auditory stimulus informing the users that a new update has just arrived and is processed by the temporal lobe at about 0.17 seconds after exposure, and finally a vibration notification is a somatic or touch stimulus that, like the auditory stimulus, informs the user that an update has arrived and is processed primarily by the parietal lobe at about 0.15 seconds after exposure (Columbus Ohio Frontiers in Physiology Local Outreach Team, 1997; Mayo Clinic, 2017).

Although research concludes that humans are distracted by noise (Shield & Dockrell, 2003; Klatte, Meis, Sukowski, & Schick, 2007), visual (Nordahl, & Korsgaard, 2010), and somatic experiences, there is no conclusive data that suggests one is more distracting than another, despite the different processing speeds or size of the sensory system. Ultimately, what researchers do understand is that sensory systems help humans "detect changes in our environments and to adjust our behavior" (Lourenco, & Casey, 2013). It is arguable that the individual differences in experience among app users depends, at least in part, on the sort of stimuli they find more or less distracting. It should be noted, however, that individuals have different thresholds for information processing from our senses, but all individuals will reach a cognitive overload level once their individual thresholds are met.

Motivation to Engage with Notifications

Although it remains unclear why some alert notifications are able to distract app users more than others, understanding why people interact with notifications is, simply put,

complicated. However, one avenue of thought suggests that use or consumption of technological devices could impact motivation to engage with notifications. Consumption, in general, is driven by the human evolutionary design, whereby humans are, in a very basic sense, “hunters and gatherers” (Kaplan, Hill, Lancaster, & Hurtado, 2000). This observation is directly applicable to both the mediated acquisition of knowledge and the practice of engaging in mediated relationships. One of the main components that fuels these activities is the cognitive rewards humans experience, so that the repetitive and intensive activity of *living* online becomes alluring and even addictive, which results in a constant craving for new, however fleeting, information (Aiken, 2016). Neuroscientists are discovering that any repetitive activity creates “strong and rapid alterations in brain circuits and functions”; alterations that encourage us to continue a behavior (Carr, 2011). This explains, in part, why people repetitively respond to notifications. Monitoring updates provided by the Internet accords with our evolutionary design (Carr, 2011), our inherited inclination to monitor any sensory input as a means to ensure survival. But instead of using these sensory systems for immediate survival, humans have come to transfer the focus of these systems to matters of social, cultural, and career survival. The medium of the app encourages a philosophy wherein humans need to overvalue what is happening in the present moment, creating an immediacy effect (Chabris, 2008).

Rewards from Notifications

Because the motivation to engage with apps is both complex and complicated, so too it is likely that our relationship with the rewards we gain from being alerted is equally complex and complicated. The alert provided by a notification is likely to impact the reward or positive feeling an app user experiences within the context of receipt. However, public research on user experience, preferences for app notifications, and customization options is relatively scarce.

A 2014 study explored the level of stress app users experienced and their level of experience with customizing app notifications, and proposed that four groups of users exist (Yoon, Lee, Lee, & Lee). First were members of the sensible group (high stress, high activeness), who actively set their notifications, but were still stressed when they received them. Second were members of the disoriented group (high stress, low activeness): this group was significantly smaller than the other three groups, but had high stress from receiving and responding to notifications because “they think that they do not know what to do to set notifications” (p.80). Third were members of the indifferent group (low stress, low activeness): they had little to no stress and did not bother to set notifications. Lastly were members of the informed group (low stress, high activeness): they actively set notification settings and experienced little stress, given their understanding of how to control their smartphones in accordance with their desires.

Relying on the work of Yoon, Lee, Lee, & Lee, researchers can begin to further subdivide and categorize app users and their variable experiences (2014). Such research is needed because it is still not well understood why a particular app user may have a positive (or negative) experience with one app notification, while having a differing reaction to another. This present study proposes to begin to explore the relation between user experience and app notifications in an effort to inform interface designers, developers, and publishers as regards effective notification design by identifying design strategies that are more likely than not to foster a positive experience a majority of the time for its users.

Best Practices in Designing Notifications for User Experience

Although there is little formal research on user experience with app notifications, there are many blogs that discuss best practices for app developers and publishers regarding user

experience with app notifications. These resources are admittedly somewhat questionable, since their advice is relatively anecdotal, being derived from private data, personal experience designing apps, or subjective preferences. Nevertheless, the discussions appearing in these blogs can be of considerable use for purposes of framing or designing research projects. In an effort, then, to begin to better understand app user experiences with, and feelings towards, app notifications, the following advice is considered.

Of the many blogs that discuss user experience with app notifications, almost all repeated the same four maxims: give the user control, provide actionable notifications, don't over message, and customize messages and timing (Vizard, 2016; Kauhana, 2014; Eyal, 2015; Schenker, 2016; Babich, 2016). Many bloggers argue that giving users more control over their notification settings will allow each individual to decide what is important to him or her. Actionable notifications are messages that allow the user to perform an action immediately within the notification message, rather than opening the app, which in turn, fosters a more efficient experience. Additionally, actionable notifications can be recognized by the server to stop sending notifications when no action is taken by the app user, which reduces the volume of potentially unwanted updates. Customized content tailors clear personalized messages that are intriguing and relevant to *that user*, rather than a blanket message sent to all users. Finally, timing and scheduling of notifications allows users to receive notifications that are relevant at the time of receipt, such as location-based messages (receiving a Target coupon app message in Target), localized time zones (avoid sending messages when the user is likely to be sleeping), and behavioral patterns when using the app (sending updates about content primarily when the user is in the app). Although this advice is provided by web bloggers, their experience is in web design, marketing and market research, UX, psychology, and software development, and their

insight should not be ignored since they are asking important questions such as “Does this notifications enhance or enrich the user’s experience?”

CHAPTER 3. LITERATURE REVIEW

Overview of the Literature

This chapter covers an overview of the key literature that is needed to examine app users' experiences with app notifications. This chapter addresses constructs that impact user's decisions to engage in smartphone activities, specifically app notifications. This relevant literature review helps formulate the basis for this research design and research questions.

Media Use of Smartphones

On a very basic level, people use technologies to create and communicate meaning (Thompson, 1995), information-seek, and entertain (Bryant & Oliver, 2008). Arguably, access to media via mobile devices is an important feature for many people (Smith, 2015). Understanding why people use smartphones and apps and how they are using this technology impacts how notifications may influence users' media activities, their attitudes towards media consumption, and preferences for app notifications.

After reviewing media use literature, researchers conclude that there is no single reason why people use Smartphones (Smith, 2015; GSMArena, 2011; Nielsen, 2014). Motives for smartphone use have been demonstrated in the following ways: bonding with others in mediated spaces (Park & Lee, 2012), need for acceptance and belonging (i.e. social norms effects) (Kim, Wang, Oh, 2016), information seeking (Ebiye, 2015), and habit forming effects from the impact of notifications increasing 'phone checking' (Oulasvirta et al., 2011; Kim, 2014). Additionally, certain personality traits have been documented as influencing increased smartphone use (Zhong, 2013).

In addition to these motivations, many smartphone users access mobile apps for the following reasons: to gain access to the Internet, to manage banking/financial accounts, to seek

health information, to search for or apply for jobs, to seek out government services, to read educational content, to obtain breaking news, to share pictures/videos/commentary, to engage in community events, to use turn-by-turn navigation, to seek public transit information or car services, to send emails, and to make video calls (Smith, 2015). Other activities where smartphone users are engaging in app usage are: social networking, taking photos, listening to music, watching online videos, mobile gaming, web browsing with popular app browsers (such as Chrome, Safari, etc.), searching for new apps in Google Play or the App Store, text messaging or SMS, and implementing features of an alarm clock (GSMArena, 2011). Through this list of motivational factors and engagement in media activities, we can see that motivational factors are likely to impact media consumption behavior.

It should be noted that smartphone app engagement is not limited by age as popularly assumed. Smartphone engagement is common among all ages, in fact, a recent study conducted in American found that 85% of 18-29 year olds own a smartphone, 79% of 30-49 year old own a smartphone, (Smith, 2015), and 51% of adults 55 years old and older reported having a smartphone ((b) Nielsen, 2014), up from previous years. To add to these staggering statistics, 52% of smartphone users reported checking their phones at least once an hour, and 81% of smartphone users stated that they kept their phones on them at all times (Newport, 2015). After analyzing the research on how and why people use smartphones, it is clear that computer-mediated smartphones are heavily used by many people and to carry out many functions.

Beyond identifying various reasons for using smartphone devices, it's important to assess users' attitudes towards mobile phones and apps, since this is likely to impact app notification attitudes as well. A recent study analyzed smartphone users attitudes toward their smartphones and reported that many people felt that their phones gave them freedom, connected them with

others, found this technology to be useful, and provided opportunities to avoid boredom and undesired social situations (Smith, 2015). However, other smartphone users from the same study reported that they found their mobile devices to be limiting and distracting. Understanding users' experiences with features of app notifications can help app developers and publishers to create apps and app notification features that permit a more customizable experience for the user, thus allowing users to determine what information is pertinent and when they would like to receive it.

Uses and Gratifications

According to Blumler and Katz, uses and gratifications theory is an audience-centered approach to fathoming the many reasons why a populace uses media (1974). As previously demonstrated in section 3.1, media consumers vary in their motivations for media selection, which impacts their media consumption. The theorists contend that media users are active seekers, choosing media that best fit the needs of that particular user, and that users consider the weight of their decisions to select a particular media in order to achieve a particular effect.

App notifications present an interesting case where some components of uses and gratifications are applicable, and some are not. The nature of the push notification takes the selection process somewhat out the hands of the media user. The selection process for notifications is an all or none process. If an app does not meet certain criteria, then users will choose not receive any notifications. However, if the media user wishes to receive some notifications then he or she will receive all notifications. The only exception to this rule is Facebook, which has in recent years developed a notification algorithm that allows the user to have some control to include/exclude categories of notifications (e.g. choosing to receive comments on their posts, but not to receive birthday notifications), thus providing a notification control system that is manipulated by the user to create a more customizable and valued process.

Smartphone users are also able to select whether or not they will open a notification at the time of their choosing; however, the initial receipt of any app notification, regardless of its message, is to an extent, pushed upon the user. This lack of customization in when a user will receive a notification and the inability to customize notification message categories is likely to impact the user's experience with the app notification, and in turn the app itself.

Within the uses and gratification approach, we understand that people are able to: elect to disregard a notification all together, open a notification and determine whether its message is or is not valued, open a notification and determine its message is valued, but not at the immediate moment, or open a notification and determine its message is valued, and then engage with an app. A notification message may on some occasions have a unique meaning to particular individuals, which contributes to different motivations for opening similar notifications. However, upon close examination, the broader context of those situations reveals categorical patterns. Persistent patterns from previous studies demonstrate that system-event notifications (such as an app needing a periodic update) have little perceived importance, whereas notifications from a calendar app/messenger/voice/mail app are perceived as very important (Shirazi et al, 2014; Iqbal & Horvitz, 2010). Motivations for responding to an app notification may differ for individuals on a micro scale (person A to person B), but after examining the broader population of app users, motivations on a macro-scale should demonstrate that users experience similar rewards or dissatisfaction with receiving a notification. To explore some of the broader themes in app notification rewards, it will be helpful to take account of the following considerations.

Many app users enjoy being distracted by notifications. Notifications are often welcomed distractions from an individual's current activity. The notification serves as a cue to the

individual that ‘it’s time to be distracted’ (Wallis, 2010). The notification cue can trigger a smartphone user to engage in the notification, with the motivation being that this notification provides a break from the previous activity or mental work (Kardaras, 2016).

Communication apps are often perceived as valuable, and so too their notifications are often responded to immediately after receipt, and are likely to promote continued in-app engagement (Shirazi et al., 2014; Ericsson, 2015).

When app users have more control over their notification features, as in the case of Facebook, users are more likely to respond to their notifications. The ability to control the customization of one’s personal mediated spaces provides a user with a greater sense of identification with their preferred context, reduce cognitive overload, and create a stronger customer relationship; this has been demonstrated with the customization of avatars in gaming platforms (Looy, 2015) and communication platforms (Ansari & Mela, 2003).

When notification messages are perceived as relevant, time-sensitive, or valued, users are more likely to open the notification and engage in activities within the app (Kleijnen, Ruyter, & Wetzels, 2007). Information that has current relevancy is more likely to gain the attention of an app user than information that is irrelevant, delayed, or simply not valued.

The level of notification frequency a user receives from a specific app can impact the engagement level and motivations to open the notification and then the app. Media users’ preferences for notifications may vary from too many to too few. Therefore, app publishers should create customizable notifications for each individual user of a particular app in an effort to foster a balanced receipt of notifications. In other words, notification systems should not send too many notifications, so the user does not feel overwhelmed or annoyed with the reminders, but not too few to the point where the app publisher is losing opportunities to engage the user.

In discussing app users' experiences with app notifications, the researcher hopes to gain new insight into those features that characterize the general phenomenon of experience with app notifications. While these features are likely to impact the quality of a given user's experience, the researcher is seeking for an explanation of the general conditions that, from each user's perspective, as revealed in the interviews, shape user experience with app notifications, rather than specific points guided by previous literature. The literature reviewed will help the researcher make connections in the analysis portion of the study.

Notifications as Pavlovian cues

Being alerted by an app notification can trigger a pleasurable chemical response in the brain. This chemical response is known as a *Pavlovian cue* (Pavlov, 1960). Under certain conditions, when an app user experiences a sound, visual, or kinesthetic notification, the brain releases a measured quantity of dopamine (a neurotransmitter that is responsible for feelings of pleasure and information seeking) (Berridge & Robinson, 1998). This research demonstrates the underlying biochemical mechanism involved when app users receive some level of satisfaction or enjoyment after responding to a notification-alert, such that the alert (i.e., the stimulus) is followed by feeling happy (i.e., the response). The Pavlovian cue is the positive response to a perceived enjoyable stimulus, as measured by the secretion of dopamine. This shows that there is a biological link between how notifications make an app user feel on some occasions and not others, on the one hand, and a specific set of chemical pathways in the human brain, on the other hand. This link thus provides a straightforward indicator for measuring both the presence and the degree of reward-derived pleasure when studying the effects of app notifications on users.

The chemical release of dopamine after the exposure to a notification can increase reward-motivated behavior (Arias-Carrión & Pöppel, 2007); and this results in more persistent

engagement with the stimulus. A reward is experienced after a wanted notification alert is received. This reward contributes to a motivated behavior to answer wanted notifications in future contexts, which increases the likelihood that an app user will immediately respond to a desired notification.

If an app user experiences a reward for responding to or interacting with a notification, he or she is increasingly likely to adopt the behavior more frequently. Learning theory demonstrates this point by showing how specific behaviors, when reinforced by rewards, are incorporated into users' habits (Roberts, Yaya, & Manolis, 2014). When an app user experiences enjoyment from receiving an app notification, the individual is afterwards more likely to engage with the notification, and to use the app more frequently in the future.

The use of both positive and negative reinforcement schedules can predict the likelihood of a user's inclination to participate in notification-checking behavior, based on situational contexts. For example, a user may be excited to receive a notification because it continues an enjoyable activity, thus furthering notification and app engagement. On the other hand, a user may be avoiding a social situation, and the notification offers an opportunity to escape an awkward feeling; here the notification serves as a negative reinforcement (by relieving social anxiety), as well as a reward for escapism; thus, when an app user is in an uncomfortable situation, a notification is welcomed, as it is a desired distraction. The reward received from the stimulus encourages the motivation to increase the involvement with the particular behavior, and thus can foster a habit-forming behavior (Grover et al., 2013).

Additionally, individuals receive greater rewards when the time at which a periodic pleasurable stimulus appears is unpredictable; this is known as variable schedule of rewards (Ferster & Skinner, 1957). Skinner discovered that mice received greater cognitive rewards when

their treats were delivered at random or unpredictable times. The sizes of their treats were also manipulated, yet the mice still preferred the variable reward schedule. This preference is also exhibited in humans. The random cues that are inherent in the information design of notifications have the ability to create greater rewards for an app user. The technological design of varied notifications can continually engage app users who enjoy or need access to their notifications because they are receiving greater rewards when the randomized cue is received.

This research demonstrates that the biochemically determinate, dopamine-regulated reward received after a notification stimulus has the ability to induce long-term habits, that is, to create a behavioral tendency to check notifications when they are delivered—a tendency that is reinforced when the notification cues are received on an unpredictable schedule.

Anticipation of Notifications

Despite the influence of unpredictable reinforcement schedules on long-term behavior, in the near-term, receiving an app notification that conforms to an immediate anticipation is likely to entail greater rewards than when the notification is not expected (Fester & Skinner, 1957).

When an app user is engaged in an activity where a notification is expected, as in synchronous computer-mediated communication, the user is likely to experience a greater reward than when the notification is unexpected. One explanation for this concerns the dopamine-modulated firings in the brain. Neuroscientists contend that dopaminergic neurons (the neurons specifically located in midbrain that release the chemicals responsible for feelings of reward and motivation) increase their activity when an individual is consciously aware and waiting for a reward, which in turn increases the desire for the reward (Arias-Carrión & Pöpple, 2007). Research in this area demonstrates that a core function of learned and associated behaviors relies on the neural pathways where dopamine biochemically generates the behavioral motivation to

seek and continue particular activities that are perceived as rewarding (Day & Carelli, 2007). Once this behavior and its associated chemical release have occurred, the brain categorizes the behavior in tandem with the reward in memory-systems (Hyman et al., 2006). In brief: the anticipation of receiving a notification can increase the release of dopamine in an app user's midbrain causing the individual to experience an enhanced feeling of pleasure.

Control over Notifications

The app user's perceived control over incoming notifications could contribute to the quality of user experiences (e.g., further engagement and increased reward satisfaction). App users control which notifications for specific apps they wish to see. This allows users to identify what they want to be reminded of, accepting the randomization of an alert, and to create a customized hierarchy of which notifications for apps matter most. The hierarchy of needs developed by Abraham Maslow (1954) suggests that people categorize and prioritize their needs in a structured order, where the most fundamental needs (i.e., for survival) demand satisfaction first, followed by safety needs, belongingness and love needs, esteem needs, and finally with self-actualization (i.e. for wisdom and cognitive autonomy), see Figure 5.

Maslow's Hierarchy of Needs

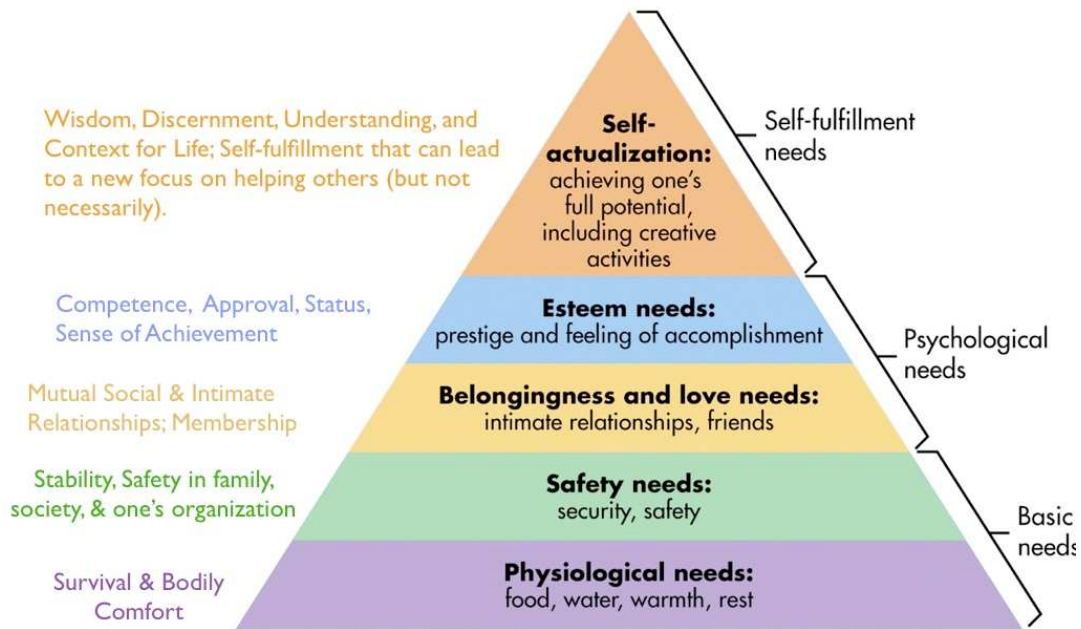


Figure 5. Maslow's Hierarchy of Needs Pyramid

In the context of user control over app notifications, a hierarchical structure is naturally present in regards to what is perceived as more or less important. This does not imply that app users categorize the importance of their apps by consciously applying this model, but rather that they prioritize their use of their apps in accordance with the value system evident in this model. It is important to recognize that the descriptors in this model (i.e. “stability”, “intimacy”, “status”, etc.) refer directly to immediate needs, as opposed to future goals. For example, if an individual is engaged in browsing a website that is perceived as rewarding, but a family safety notification interrupts that activity, the individual is likely to terminate the first activity to attend to the safety notification. This is caused, in part, by the nature of the individual's hierarchy of needs, where the safety of one's family (a basic need) will tend to take precedence over self-actualization needs (psychological needs). This hierarchy informs, and therefore arranges, the

prioritization of an individual's immediate and direct needs, the satisfaction of which is enhanced when the individual has sufficient autonomy, or control over situational factors (Tamborini et al., 2010). Consequently, when app users either feel as though they have control over their notifications, or when a satisfying lower-level hierarchical notification is received while participating in a higher hierarchical level, they are likely to have a positive experience (Cao et al., 2013).

Adapting Maslow's hierarchy of needs to smartphone app activities allows researchers to reveal patterns in smartphone behavior. In the adaptation of Maslow's theory for smartphone activities, one can see that basic needs are those that stem from health related apps (medication, exercise, and other bodily needs). Safety needs are met by apps that handle home security systems, financial or banking apps, as well as insurance apps. Applications serving love needs can be associated with any communication app. Esteem needs are served by apps that execute goals, such as organization or calendar apps, alarm clocks, etc. Finally, self-actualization needs can be understood as those fulfilled by apps that are associated with information-seeking activities or education apps (e.g., watching a YouTube video to fix your own plumbing).

When applying this framework to the study of app notifications, it is important to distinguish between the generalized and abstract classification of higher over lower level needs and the specific, concrete appearance of particular needs in the course of an individual person's activities and experience. An app notification, for example, that addresses an unmet basic need may be expected to take precedence over one that addresses a self-actualization need, but not if the basic need in question is already sufficiently satisfied at the time the notification is received. That is to say, it is the *perceived need* of the individual that dictates the order of important situational factors. For instance, if an individual has a strong desire to watch a baseball game

(higher order need), but receives a notification from a communication app, the individual's need to view the game may be considerably stronger, at that time and in that place, than viewing and responding to the communication message. Likewise, a sleep app notification may alert a user that in order to get eight hours of sleep, he or she should be getting ready for bed. This notification pertains to a future and presumably desirable goal, but if at the time of receipt the individual is in somnolent, and has a stronger need to solve a problem (such as finding gift ideas by browsing the web), then the individual will not receive a reward from the notification due to the salience of the current activity. The use of Maslow's theory provides a guideline for identifying patterns of behavior, which is not to say that these levels are hard and fast rules, but rather propensities in behavior.

Planning to Receive Notifications

App users can plan to receive or to deny notifications for any app on any smartphone device. Planned and unplanned notifications will both meet with initial reactions to the receipt of a notification, without any contextual information regarding the update or message; focus here is simply on the immediate response to a notification in the absence of context. The app user sets planned notifications, where he or she agrees to the delivery of random notifications. An app that is planned to receive notifications will impact a user's experience, because the user intentionally planned to have access to immediate updates. Internal control over access to immediate information makes individuals feel that they have control over the situation, also known as the locus of control, which can be more rewarding than feeling that matters are out of one's control (Rotter, 1966).

Context Matters

The context in which a message appears has two facets. The first can be called the context of information (where the *content* of the message fits in an existing stream of information), while the second can be called the context of receipt (where the *appearance* of the message fits in the current physical and social situation of the receiver); both will impact whether the receiver will experience a reward upon receiving a message (Thompson, 1995).

Context is one of the most significant factors to consider when analyzing a user's experience with app notifications. The context of a text-message can determine if the user wishes to respond, is indifferent, or is annoyed by the notification. Within the context of information, an app notification indicates that a specific message is being communicated. Judgments are then made about the importance of the information (Guo, Tan, & Cheung, 2010). At this point, the app user evaluates whether to engage with the notification and app based on the information communicated through the notification. This assessment is processed in accordance with the hierarchy of needs while an individual determines the relevancy or importance of the message in the context of his or her current activity, that is to say, within the context of receipt (Farrancha, 2015). If the notification meets the individual's standards and requirements to be considered worth interaction at the time of arrival, then the individual will engage with his or her notification and app. Likewise, if the notification does not meet the individual's standards and requirements to be considered worth interacting with at the time of arrival, then the individual will be unlikely to engage with the notification and app. Both facets of context impact the likelihood of a notification being interacted with based on its perceived importance by the user.

Notifications as Distractors – Media Multitaskers

When app users have habituations to media multitasking and enjoy multitasking, they may have different experiences than app users who prefer to pursue one activity at a time. Media multitasking, or the use of two forms of media either simultaneously or asynchronously, attracts many smartphone users due to the perceived task productivity involved (Ophira, Nass, & Wagner, 2009). It is a behavior that is frequently found in many occupations, educational organizations, and is even seen in households (Jackson, 2009; Grover, 2011). However, there are many complaints from cognitive psychologists concerning media multitasking and its perceived effects on attention (Hassoun, 2012), such that media multitaskers are easily susceptible to irrelevant stimuli, thus making them more easily distracted (Kazakova et al., 2015). The technological design of notifications as random cues gives the user many opportunities to be distracted. Despite researchers' concern for this, app users often welcome the distractions provided by notifications (Iqbal & Horvitz, 2010). This has been recorded during times of boredom, frustration with current activity, social anxiety, sickness, and times of relaxation (Jeong & Fishbein, 2007). Distractions that are created by app notifications give users an excuse and an opportunity to change their current activity or increase awareness.

Notifications are often welcome distractions from an individual's current activity. The notification serves as a cue to the individual that 'it's time to be distracted', although the individual may not be consciously aware of the trigger (Wallis, 2010).

Notification Categories Have Different Reward Levels

The category of an app notification is likely to impact a users experience with, and feelings towards, app notifications. As previously mentioned, there is a variety of apps that are available for an app user to download from app marketplaces (Google Play, App Store, Windows

Phone Store, and Blackberry App World.). Mobile notification research has reported that communication apps are perceived as more important, opened more frequently, and have shorter click times (response to notification after received) than other apps, e.g., tools, reader/news, games (Shirazi et al., 2014). This shows that different notifications from different app categories have different perceived values for differing app users. The subjective importance of a notification is determined by a user's qualitative characterization of its message, i.e., "how interesting, entertaining, relevant, and actionable a message is" (Shirazi et al., 2014 cites Fischer et al., 2010, p. 2). Notifications that are about an event, a communication with a contact, and the usefulness of the notification are reported by users as the most important notifications (Shirazi et al., 2014; "Notifications" 2016; Wilson & Miller). The relevancy of the information in a notification can contribute to its perceived importance.

Notifications that inform an app user of self-initiated actions and system events are reported as being the least important and are often perceived as annoying (Shirazi et al., 2014; Morse & Jo, 2015). From this it can be concluded that app users do not want notification reminders or messages of actions they themselves performed, excluding notifications regarding calendar events. App-initiated notifications whose messages are perceived as important, relevant, and entertaining are more likely to be received with satisfaction than notification messages that are self-initiated.

Familiarity with Technology

The level of experience an app user has with smartphone apps is likely to impact his or her feelings towards app notifications. For novice or intermediate app users, an app notification may be a new stimulus. The experience with notifications may be new, and any associated feelings and behaviors may not be developed yet. Whereas experienced and advanced app users

may have determined feelings towards notifications due to the developed association and repeated experience with notifications (Bowen & Pistilli, 2012).

Moreover, familiarity with technological device features, such as app notifications, can impact the utility the user perceives these devices to have. Rizvanoglu & Cetin (2013) outline in their book that experience [with a technological device] was significant factor [in finding mobile banking] easy and acceptable. They state that, “the enjoyment and satisfaction associated with the use of the mobile technology links to acting in a known familiar mobile centric paradigm” (p. 56). This suggests that familiarity with a technological device is linked to the positive or negative experience the user is likely to have.

An earlier study from 2006 demonstrated that familiarity was not only shown to positively impact brand loyalty and medium consumption loyalty (getting the news via online or via newspapers), but positively impacted user experience. Interestingly, the authors note that the “perceived usability [or ease of use] of a website has a significant influence [on user experience], irrespective of how experienced users are” (Flavián, Guinalíu, & Gurrea; Davis, 1993). This insight shows that while familiarity with a technological device or its features is an important factor in promoting a positive experience for the app user, the user friendliness (or ease of use) of the device and its features is equally, if not more important.

Kelley (2015) echoes this point, stating that unfamiliarity with technological devices can often contribute to barriers with the interface, leading to negative experiences. When users are shown the *value* of a feature, users see how *they* can benefit. When interviewing teachers who were told to implement new technologies they were not familiar with, Kelley observed similar negative experiences:

When handed technology and told to experiment, many did not know what to do, and wound up using it infrequently, if at all. Individuals with family or friends who were familiar with the devices tended to request help to learn, while those without such connections often felt frustrated and did not like using the devices. (p. 11)

As Kelley highlights, users are likely to have negative experiences with technological devices or their features when there is low familiarity, or when there is a reduced ease of use of the interface. Personality traits and cognitive capacities are likely to impact this as well, such as internal vs. external locus of control, high or low self-efficacy, high or low motivation, and/or high vs. low need for cognition.

Technological Self-Efficacy

Under the umbrella of self-efficacy proposed by Albert Bandura (1977), technological self-efficacy refers to a “belief in one’s ability to successfully perform a technologically sophisticated new task” (McDonald & Siegall, 1992, p. 467). Technological self-efficacy refers to judgments and feelings about what users believe they can accomplish with their various skill sets as regards the adoption of a new technology. It is understood that age (Reed, Doty, & May, 2005), gender (Olgetree & Williams, 1990), prior experience (Compeau & Higgins, 1995), and modeling/resources (Torkzaden & Van Dyke, 2002; Butler & Sellboom, 2002), all contribute to levels of technological self-efficacy. These factors contribute to a user’s task performance (McDonald & Siegall, 1992), perceived ease of use (Compeau & Higgins, 1995), and user experience (Igarria & Iivari, 1995).

Research from this field demonstrates that experience with a device is a strong predictor of high technological self-efficacy scores (Compeau & Higgins, 1995). Furthermore, computer self-efficacy levels have been positively correlated with computer experience, familiarity,

owning a computer, and computer training (Cassidy & Eachus, 2002). In the case of mobile technological features, the researcher is likely to see how technological self-efficacy levels and familiarity impact emotional responses to app notifications.

Wanted and Unwanted Notifications

Wanted notifications are app notifications that have been permitted to notify the app user randomly, and are welcomed or wanted at their delivery time. Unwanted notifications are app notifications that have been permitted to notify the app user randomly, but are unwanted at their delivery time. Unwanted notifications can annoy an app user due to distraction (Fischer, Greenhalgh, & Benford, 2011), frustrate an app user due to frequency of randomized notifications (Poppinga, Heuten, & Boll, 2014), and cause the push-notification feature to be turned off or result in the app being deleted (Hang et al., 2013).

The wanting of a notification by an app user is influenced by the current situational context the individual is experiencing, the perceived power over the notification, and the position of the information in the hierarchy of needs, considered in the current context of receipt.

Research Questions

After reviewing the literature, several features emerge that are likely to impact the qualitative characteristics of users' experiences with app notifications, and possibly impact larger, more general themes discussed by participants. First, environmental factors (such as the location of the user or current activity), the visual, auditory, and/or haptic alert of a notification, familiarity with notifications, the category of the app, control over notification settings, and messages that are perceived as relevant, time-sensitive and valued are likely to impact a user's experience with and feelings towards a given notification.

The socio-cultural expectations of people in developed or first world countries suggests that our youth, young adults, and adults (under the age of being classified as ‘senior’) will be connected to the Internet in some manner everyday (Duggan, 2013). There is a dominant message popularized by credible media sources and advertisers that these demographics *need* to be consuming technological devices, fostering relationships in online settings, and consuming interactive products, otherwise known as the features of a technology (such as the like button or app notifications). This expectation to “stay connected” inclines people to enter online environments, which predominantly occur on smartphones (Nielsen, 2016) through app notifications.

From this literature, the researcher will conduct an exploratory study with a purposive sample to address the following questions.

Research Question 1: How do app users’ describe their experiences with app notifications?

Research Question 2: How do app users’ describe their feelings toward app notifications?

Research Questions 3: How do these experiences and feelings inform or shape the overall app-user experience?

To examine these questions, this project will conduct in-depth interviews with 18-24 year old college students. This method will provide the researcher with enriched data by allowing the researcher to ask participants about their app notification preferences, experiences, and feelings towards app notifications. This method offers the researcher the opportunity to understand various users’ experiences by means of open-ended questions and follow-up questions, giving the researcher a fuller and better understanding of a given user’s experience with app notifications. Using thematic analysis, the researcher will examine and categorize each participant’s responses to identify possible themes, and so to reveal possible patterns of reactions

to notifications. This analysis allows the researcher to draft a larger picture of experiences with notifications.

CHAPTER 4. METHODS

The following research examined app users experiences with app notifications to understand and unveil the individual differences that led users to have different experiences with, and emotional responses to, app notifications. The analysis and results of this study aimed to understand and define the essence of users' experiences with app notifications. Understanding what leads app users to have pleasurable experiences after receiving some notifications but not others is expected to assist application developers to customize applications in order to better serve individual users' needs and desires, creating a more pleasurable experience for users to engage with particular applications more effectively than they otherwise would.

Phenomenology as the Research Method

Understanding users experiences, behavioral reactions, and emotional responses to app notifications was best done with the methodological approach of hermeneutic phenomenology, often used in qualitative studies. Phenomenology, borrowed from the field of Philosophy (i.e. metaphysics and philosophy of mind), is a method of inquiry that “concentrates on the study of consciousness and the objects of direct experience” (*Oxford Dictionary*). This approach is used in qualitative studies to understand peoples' experiences and how they come to experience particular phenomena (Morse & Richards, 2002). The hermeneutic phenomenological method is most appropriate for this study since it seeks to “understand an area where little is known or where previously offered understanding appears inadequate” (Morse & Richards, 2002, p. 27). Additionally, this method lends itself as a useful guide to this research design due to the complex nature of the multicontextual data. In other words, examining app users' experiences with app notifications observing and interpreting a shifting phenomenon that is influenced by a variety of factors and the phenomenological approach allowed the researcher to take the perspective of

individual users, into account in order to better understand the variously shifting phenomena of experiences with app notifications.

Understanding the object of a person's perception is seeking to understand the *processes* whereby the individual experiences an object, activity, event or happening from that individual's point of view. In using hermeneutic phenomenology as a methodological approach, it was essential to capture the "rich descriptions of phenomena and their settings" (Bentz & Shaprio, 1998, p. 104). The goal of this approach was not to look for answers to previously conceived ideas, but rather to explore individual experiences as a means to understanding particular situations from an individual's perspective (Bentz & Shaprio, 1998). As such, the questions provided to participants addressed their experiences and feelings about the theme in question (Welman & Kruger, 1999) by guiding them to reflect on their past experiences, rather than discussing the phenomenon abstractly.

The use of broader, overarching interview questions was implemented in this research design to guide the participant to provide a narrative account of their experiences with the phenomenon, rather than guiding them to address specific talking points about the phenomenon. In the hermeneutic phenomenological approach, the broader questions asked (see Appendix B) are used to initiate a conversation with the participant, but once engaged, the researcher followed the participant on his or her experiential journey with app notifications. Additional probes were provided if the researcher wished to continue exploring how the participant understands and feels about a particular example or if the participant felt unsure how to answer a broad question. The goal in using hermeneutic phenomenology at the method of inquiry was for the researcher to explore and understand "(1) how people interpret their experiences, (2) how they construct their

worlds, and (3) what meaning they attribute to their experiences. The overall purpose is to understand how people make sense of their lives and their experiences” (Merriam, 2009, p. 23).

Research Design

In an effort to understand how app users experience notifications, the researcher conducted 60-90 minute in-depth interviews with 18-24 year olds. One of the key benefits that in-depth interviews afford to researchers is the ability to gain deep and detailed answers, where participants recount their personal experiences, allowing the researcher to reflect on and examine the emerging themes that were interpreted as contributing to those experiences (Markham & Baym, 2009; Rubin & Rubin, 2013; Morse & Richards, 2002). Additionally, the in-depth “interview is considered the main method of data collection in phenomenological research as it provides a situation where the participants’ descriptions can be explored, illuminated and gently probed” (Kuale, 1996).

A purposive and convenient sample was used in this study design. The use of a purposive sample is best suited to this project as the researcher is specifically looking for individuals who “have had experiences relating to the phenomenon to be researched” (Kruger, 1988, p. 158.) Individuals were recruited from JTC 351 Media and Public Relations class, due to the appropriate size of the class, age of the participants, previous familiarity or exposure to app notifications, and researcher access to individuals without contamination (e.g. no students partaking in the researcher’s currently taught classes).

After written consent was provided, the interview was audio recorded and the researcher took additional notes during the interview. Interviews lasted between 60 and 90 minutes, and were conducted over six days. The researcher asked participants to discuss their experiences with app notifications (see Appendix B). With the guidance of the hermeneutic phenomenological

approach, the researcher used open, semi-structured, interactive in-depth interviews to explore both the objective features of a given individual's experiences with app notifications, and the subjective feelings they experience when they receive various types of notifications and notification messages. Through this process of listening, note taking, and probing the researcher gained insight into, and understanding of, the individual experiences each participant discussed. Also, participants were asked to bring their smartphones to the interview since this will help both the researcher and participant discuss specific references to app notifications.

In the analysis stage (see 4.4 for more details), the researcher reflected upon the participants' discussions. The researcher began to formulate emerging themes from the text, and interpret these themes. This resulted in identifying broader patterns of thought, feelings and behavior. This structure aided in examining factors or catalysts that contribute to experiences with or towards app notifications. The researcher used thematic analysis to identify themes and patterns in respondents' answers. Using thematic analysis provided detail, depth, clarity, understanding, nuance, and richness to the interpretation of the participants' responses (Rubin & Rubin, 2013).

Key Benefits of In-depth Interviews

The use of in-depth interviews is an appropriate methodological choice for this study because they "help portray ongoing social processes", "allow the research to explore complex matters", and reveal conflicting versions of the same incident (Rubin & Rubin, 2013, p. 4) which provides data that is rich and insightful. Quantitative research is common in research that examines how humans interact with computers (Yang et al., 2015; Warren, Meads, Srirama, Weerasinghe, & Paniagua, 2014; Shirazi et al., 2014); however, a qualitative approach will

provide enriched, fresh, and vivid data about the specific factors that contributed to, or hindered, an app user's experiencing of a cognitive or emotional reward after exposure to a notification.

While in-depth interviews rely on the researcher to make interpretative decisions about a given interviewee's responses (after confirmation of their meaning), this allowed the researcher to "assume that interviewees have different frames of reference" (Rubin & Rubin, 2013, p. 16). This approach is problematic in quantitative designs, but is a useful tool in qualitative studies (allowing the researcher to construct meaning). However, it should be noted that researchers need to refrain from imposing stereotypes on their participants, assuming meaning without confirming with the interviewee, and creating themes where they do not exist. This lack of acknowledgement will negatively impact the data gathered and connections made thereafter. In-depth interviews in this context allow the researcher to "examine overlapping explanations" and "figure out chains of causation" (Rubin & Rubin, 2013, p. 50), which are a necessary in order to accurately understand, analyze, and describe the complex relationship between user experience and the design of app notifications. Additionally, rapport building can occur more quickly compared to other methods (Fowler, 2009), which permits participants to feel more relaxed, enjoy participating in the research, and discuss in depth the details of their experiences.

The use of open, semi-structured, interactive interviews was implemented in this research design. Semi-structured interviews traditionally have several prepared questions, where the interviewer listens to the 'story' provided by the participant but still allows to researcher to discuss areas of interest to the phenomenon at hand. It is suggested that interviews have roughly six to ten main broad questions that address the overarching focus of the *entire* study (Morse & Richards, 2002). In the event that the researcher is seeking additional information about a shared experience provided by the interviewee, the interviewer would ask planned or unplanned probing

questions, follow-up questions, and/or clarification questions in an effort to obtain a deepened understanding of the phenomenon at hand. The role of the researcher in this position is to listen; this task cannot be overemphasized. The researcher will guide the interview “to maintain the conversation rather than interrupting the participant’s flow of thought” (Morse & Richards, 2002, p. 93).

Researcher Style and Approach

In using in-depth interviews under the naturalistic or heuristic approach of qualitative studies allowed the researcher to have conversations with knowledgeable people in settings that “focus on how people perceive their worlds and how they interpret their experiences” (Rubin & Rubin, 2013, p. 3). The researcher adopted a responsive interviewing style, allowing the participant to do most the talking after the interviewer provides broad and open-ended questions. This style respects the conversational flow, and, being coupled with the ‘opening the flood gates’ interview structure, provides an interview that is “structured around one or two broad main questions designed to encourage the conversational partner to talk at length and in depth” (Rubin & Rubin, 2013, p. 123). The respective style and loosely structured interview fits neatly within the umbrella of the phenomenological method. It does not push participants into discussing specific attributes of a phenomenon, but allows them to explore and share their experiences ‘freely’, with descriptions flowing naturally from the participants’ several points of view and trains of thought.

Using a respective and reciprocal conversational method, the researcher gained insight from participants by asking over-arching thematic questions, and following the participant through their experiential journey. To gain enriched data pertaining to phenomenon at hand (experiences with app notifications), the researcher had prompt follow-up questions by asking

for examples, share feelings or extend discussions about a particular situation with app notifications. In adopting a responsive interview style, the researcher was respectful towards the participant, allowed to the participant to do most of the talking, and never pushed the participant to discuss a topic with which he or she is uncomfortable.

The researcher's approach, that is, by way of adopting the hermeneutic phenomenological method, incorporated the use of *bracketing*, which may be understood as the setting aside of one's previous knowledge, theories, and personal experiences with the phenomenon (Morse & Richards, 2002). In doing so, the researcher "suspends belief so that preconceptions and presuppositions are put aside and the 'true' phenomenon or essence is revealed" (Crotty (1996) cited in Wimpenny & Gass (2000), p. 1487). This 'detached position' afforded the data garnered to be fresh and precise and necessarily not predetermined. The researcher stays open-minded to any new or even contradictory themes that may emerge in the analysis stage, and did not make assumptions about the participants' experiences, nor attribute these experiences to an unwarranted conclusion. This methodology reinforced the philosophical practice of listening, understanding, and asking for confirmation about the researcher's interpretation of the participant's expressions with or towards app notifications.

Wimpenny and Gass (2000) state that bracketing "presupposes that it is the researcher that is 'contaminating' the data" and specific research skills are required to acquire data to avoid such errors (p.1487). Through "the use of reflection, clarification, requests for examples and descriptions and the conveyance of interest through listening techniques", the researcher was able to create questions that did not push the participant into a specific answer but also guide the researcher not to assume participant's intentions behind shared experiences (Jasper, 1994, p.311). To achieve successful bracketing the following steps were taken to provide more

credibility to results obtained: mental preparation and assessment of the researcher's personality, engaging in reflexivity, asking broad, open-ended question, adopting a 'not-knowing stand' in the interview so as not to make faulty interpretations, keeping a decision trail, and using thematic analysis to understand the content and complexity in meaning of respondents' responses (Chan, Fung, & Chien, 2013). This entailed using many direct quotes in the analysis and results section to allow the participants' experiences draw conclusions.

To address the potential influence of the researcher's background, subjectivity statement is in need. The researcher was born and raised in middle Tennessee where she attended a large public school and but was not involved in any engineering or technological extra-curricular activities. It was not until the researcher attended college at Middle Tennessee State in 2009 did she become intrinsically interested in philosophy and the pursuit of curiosity and active questioning of life's most basic and complicated questions. This led her to a communications and media technology program at Colorado State University in 2015 to explore how people interact with technologies. These experiences have shaped the researcher's academic path and have influenced the undertaking of this research project.

Sample and Recruitment

As previously mentioned, a convenient, purposive sample, homogenous sample was used for this study. The researcher was looking for individuals with specific characteristics (i.e. age bracket and experience with notifications). Because of this, the sample was homogenous (all sharing similar characteristics or traits). The sample is intended not to randomly select participants to make broader generalizations about the larger population of app users, but instead, to select participants based on particular characteristics that are of interest (i.e., age bracket and experience with notifications).

College students in the 18-24 age demographic are an ideal population for this study because the majority of this population should have some experience with app notifications on computer-mediated devices (Duggan, 2013). This specific demographic falls in the millennial generation, members of which spend more hours per app than any other age grouping (comScore, 2015). This is not to suggest that this demographic has extensive knowledge about notifications, but that their time spent with notifications is greater than other age groupings. Thus the researcher assumes that the majority of this sample population will have valuable experience using app notifications and a ready ability to express their experiences with app notifications.

Additionally, because the 18-24 age demographic spends more time with and in apps than any other age grouping, their experiences with app notifications, expressions of preferences for and against notification messages, and behaviors opening and ignoring notifications at their time of receipt is helpful to extract themes and patterns that will help app developers and publishers to examine what app customization features would best engender an enjoyable user experience. This demographics' data can help the app industry to advance the project management of notifications and to budget for app development/management projects.

The researcher recruited 10 college aged cellular phone app users a convenient purposive sample to participate in an in-depth interview lasting roughly 60 minutes. The length of the interview allowed the researcher to ask the broad questions crafted from the research questions, and provide time for the participant explore his or her experiences and feelings with and towards app notifications.

For recruitment, the researcher asked members of Instructor Jill Goodwin's JTC 351 Publicity and Media Relations class section 002 in the Spring 2017 term if they would like to participate in an in-depth, face-to-face interview for 20 extra credit points in the class (the

equivalent of two lab assignment grades). Undergraduate students between the ages of 18-24, who have and use cellular phone apps will be the targeted demographic. The majority of millennial aged college students are engaged with app notifications on some level, whether they are new to the technology or experienced users. Because of this, they will most likely have valuable experiences with notifications. Their attitudes about app notifications and experiences with notifications will provide insightful nuances that examine the relationship between app users and app notifications.

All students interested in participating in the research contacted the researcher via her Colorado State University email. Ten participants are desired for this study, however 17 would have been permitted. An alternative assignment was offered (write an essay about the history and cultural impact of apps) if students did not want to participate in the study, but have would liked extra credit. After participants contact the researcher, they received a confirmation email that the researcher has received their interest in participating in the study, in addition to a date, time and a location for the participant to meet the researcher for an individual one-on-one 60-90 minute interview. An audio recording recorded the entirety of each interview. A follow up was not be required.

Concepts or Themes

Respondents were asked to discuss their experiences with app notifications in order to better understand the nuances of experiences with app notifications. Conversations included discussing examples in which app users experienced an app notification as being pleasurable or unpleasurable, and subsequently to discuss the setting that contributed to those experiences. While there were no formal interview questions planned to discuss these topics, the participant

was encouraged to describe their experiences with all apps and app notifications previously downloaded or currently downloaded, and to discuss their feelings towards those experiences.

In the analysis stage the researcher began to examine any emerging themes present in participants’ responses, rather than confirming previously outlined ones. This approach provided insight into emerging themes that concern why some app notifications are perceived as rewarding and others not. Moreover, this allowed the researcher to discover layers, nuances, and overarching patterns in a given respondent’s views of notifications. While the research design is guided by the hermeneutic phenomenological approach, and therefore does not predefine expected themes, previous literature surrounding this field suggests that there are features that may be experienced and emerge from participants’ answers. It is important to note that the researcher was not specifically looking for, or only for, these features; they are mentioned only as *possible* results (see Table 1). The researcher remained open to new and even contradictory features and themes to ensure that the essence of the phenomenon is revealed and thoroughly described from the raw data. These features from the reviewed literature and theory are helpful for categorizing a user’s experience with app notifications.

Table 1. Possible Features of Experiences

Possible Features of Experiences	
Setting	Location of User
	Current Activity
	Alert
	Control
Type of Notification	Category/Genre
	Notification Message

Data Collection and Procedures

Data collection occurred through in-depth interviews conducted in a study room in the library. The researcher adopted a responsive interviewing style, allowing the participant to do most the talking after the interviewer provides broad open-ended questions that are focused on the phenomenological theme (i.e. experiences with and feelings towards app notifications). This style respected the conversational flow, and, being coupled with the ‘opening the floodgates’ interview structure, providing an interview that was “structured around one or two broad main questions designed to encourage the conversational partner to talk at length and in depth” (Rubin & Rubin, 2013, p. 123).

The researcher conducted a pilot study with two students to ensure that the interview questions do not have any wording issues, or order issues, and to test audio equipment, and interview flow. The researcher incentivized participants by providing 20 extra credit points in Instructor Jill Goodwin’s JTC 351 class. The researcher pre-notified the students in the classroom by announcing (see Appendix A) that the researcher is looking for volunteering students who are interested in providing their feedback on app notifications to participate in an in-depth interview. The researcher communicated with students via her Colorado State University email, through which she confirmed respondent interest and assign a date, time, and location for the interview. The researcher set up interview appointments over the course of three days, and accommodate participants that cannot meet on those three days. The researcher conducted an open, semi-structured, interactive interview that addressed roughly eleven broad interview questions (see Appendix B). The researcher made any necessary changes to the interview questions after the pilot was conducted.

The respondents received an IRB-approved informed consent statement before the interview and were asked to review and sign if approved before the interview begins. If any participants chose not to consent, the interview would have been terminated, however, they would still have received extra credit. Per IRB, they were not be required to answer every question in the interview, and they could choose to drop out of the interview at any time. After they have completed the interview, the researcher confirmed that the interview was complete and thanked the participant for his or her time and feedback.

Analysis

After the interviews were complete, participant answers were transcribed word for word, coding key ideas, events, topical markers, examples, concepts, and themes that were relevant to the research questions (Rubin & Rubin, 2013). After transcribing and coding of the interviews was complete, analysis of connections and comparisons, emerging themes and patterns took place. This was an inductive study (reaching conclusions based on observations) and coding and classifications may change based on answers.

Steps to complete the thematic analysis are four fold (Rubin & Rubin, 2013; Morse & Richards, 2002):

Step 1:

- Transcribe verbal conversations into written text
- Read transcript, to re-familiarize
- In second reading, record observations/reflections about the text and interview notes

Step 2:

- Begin coding key ideas, events, topical markers, examples, concepts, and themes
- Transform initial notes into emerging themes
- Formulate concise phrases that are grounded from responses but offer conceptual understanding

Step 3:

- Examine emerging themes and cluster themes to produce structure
- Report about comparisons and contradictions

Step 4:

- Create table of themes analyzed

- Write narrative accounts and limitations

Qualitative Validity and Reliability

When conducting qualitative studies, Lincoln and Guba (1985) contend that the terms ‘validity’ and ‘reliability’ have no place in qualitative contexts. However, this does not place qualitative work in the realm of the unreliable, but rather recognizes that the criteria for ensuring validity and reliability are necessarily different (Leininger, 1994; Houghton et al., 2013) due to the method selection. Qualitative studies are held to standards and procedures of credibility, transferability, and dependability (Morse & Richards, 2002).

Shenton (2004) states that qualitative studies can have external validity when the data is credible. To ensure that this study is credible, or to assess the degree to which it is trustworthy, the researcher understood and described the phenomenon of interest from the participant’s perspective.

Houghton et al. (2013) note that qualitative studies can achieve external validity when the data are transferable to other studies. In order to ensure that this study can be transferred or used to foster future studies, the researcher provided a thorough explanation of the context in which the study was conducted, explicate the decision trail, outline the structure of the interview, provided the specific interview questions, and explained any assumptions that were included in the study design. As discussed by Rubin and Rubin (2013), the quality of a qualitative study is measured by the “freshness, thoroughness, richness, accuracy, and credibility” of the research design (p. 57).

Shenton (2004) also argues that qualitative studies can have reliability when the data is dependable. Qualitative studies by definition measure things differently, rather than the degree to which the data can be reproduced with the same precise results. To ensure this study is consistent

or dependable for replication, the researcher will account for changes in the analysis stage within the decision trail.

Design Rigor

One of the key components in conducting a qualitative study that has ‘validity’ and ‘reliability’ is ensuring that the research design has rigor. Morse and Richards state that to ensure that a study has rigor, appropriate pacing of the project, consistency in coding, and audit or decision trails should be outlined (2002). Appropriate pacing of the project guided the researcher to complete each analytic task before moving on to the next, since leaving “the research open to incomplete work, missing analytic opportunities...loses validity, credibility, and rigor” (p.174).

Consistency in coding is essential for open, semi-structured, interactive interviews to develop a rich and interpretative study that relies on a continuous investigation of the phenomenon from each successive interview. Morse and Richards state, “in semi-structured interviews, participants are all asked the same questions in the same order in a search for patterns of answers, so consistency is important ” (p.175).

Decision trails increase the trustworthiness and rigor of a project by documenting the changes in ideas and connections, identifying events that contribute to shifts in influence, and tracking actions of the researcher (Koch, 2006). This historical trail of thoughts and actions provided an audit for readers to analyze “the researcher’s decision rules for categorizing data and making analytic inferences” (Polit & Beck, 2010, p. 498), thus allowing readers and other researchers to examine the processes and to “arrive at the same or comparable but not contradictory conclusions given the researchers data, perspective and situation” (Sandelowski, 1986, p. 15 cite in Carcary, 2009). Lincoln and Guba (1985) outline six areas that need to be collected: raw data, data reduction and analysis notes, data reconstruction and synthesis products,

process notes, materials related to intentions and dispositions, and preliminary development information.

CHAPTER 5. FINDINGS

This chapter records the findings from data obtained through in-depth interviews with smartphone app users from Colorado State University who met the criteria of being 18-24 years old and have had previous and current experience with app notifications. This chapter simply presents and reviews these data, whereas Chapter 6, the Discussion chapter, examines the data by way of thematic analysis in order to draw conclusions about the relation between app notifications and users' experiences. The purpose of this study was to gain a better and deeper understanding of app users' experiences with app notifications in order to evaluate what contributes to a positive, negative, and indifferent notification experience. Six areas of research were used to continually guide the study. Elements of media use, uses and gratifications theory, literature from neuroscience, the theory of hierarchy of human needs, smartphone user engagement literature, and information design were used to construct a cohesive foundation for interview questions, which resulted in data that provided insight into experiences and feelings/attitudes toward apps and app notifications. To examine app users' experiences with and feelings toward app notifications, the following research questions were evaluated:

Research Question 1: How do app users describe their experiences with app notifications?

Research Question 2: How do app users describe their feelings toward app notifications?

Research Question 3: How do these experiences and feelings inform or shape the overall app-user experience?

Participants

The app users who participated in this study came from different backgrounds, with regards to app notification experiences and preferences. Participants provided information regarding their behaviors with, attitudes towards, and experiences with their smartphones, apps,

and notifications. Participants were recruited/selected through a purposive and convenient sample (see Chapter IV). While specific demographic data were not obtained, the participants provided information about: typical uses of their phones, notification setting preferences, feelings towards notifications in general as well as towards specific types of notification, the advantages and disadvantages of notifications, and the characteristics of app notifications that are viewed as burdensome, annoying, or otherwise frustrating, over against those that are viewed as liked, requested, or enjoyed. All participants were students at Colorado State University with majors in Journalism and Media Communication, with interests in PR and Marketing. All participants were between the ages of 18-24 years, and have had at least two years of smartphone, app, and app notification experience.

The following review provides a brief summary of each app user who was interviewed for the study.

Luke is an experienced app user, who has had a smartphone since he was 14 years old. He uses apps on his phone primarily for communication (text/call/social media) and sports updates.

Rebecca primarily uses the apps on her phone for communication, music, and to seek information. She finds current app notifications limiting.

Amy enjoys using her phone apps for a variety of common activities, including: communication, organizing her work/school schedule, information seeking, music, games, and shopping. She enjoys notifications that have quirky, unique, or different messages.

Jennifer is the oldest of the participants. Easily annoyed by app notifications, she spends as little time as possible on her phone. She primarily uses her smartphone apps to organize her work/school/social life schedules and activities for work.

Sam uses his phone apps mainly to seek information, specifically on Twitter, and to communicate. He spends the majority of his time on his phone, and is greatly concerned about privacy, specifically with regards to others knowing to whom he is talking.

Sarah primarily uses her smartphone apps for communication. She has all notifications turned off, except for Snapchat. She finds subtle notification messages more preferable than blatant ones.

Zoey primarily uses her smartphone apps for communication. She has had many experiences with notification glitches, wants more connectivity between mobile apps to desktop apps, and wishes she had fewer interactions with notifications.

Megan primarily uses her phone apps for communication. She ignores her phone if she receives ‘too many’ notifications, has had her phone since she was 14, and stated the sounds accompanying apps were an important characteristic in a smartphone user’s experience.

Becky uses her phone apps mainly to manage her sorority’s various social media activities. She is constantly on her phone, but finds she has too many notifications.

Jack self-identifies as a forgetful person, and only looks at his phone if he receives a notification alert. He finds himself easily annoyed by notifications, and will delete apps if he receives too many.

A summary of information regarding participants’ sex, year at CSU, and the type of smartphone can be seen in Table 5. Pseudonyms were assigned to respondents to ensure anonymity for each individual.

Table 2. Summary of Participant Information

Pseudonym	Sex	Year at CSU	Type of Smartphone
Luke	Male	Sophomore	iPhone
Rebecca	Female	Sophomore	iPhone
Amy	Female	Senior	iPhone
Jennifer	Female	Senior	iPhone
Sam	Male	Sophomore	iPhone
Sarah	Female	Senior	iPhone
Zoey	Female	Senior	Android
Megan	Female	Sophomore	iPhone
Becky	Female	Sophomore	iPhone
Jack	Male	Senior	Android

The following excerpts briefly detail each participant's reported experiences with and/or feelings toward app notifications. All ten participants were Colorado State University students, with declared majors in Journalism and Media Communication. Three of the participants in this study were male, and the remaining eight were female. Only two types of phones were present, nine iPhones and two Androids. All of the participants had their first experiences with their own smartphones sometime in middle school or high school. Every participant claimed to find notifications important.

Jennifer explained why her notifications are important:

JENNIFER: I feel like, if I turned off any of the ones I have on right now, I would either miss something important [or] someone would be trying to get a-hold of me that can't.

Becky agreed with this point:

BECKY: I'd say they [app notifications] are very important because this world is so into social media now, so if you didn't have them [app notifications] you'd never be in contact with people, and it'd just be really hard.

Amy described why notifications are important to her:

AMY: Just depending on what it [an app notification] is, like I think my news apps are really important to me because I don't click on the news app, I just go through the notifications... chances are if I don't get a notification then I'm not gonna go and check out the news on my phone.

Although all the participants had reasons for saying why notifications were important to them, each participant also claimed that notifications had several disadvantages.

ZOEY: It [app notifications] helps me use my phone for a tool when I don't have my laptop, but at the same time they are a very big nuisance and distraction, 'cause you get them all times a day.

Jennifer continued by stating:

JENNIFER: If I have an app that's constantly sending me messages, I feel attached to my phone, and I don't like that. They're constantly engaging me in phone ... I would disconnect from the rest of the world, and I don't like that. I value my physical presence a lot more, so I feel like, I think that's kind of like the big reason why I turn off my phone [when she's with loved ones].

Luke shared his opinion about the disadvantages of notifications, despite their ability to keep him "staying up to date".

LUKE: Receiving floods of notifications and things you don't want, which also like, there's gonna be important ones within that flood, but since you're getting a flood you're not gonna even see the important ones or care about it as much cause you just want to get rid of all of them.

Sam also discussed frustration with notifications:

SAM: It just distracted me a lot, take[s] more of my time, for those took more of my focus away, and it took more time to go to where I really wanted to go to on my phone. I don't really have any advantages that I really see.

Several participants stated that conciseness, frequency, and previewing messages were key components to a positive or neutral notification experience, and preferred

notifications with these characteristics. Jack, Sarah, Zoey, Luke and Jennifer all discussed the importance of these characteristics.

JACK: I like having mine with, [for example] your email, I could read most of your email. I like previews, as long as I don't have a lot of notifications if I get an email the bar will be big enough for me to read kinda what it's about.

SARAH: For characteristics, that they're not obnoxious, they're very subtle, and they give you options of how you want those notifications.

ZOEY: It's really important to, especially, if it's a messaging app, [to] have the profile picture or the number of whoever's messaging you, but it also needs to have the logo of whatever app they're messaging you on. It definitely needs the preview and it needs a short, like at least the first 100 or so characters of whatever the messages is.

LUKE: I would say the frequency and I think the way they [app notification] present themselves. I mean it's different for all of them, but by frequency I mean like, ones giving you too many, they should give you less if it's in the app [the user should receive fewer notifications outside the app if they are also receiving notifications within the app]. Because apps want to give you notifications for everything, whereas I feel like there are only certain things you need notifications for.

JENNIFER: I would say conciseness... you don't have to give me a whole paragraph.

Data concerning this reoccurring theme—of balancing the stress or annoyance of notifications with the need to stay connected—are presented in further detail below.

Key Findings

Overall, the participants in this study expressed both positive and negative experiences, feelings, and overall perceptions of app notifications. This sample of participants represented a small but diverse spectrum of app users. Through the convenient sample method, all of the participants were recruited from a Colorado State University, with majors in journalism and communication, with interests in public relations. Despite all participants being between the ages

of 18-24 years old, users had varying experiences and feelings that helped enrich the data gathered.

While gathering data, and more so after analyzing, the researcher identified several common themes across participants responses.

Users appreciate brevity in their notification messages. Many of the participants shared that conciseness was an important characteristic for their notifications to have. Several of the participants mentioned the perception of being busy and receiving over 100 notifications a day as root causes. Some felt that they did not have time, or that their time was limited, so they need only get messages that are clear and can be evaluated quickly so as to continue on with their previous task.

Users do not want to be disturbed, distracted, or made aware of notification messages (especially when they are busy) that have no perceived relevancy, importance, or time-sensitivity. This includes notifications about engaging in the app because the user has not activated the app in a few days, game notifications that remind the user to play, and social media notifications that are individual updates about something they posted or posts that are about other peoples' activities. Because users get so many notifications a day and they consider themselves busy, app users only want to be pulled away from their current activity if the notification ranks as more important or equally important to their current task.

Users weigh the importance of their apps differently, factors that contribute to this are age and experience with smartphones. As previously mentioned in the literature review, the theory of hierarchy of needs is indeed at play in how users react and respond to notifications. However, in this instance, users demonstrated having a more inverted pyramid, where psychological and self-fulfillment needs were mentioned more, and prioritized more than other

app activities. The hierarchy of needs is present in app users' behavior in responding to app notifications, however, a more comprehensive model is needed with consideration of age, culture, profession, etc. to help demonstrate specifically how notifications are prioritized.

Users feel frustrated when they receive too many notifications because they don't have more options to control what specific notifications are coming to them. Many users stated that they liked specific apps, but that they the app sent too many notifications. While some companies, like Facebook have controls for all of their notifications, others do not, forcing the user to turn on notifications for some important messages knowing they will receive other unimportant ones. Others said that companies, like Facebook, don't offer enough customization of notifications they do want to receive (being notified it's a family members birthday, and not a causal acquaintance's birthday.)

Users remember more bad experiences than good. While users shared positive experiences and feelings about their interactions with app notifications, the majority of the conversation was described as negative experiences and feelings upon reflection of their interaction with notifications. This is especially important for app developers and marketers to consider, as one bad experience with an app notification could permanently remove a relationship with an app user.

Users have a fear that if they are not immediately updated about social media posts that they are missing out on possibly important 'in group' experiences. As previously discussed, the impact of needing to know what's happening at all times with specific regards to activity in a user's apps can be linked to feelings of fear of missing out. Participants recognize that this fear is unnecessary, but cannot overcome the habit to immediately check their phones after receiving a

notification unless they have created clear boundary points (such as turning their phone on ‘do not mode’ if they are in class).

Research Question One

The first research question sought to explore how users describe their experiences with app notifications. In examining this question through the lenses provided by the theories and perspectives discussed in Chapter 3, several emerging themes became apparent in users’ experiences: users want to receive only relevant/important/time-sensitive messages; users understand how to control notification settings; users have a need for immediacy; users are always evaluating notifications; users receive too many notifications; users weigh the importance of an app category/genre; and users view the smartphone as a tool.

Users Want to Receive Only Relevant/Important/Time-Sensitive Messages

Among the most important features of app notifications to participants was the salience of the message. Every participant mentioned an expectation that app notification messages should be relevant to their current activity or interest in an app, or should contain a self-perceived important message, or should be time-sensitive. Moreover, all of the participants indicated in some manner that if their app notifications fail to have these characteristics, they should not be receiving them.

LUKE: The ones I’ll keep on are the ones I feel like are necessary and things I would actually want to know every time I get a notification. Other apps I keep off maybe for things that I don’t really feel like I need to know about. Instagram and Facebook I want to be up to date, so I want to get a notification, but like Hooked and stuff like that I don’t really feel the need [to get notifications].

To Luke, social media messages contain information that is important for him to access in a timely fashion, so he turns on his notifications; which is to say, because the messages on social media sites are deemed important, notifications from these sites are consequently also deemed

important. Six participants mentioned being busy as a prime reason notifications that need to be relevant/important/time-sensitive, if they are to be turned on. “To me, it reflects if I’m having a busy day or an eventful day. Whereas, if I don’t have as many app notifications I feel like not as much is going on in the world,” said Luke. Zoey and Sarah mentioned how notifications that are irrelevant are ignored.

ZOEY: When I swipe down to view the notification, if it’s just a boring spam [message], like “We’ve had a new update, come check our things” I’ll just swipe it away and ignore it. But if its actually relevant to my profile or something, then I’ll go ahead and click on it.

SARAH: I consider myself busy, cause I don’t really have a lot of time to go and do all these apps. I find it annoying when it pops up, and it’s like whoa Words With Friends [app notification message] “We haven’t seen you in a while,” ya know? I’m just like yeah, I’m in class, go away. I feel like I value my time and I value my time on my phone and if someone’s gonna send me a couple sentence notification, I’m just gonna be like “why did I just read that?”

The consensus was that when participants did not apportion time to interact with certain apps because these apps were not prioritized as important, they (the participants) did not have time to receive, be distracted by, or to evaluate notifications from these apps, and then decide on a response action. From this data, the researcher finds that users appreciate both relevance and brevity in their notification messages. Many of the participants stated that concision was an important characteristic for their notifications to have. Several participants mentioned having the perception of being both busy accomplishing tasks and receiving over 100 notifications a day as warrants for preferring concision. Some felt that their time is often so limited that they require messages to be sufficiently concise (that is, both brief and informative) to be evaluated quickly, so as to continue on with their previous tasks.

Users Understand How to Control Notification Settings

While all of the participants discussed how they have their notification settings prioritized, six participants discussed how social media platforms or iPhone/Android sent notifications informing them of their notification settings options, which offered them a better user experience. Jennifer stated, “Once every three months [I] go through my settings one by one and change things...before it was a lot of curiosity like how is this app gonna contact me, then after realizing okay this is useless.” Jack offered a similar feeling: “I’ve learned how to shut the ones I don’t want off, so now when I get a notification, I most of the time pay attention to it.” When Sarah shared her experience with learning about notification settings, she also mentioned the control allowed her to have notifications that were not going to distract her as much, and didn’t waste her time.

SARAH: Now what they do is they’re like “Do you want the push [notification]?” and when they didn’t do that [give her the option to turn on/off notifications at the time of download] I did realize it, and that’s when I’d go back to my phone and change them. I always say “don’t allow”.

Sam shared a similar experience.

SAM: I used to have them all on [all notifications turned on for all apps], I used to have to delete my apps and re-get them just so I could have space again. So once I deleted them I would get them back and then it would ask me again and I would think about it, do I really need this notification on my phone? I would see too many in there...so I would go to my settings and that would make me adjust my settings.

Zoey mentioned how Facebook helped her realize all the options for notifications and how the central location of notifications within Facebook helped her manage all her notifications in one place.

Users expressed appreciation for having controls over their notifications. All ten participants stated that they had all of their notifications turned on when they first acquired

smartphones, and as all the apps on their phones sent them messages, each demanding immediate attention, this created a sense of overwhelming stress, which was expressed as a negative experience.

Users Have a Need for Immediacy

All ten participants shared experiences of developing habits of anticipation in conjunction with the need to respond to new notifications. They discussed feeling an immediate pressure to check their phones whenever they sensed a new notification, followed by an urgent need to evaluate the source/message and, in turn, a need to respond immediately when prompted by communication notifications. Sam stated that he checks his phone immediately if he receives a notification, regardless of his current activity.

SAM: because it's a grown habit, I did it all the time, I'm always on my phone, so now when I get a notification, it could be anything. When my phone's on vibration and [he receives two vibrations] I'm like the heck, what's going on and then it'll just be ESPN. But before I check it...I'm like gotta check my phone, what if someone's texting me.

Sam expressed anger and irritation when he expected a notification to be important (like receiving a text from a friend), but was let down when he received an unimportant ESPN message instead. Becky explained that since she uses her phone to maintain her sorority's social media pages, she too is constantly attending to feelings of obligation to check her phone for notifications.

BECKY: When I get them [app notifications] I get pretty distracted, I just have to click on it, have to see, like who Snapchatted me, I wonder who it is. In class, I put "do not disturb mode on" because I know if it goes off I will look at my phone, it's just like I have to see, I wonder what it is.

In recounting their experiences, Megan, Zoey, and Jennifer all mentioned that while they would check their phones immediately, they would first evaluate the source and message before opening the notification. "I gauge if it's important to me, and then I will check it, if it is," said

Megan. From such observations, it becomes apparent that users develop compulsive habits stemming from fears of missing out. Becky recognized this in herself stating, “It’s like you’re missing out, there always that fear of missing out, like oh I haven’t checked Instagram in 4 hours and I was doing something, did I miss something big? Even [though] you know you didn’t, but you have to check.” Luke also discussed feelings of responsibility to respond immediately to notifications: “When I get a Snapchat I’m gonna be obligated to reply to the Snapchat, because you don’t want to leave someone open on a snap.”

Needing to be available at any time, along with feelings of anxiety from fear of missing out, impacts users’ other activities. Sam shared how fear of missing out affects his recreational activities: “... that’s why I don’t like camping, I don’t like going places where I have no service, ‘cause I need to know what’s going on, I always need to know.”

Users Are Always Evaluating Notifications

Of the participants, all ten mentioned having some method of evaluating notifications before responding, or reacting, or engaging with applications. Two participants mentioned sound as being particularly useful. All ten mentioned the source as their main indicator for determining whether a notification has value and immediate relevancy; and eight participants indicated that preview boxes especially help them to assess which notifications demand immediate responses or action. Megan stated that app sounds help her quickly to identify which app has notified her, and then uses this information to evaluate whether she will look at her phone or not. Sam also mentioned that he relies on app notification sounds to alert him that he needs to check his messages (since he has app notifications turned on only for the four apps he really cares about): “They catch my attention the most.” He also shared that he would like more control over notification options for sounds, stating that since he is always on his phone and it is always being

updated with notifications, that “a nice sound, a bearable sound, not an annoying one” is really important in his user experience. Zoey shared her preferences for the preview box in app notifications.

ZOEY: It’s really important, especially if it’s a messaging app, [to] have the profile picture or the number of whoever’s messaging you but it also needs the logo of whatever app they’re messaging you on... it definitely needs the preview and it need a short, like at least the first 100 or so characters, of whatever the message is.

Jennifer stated that she evaluated whether or not to respond or react to an app notification depending on who the notification is from and how long their message is, or what it is about. “You don’t have to give me a whole paragraph...conciseness is definitely something to value,” she said. “Some notifications send you notifications with “squiggly, star, asterisk” and I’m like who are you 12? Why are you sending this to me?”

Users Receive Too Many Notifications

Of the participants interviewed, all ten mentioned that they have had experiences where they received too many simultaneous notifications. Several participants described their experiences as receiving “a flood” of notifications, after which they experienced frustration, stress, and annoyance. Rebecca stated that Pinterest was particularly difficult because she could not find a way to control notifications within the app: “I think of Pinterest ’cause it’s such an overload.” When asked about her experiences with app notifications she said, “I hate the majority of them,” but later said, “I would love push notifications so much more if I could control the majority.” Nine of the participants stated they receive roughly 100 notifications a day, depending on how active they are on a given app. Amy also described her notification settings: “I have Facebook turned on, but Instagram, the likes, turned off, so that it’s not like a flood every time I post something.”

Jennifer said she does not have her school email set up with notifications because she would then be likely to receive 15 emails a day, and that, "... it's almost overload at that point." Luke also discussed his notification settings, stating, "I keep Groupme off because those kind of flood my phone...I'd probably end up using the app less cause that would feel like it's annoying me." In his discussion of the disadvantages of app notifications he stated,

LUKE: receiving floods of notifications and things you don't want, there's gonna be important ones within that flood, but since you're getting a flood, you're not gonna even see the important one, or care about it as much, cause you just want to get rid of all them.

Sarah discussed why she turned all her notifications off, except Snapchat: "I have all of them turned off, 'cause I find it annoying. I don't like when it's constantly popping up and popping up." She later discussed game notifications, saying, "I find where they will flood you and then I'm just kind of like, 'Oh my gosh'... they just tell me irrelevant information."

The interpretation of these experiences leads the researcher to surmise that users find notifications overwhelming when there are too many being received within a given time-frame, especially in cases where they find the information irrelevant, unimportant, or not particularly time-sensitive. The results of these types of experiences have either forced users to "deal with" notifications, turn off the notifications, or to end up deleting the app entirely. Rebecca explored this phenomenon, noting that "the push notifications are something I've learned how to deal with, but certain apps I'm like, you don't need push notifications, okay this is enough."

Users recognize that app notifications are a marketing tool, however, these attempts are unappreciated. Sarah shared this point: "I understand why they bug you 'cause that is a part of their marketing technique. They're trying to get you to go on to their app, but to me, I know what you're doing; isn't working today."

One of the complaints about this from users was that they “didn’t need a notification” because they check the app regularly, “on a daily basis,” and only turned on notifications for things they “want to be immediately up to date on.”

Users Weigh the Importance of App Category/Genre

When asked general questions about app notifications, many of the participants described their experiences using the phrase, “it depends on the app.” All but two participants organized their notifications according to which social media platform(s) they used most. After re-reading their transcribed interviews, it was apparent that communication apps (text/call/email/messaging/social media) are prioritized and used more than any other app genre. While they stated that they had other apps on their phones, and had notifications turned on for them, they emphasized the importance of their communication with others via the notifications. Sarah mentioned that she only had Snapchat notifications turned on because, “that’s how I communicate, ’cause I do have a lot of friends who I’ll text, [but] who Snapchat rather than text.” Sam also found communication app notifications really important and prioritized those interactions. When discussing the importance of notification sounds, he said that if he didn’t hear it,

SAM: I might not check it for a while, so what if a nice girl sends me a message, and then I don’t check it for a while, then she gets salt [upset] ’cause [I haven’t] checked it for like 30 minutes ’cause I didn’t see it, I didn’t hear it, I didn’t feel it.

The general interpretation was that this group of individuals valued notifications concerning their communication with their friends, family, and work connections more than notifications about any other app on their phones. However, while Jennifer did not have social media notifications turned on, she visited the app on a daily basis. She observed that texts and their notifications from her boyfriend and father were particularly important to her, stating, “My

dad sends me cute messages and that's cute... so does my boyfriend," and "... but if it's a person trying to get ahold of me, especially because of my dad doesn't live in the United States, that's like precious."

Seven of the participants mentioned that they specifically turned off game notifications because the messages are too frequent and not useful. Jack said in reference to game notifications, "No, I shut those off 'cause they're ridiculous... I used to have that Clash of Clans game, and then it would notify me when I stopped playing it, cause I only played it for a week. Then for the next two months I got a notification every week and I deleted the game."

When asked if participants wanted more or fewer notifications, six participants said they didn't mind if they had more as long as they were relevant. Amy, for example, said, "I don't really know if I necessarily want more or less, it's just whatever, if gonna be relevant to me." Rebecca expressed similar feelings: "I think it depends on the app, like my social media I love having, but other apps I don't care for." Jennifer agreed with this, stating, "I kind of like it just how it is, I feel like I've really tailored it." Luke had a very similar feeling too: "I think I'm content with where I'm at... 'cause the apps that notify me are the ones I want to notify me."

Four participants stated that they wanted fewer notifications because they find them distracting and overwhelming. Sam said:

SAM: fewer, just 'cause they [create] a lot of distractions... I used to get in trouble a lot in high school [because he was on his phone all the time]... I wish I wasn't on my phone as much cause I'd probably learn a little more, or just where we're at [in class], not have to ask questions as much.

Megan agreed with these points, stating, "...probably fewer, 'cause it goes back to there's a lot."

Becky also agreed with these points:

BECKY: "I'd say fewer because I'm really trying to distance myself from my phone a little bit, because I feel like it does take over my life, which is why I've turned off everything I don't need. I just feel like I should interact more in the real world more...my

little sister is always on her phone and it's hard to pull her away from it. I just don't want to be like that.

Zoey was the only participant who said she did want more:

ZOEY: With some applications I would like more notifications. So like Snapchat, it doesn't necessarily notify you when someone's posted a story, it only does the direct thing. So if I'm mostly just following people's stories I want some of those notifications.

But she also stated that, "the only ones that I'd want fewer are some of the ones that don't let you change anything at all, like Disney gif."

Users See the Phone as a Tool

One of the more intriguing references users made towards their smartphones was in viewing the phone as a tool, rather than a fun toy or medium of entertainment. Participants also discussed how their smartphones had become extensions of themselves, and that app notifications needed more options and filtering capabilities, so that they would operate more intuitively. Amy was the first participant to highlight these points.

AMY: So I think at first my phone was this really fun piece of technology, and I was like oh my gosh this is so cool and I have all these apps on here and I can do this and that, at first it was really cool and fun. But then it became more like an extension of myself rather than like this fun toy almost, it became a tool. And so the difference between that is that I wanted it to be a little bit more focused. It was something new...but then it lost its novelty and I was just like, ok I'm done with this I need to turn some of these off.

When Luke shared his past experiences with notifications, he said he went through a transition:

LUKE: I first got a smartphone in like 7th or 8th grade so definitely the notifications that I had were different. I would say now they're more like things I need to know, like business stuff, and through Twitter, things I want to know whereas other things are like playing a game, or something like that don't really matter. So, I'd say as I've gotten older the notifications actually are used to keep my life more organized, rather than it being just pointless things. I eventually started using my phone more, just like keeping my life organized, and for things I needed, rather than having like four pages of pointless games. Once I deleted those I would go and customize, this is what I want to know about, and keep the apps that I feel like I need and not just waste space. When I made the transition for using my phone as a necessity rather than a hobby.

This group of users all started having experiences with their smartphones in middle school and high school. The way they viewed their phones, the capability of phones, and the culture of smartphones is different than it was even five years ago. As they matured into young adulthood, and took on more responsibilities in their academic, work, and social lives, the way they saw and used their smartphones also changed.

Research Question Two

The second research question sought to uncover information about users' feelings towards app notifications. Participants explored both positive and negative attitudes towards notifications, and as a result, five themes emerged: fear of missing out, annoyance with constant distraction, frustration with current control options, and a tension resulting from notifications that are perceived as both important and annoying.

Fear of Missing Out

When participants discussed their feelings about app notifications, many referred to fears of missing out, with specific regard to social media, text, call, or other communication updates. Although users did not explicitly explore why they had fears of missing out on notifications that allowed them to be instantaneously updated about what others were doing, the origin of this seemed to stem from being left out, from feelings of neglect/rejection, or questioning what the individual did to alienate other 'in-group' members. When asked what they would do if they received no notifications, users said they would feel "bummed," "terrible," "weird," "paranoid," "sad," "awkward," or unsure of themselves, frustrated that no one responded to them; and that they would find it too tedious to go through and check all of their apps for possible updates.

Amy explained that she expects to receive a certain number of notifications a day, and that a dramatic change, such as receiving no notifications, would make her feel "strange and

weird,” making her second-guess whether it was her activity on the social media sites that influenced the change in notifications or if it was the phone not acting properly.

Rebecca said she would be “frustrated” if she posted something and no one liked it, stating that she would delete the post, and try again at a different time, assuming no one saw it. Jennifer shared that she would end up checking her phone more, and experiencing “that awkward moment where you unlock [the phone and check for updates] and nope, nothing.” The fear of missing out when not receiving notifications makes users question their own behavior, re-evaluating it, or questioning the operating system on the phone. Sam said it would increase his phone checking activity and entering/exiting apps even more, worried that he might not be getting his updates as usual. Becky and Jack both mentioned being sad or “bummed out” that no one connected with them. Jack continued, saying that if it were a glitch, he would be “pissed” because his phone was not doing the thing it was made and marketed to do, which is to alert him when he needed it to.

Zoey was the only participant who mentioned being happy to receive no notifications: “I would be so relaxed that there would be no notifications...if I got no notifications, I’d probably be fine,” as this would be a reflection on having fewer things to complete for her work and being able to enjoy her day because she, “find[s] it very annoying if I have to check my phone 100 times a day to continue to swipe away all the notifications.”

Some participant stated having a fear that if they are not immediately updated about social media posts, that they are missing out on possibly important ‘in group’ experiences. As previously discussed, the impact of needing to know what’s happening at all times with specific regard to activity in a user’s apps can be linked to feelings of fear of missing out. Participants recognize that this fear is unnecessary, but cannot overcome the habit to immediately check their

phones after receiving a notification unless they have created clear boundary points (such as turning their phone on 'do not disturb mode' if they are in class).

Annoyance of Constant Distractions

The relationship between user and notifications is an interestingly complicated one upon reviewing participants' conversations. Almost all of the participants felt that the notifications which they had customized on their smartphones were important to them, yet all of them repeatedly mentioned having feelings of annoyance, stress, frustration, being overwhelmed or overburdened, or general anger towards notifications.

Jennifer said that product update or marketing notifications are not only annoying, but that they, "destroy my mood." She continued, saying, "I feel attached by my phone," when apps send her too many notifications. Amy shared that she turned off Spotify notifications, "because it got really annoying, it was notifying me way too much." She echoed Jennifer's feelings about marketing notifications, stating that Duolingo would send her 'Haven't Seen You in a While' reminders "that would annoy me so much...it be antagonize me so that was annoying." She said that Pinterest was notifying her too much, and that she ended up deleting the app, even though she still liked the platform to search for recipes and other things she enjoys.

Zoey mentioned that she gets annoyed, "because you can't get rid of them unless you open the app and I don't want to do that all the time." Sam and Rebecca both mentioned hating specific apps (Facebook/Messenger and News/Pinterest, respectively) because of the app notifications. Megan shared that she gets easily annoyed with the volume of her notifications, and finds it "tedious" to go through them all. Even Becky, who was very concerned with missing out on updates, stated that she gets annoyed with notifications because she gets so many, and doesn't read them when she's working on something, but continues to receive more notifications.

It is clear from these discussions that users find *their* notifications important, that is, the ones they turn on, because they are perceived as important, and feel disappointed or frustrated if they don't receive them. However, they also discussed feelings of being overwhelmed or just annoyed with the sheer volume. Sam pointed out that he feels anger when he anticipates a communication notification, but receives an ESPN or non-communication notification.

Participants shared that they do not want to be disturbed, distracted, or made aware of notification messages (especially when they are busy) that have no perceived relevancy, importance, or time-sensitivity. This includes notifications about engaging in the app because the user has not activated the app in a few days, game notifications that remind the user to play, and social media notifications that are individual updates about something they posted or posts that are about other people's activities. Because these participants receive many notifications in a single day, and because they consider themselves busy, these app users only want to be pulled away from their current activities when a notification ranks as more important or equally important as their current tasks.

Frustrated with Current Control Options

As previously discussed, users experience frustration with app notifications for a variety of reasons: they receive too many notifications (even when they want notifications from a particular app), they do not like to receive notifications when they are trying to go to sleep or are busy/working, they anticipate a specific notification but receive a different notification instead, or when they do not appreciate the message. This frustration ultimately stems from not being able to control enough features within app notification settings. In fact, several participants mentioned wanting total updates from their social media sites, rather than individual updates. For example, after posting something on Facebook, a person will receive a notification for roughly

every person who ‘liked’ the post. Four participants mentioned wanting one update indicating how many people liked their post, so as to avoid the “flood” of notifications.

Additionally, participants mentioned wanting even more options to customize the specific contents of their notifications. Sam and Luke both mentioned that they don’t really care about birthday notifications on Facebook, except for a few people that they care about. However, this notification feature does not currently allow users to be notified of some people’s birthdays and not others. Sam and Luke also said they get notifications about people who haven’t posted in a while on Facebook, and that they do not really care for those types of notifications either. Amy stated that she doesn’t like notifications from Pinterest trying to connect her with other Pinterest users with messages like ‘Tiffany has a similar board as you’ or ‘Tiffany re-pinned your pin,’ but she cannot figure out how to turn them off.

Becky observed that she has to turn on ‘do not disturb’ mode when she’s busy because she gets too distracted, and can’t focus long enough to get her work done.

Notifications are Important but Annoying

After reviewing participants’ conversations about their feelings towards notifications, it is evident that users find app notifications to have both positive and negative characteristics. Whether or not users have a positive or negative experience, just as the participants often stated, it depends on the app and it depends on the notification. When asked if they found notifications important, Rebecca said, “Yes, and no. Instagram, Twitter, Snapchat, those notifications are important to me ’cause they’re communication based.” But other notification updates about her activity in an app, she mentioned as hating. Zoey shared a similar feeling:

ZOEY: I feel like the notifications are important because it does get me [an] immediate response to things that are time-sensitive. It helps me use my phone for a tool when I don't have my laptop. But at the same time they are a very big nuisance and distraction. 'Cause you get them all times of day and so, if you're trying to pay attention to a class or

trying to get stuff done and then you hear your phone ding it's like, uh I have to go check that, it's just another thing that you have to do.
are a reminder that they have one more item on their 'to-do list' for the day.

Megan mentioned that she checks her phone often, but that, “sometimes when there’s too many (more than 15) I’ll just turn it all off and probably ignore my phone... [because] sometimes they can be overwhelming.” Part of the problem with notifications is that while the message/source has salience to the user (especially when users customized their notifications), notifications require time and energy. Users need sufficient time to stop their current activities in order to check messages, as well as enough energy and mental capacity to evaluate the sources and contents of messages; and then both time and energy to make executive decisions about whether or not they need to perform any actions in response to their notifications. Many users, like the ones in this study, do this constantly throughout the day for 30-100+ notifications. Notifications are not passive entities; they are activities, or interactions between user and update. They necessarily require some type of action from the user. So, even though every participant expressed a preference for having their notifications sent to them in order to “stay up to date,” they all provided and discussed more negative feelings than positive.

Participants remember having more bad experiences than good ones. While users shared positive experiences and feelings about their interactions with app notifications, much, if not most, of their conversation was devoted to expressing negative experiences and feelings upon reflection about their interactions with notifications.

Research Question Three

The final research question examines how these experiences and feelings inform or shape the overall app-user experience. After examining both research questions 1 and 2, the following themes emerged: information design matters to users; limited notification control options

negatively impact users; notifications are marketing focused, not user focused; primacy of apps (first exposure to certain apps) impacts users; smartphones are perceived more as tools than entertainment; and user experiences and feelings reflect on the brand.

Information Design Matters to Users

The visual appearance of app notifications on the smartphone screen, along with the kinds of sounds that accompany notifications, were both discussed so heavily that their relevancy cannot be overlooked. Six of the participants mentioned that badge notifications (or the red circles that sit on the app icon in the top right hand corner) were annoying enough that they felt compelled to click on the app to clear out the badge reminder. Amy said that badges help remind her that she has notifications she needs to respond to, but that she didn't like the color.

AMY: would be nice if you could change the color, cause it would be a lot less obnoxious if it wasn't red... 'cause I think, out of all the app notifications, this is the most annoying... your phone shouldn't be harassing you, you know? It should be something that's helping you. I think we are getting to this point technologically where that is what it should be.

Jack also mentioned how he used badges as reminders to check his apps; however, he indicated that the color or number does not bother him. When Luke shared his experiences, he said that he "need[ed] to get rid of them," and often felt frustrated with his mail app because the notifications were subject to software glitches.

LUKE: I'd need to get rid of them, and it really pisses me off, because my mail app has this glitch on my phone, where even though all the mail that I've read is read when I check my email on like a computer, it says it's not read on my phone. So like my mail app has like 7000 next to it, so I've had to like live abiding by that, which sucks.

After listening to these app users it became clear that while some do not feel bothered by badge notifications, others find their control over how badges appear on the screen too limited, which contributes to bad app experiences, despite notifications being perceived as useful.

Several participants also indicated that the location of banner notification was important to them. Luke, Sarah, Megan, Sam, and Becky all stated that they had preferences for banners to be at the top of the page. Sam stated, “I wouldn’t want it to [be] right in front of my face.” Sarah shared a very similar view, noting that banner notifications appearing in the middle of her screen were “overwhelming” at times: “It was overwhelming, it was just kind of stressful, like I don’t need to see all these in my face.”

Some users are sensitive to notification sounds as well. Zoey, Sam, and Megan all stated that the sound of notifications were important to them. Sam went so far as to say that notifications need a “nice sound,” and that he thought Facebook, Instagram, and Tinder all had “weird sounds.”

While some participants do not need or desire more customization over the visual and auditory features of notifications, these features mattered to other participants, so much that they will turn off their notifications when they cannot have them turned on without having to deal with negative experiences, despite enjoying everything else about a given app.

Limited Notification Control Options Negatively Impact Users

When the participants in this study were asked how their experiences with app notifications might be improved by app developers, each participant expressed a desire for more control over their notifications through customization options. The following responses reflect the sorts of options individual participants wanted for better app notification experiences.

Zoey stated that she wanted more customization with reply buttons within notifications, and to have the ability to make her own notifications; she also emphasized the importance of having every app notification accompanied by a sound or strong vibration.

ZOEY: Can you make a notification setting so that when this happens I get this...it’d be nice to have the option to create your own custom notifications. And I strongly say that

they still need to have better connectivity to a desktop. [And] making sure it has a sound or vibration.

Jack stated that he wanted fewer engagement messages.

JACK: Don't remind me that I still have an app...those are the ones that really drive me crazy.

Megan stated that she wanted notification sources to recognize when too many were coming in and to pause or wait for her to open them.

MEGAN: If they know it's going off every 3 seconds, pause it or something.

Becky stated that she wanted a total update rather than individual updates for social media reactions to her posts.

BECKY: I'd honestly tell Instagram that when you get likes you don't have to do each individual like because then you have 200 things going on; you could be like 75 people liked your photo, click here to see, just like one solid thing. Instead of this person, this person, this person [liked your photo] 'cause that's frustrating.

Luke said that he doesn't like how many notifications he receives as well.

LUKE: I would tell Facebook that they give me too many notifications. And being more concise [with app notification messages.]

Amy said that she also wanted to change the frequency of notifications for some apps.

AMY: If I could talk to that survey app I was talking about, I would say you need to leave it alone and slow down, 'cause I will go in there whenever I want to go in there. This isn't something that I want to be reminded of, it's more something that I want to go to when I feel like it. What it comes down to is being able to customize it because nobody's the same, so why would you have their notifications all the same? You should be able to customize it within each app, I think that would be cool.

Sarah also agreed about receiving too many notifications and not wanting marketing messages.

SARAH: I'd want them to know and change too, [to] not be pestering people. If you're gonna send notifications to have the opportunity to choose whether or not you want them on or off and then how you relay the message. If it's gonna be something like, oh haven't seen you in a while, maybe send that out like once a month rather than once a week. And then if it's a communication, try to make it as short and simple as possible.

Rebecca also agreed about receiving too many notifications and message importance.

REBECCA: I definitely would want Pinterest to go back to its beta settings [she means when she first started using Pinterest]. Because I feel like having that much way too much for any person. Some of the stuff that they put notifications for are pointless, people don't care for it. We're all so different how we utilize push notifications. I know for a fact, from me to my sister to my cousin, we all use them differently because we're all in different bases of our lives. I think even if they could have their customization they would be the happiest people [her family who struggles with technology].

Jennifer said that she wanted apps to have more consistency about where developers put the notifications.

JENNIFER: You can't through the settings of the phone, [you also have to go into the app].

Sam stated that notification sounds matter, that he wanted total updates as well, and not to send so many notifications because users check their apps without needing to be notified.

SAM: I would want them to know that sound does really affect people. A message that says two or more people just liked this tweet or whatever, we don't need that. We don't need to see that they haven't posted in a while; we don't need to see that they're live; we don't need to see if they've posted a story. We don't need to see that, we can see on our own. So maybe cut that down a little bit, then maybe pick and choose.

Notifications Are Marketing Focused, Not User Focused

Eight of the participants mentioned that they did not like marketing notifications, which not only failed to work on them, but instead had an opposite effect. In interpreting their responses, the consensus was that engagement messages were annoying because users certainly already knew they had the app, but had reasons for not recently entering and spending time in the app. Users are uninterested in irrelevant marketing or engagement messages. For example, Rebecca said, "I don't care about all this other stuff you're trying to engage me and notify me of." And Becky said, "I just don't like when things are spamming me, too much [is] going on, 'cause I get annoyed." Sarah even said, "I know what you're doing; it isn't working today." Jack

reiterated that, “[a] completely pointless notification just make[s] me want to delete apps... don’t say, ‘I’m here’ notifications. I hate them so much.”

Participants shared that they feel frustrated when they receive too many notifications because they do not have enough options to control which specific notifications are coming to them. Several users stated that while they liked specific apps, these apps sent too many notifications. Although some companies, like Facebook, do have controls for all of their notifications, others do not, forcing the user to turn on notifications for some important messages knowing they will receive other unimportant ones. Some participants said that companies, like Facebook, don’t offer enough customization with respect to the notifications they do want to receive (being notified about a family member’s birthday, and not a causal acquaintance’s birthday).

Primacy of Apps (First Exposure to Certain Apps) Impacts Users

An interesting, and unforeseen, theme that emerged from talking with the participants was the effect of a user’s first exposure to, and enjoyment of, a particular app when the user first began using a smartphone. When asked what users expect of app notifications, the researcher received very similar answers, such as: concise messages, reduced number of notifications, that messages have relevance or perceived importance, and that users have control over the kinds of alerts that accompany notifications. However, when asked *why* they had this or that expectation of app notifications, several of the participants mentioned that these expectations stemmed from their first interactions with the apps that they liked and continue to spend a lot of time with. Sam, for example, discussed how Twitter shaped and informed his experience with apps and then his expectations of app notifications in general.

SAM: I expect it to be just like Twitter, every time. I feel like it should have the same sound, same way it pops up, the same amount of information. Because I think Twitter

was the first app I ever really used. When I did have a smartphone, and that's the one I probably get the most notifications on.

Luke shared similar feelings, but with Instagram. His previous experience with Instagram shaped his feelings with other notifications.

LUKE: I would tell Facebook that they give me too many notifications; they should be more like Instagram. [Also] I think Twitter, and this could be 'cause I'm more new to Twitter... but I think Twitter is a little unorganized... if you're new to the platform it doesn't just completely make sense. Whereas, when I started using Instagram, even like my first week using it was pretty cut and dry, and there wasn't anything not to get. So, I think there is a way they [other app platforms] could avoid that.

Amy also shared similar feelings about expectations from other apps on her phone based on her experience with an app called Tap Tap Fish.

AMY: I have this silly game called Tap Tap Fish...I like their notifications and I would be like good job [to the marketers] 'cause it's the perfect amount, and it's not overbearing, and it's like a little nudge.

Sarah shared similar feelings about what she expects from app notification messages, based on her experiences with Snapchat.

SARAH: Like with Snapchat, it will just say, "Caitlyn is typing"; it doesn't say, "Caitlyn sent you a video" [or] "Caitlyn sent you a message." They want it to be as short and sweet as possible. It doesn't take up much room on my phone.

Rebecca said that she also has expectations of certain apps, and that her expectations are based on how the app behaved when she first downloaded it. She shared that when Pinterest changed its notifications, it annoyed her, and that she would prefer the app to revert back to how it was when it first came out.

REBECCA: I think for Pinterest 'cause it's such an overload. Pinterest never used to be like that and I had Pinterest when Pinterest first came out. I had the app when it first came out, so I'm like "This is not like Pinterest." I think it's trying to like, it's their way of trying to be still like a social mind [it's trying to be like social media]. For me that's not what this was created [for], this was literally created so you can get workouts, clothes ideas. Learn how to do crafts and arts and for me it's like... the matching you with someone else, like I don't really care. [Also] you have six new saved things. I'm like,

"This is literally just like Facebook; those [are] the notifications [that] irritate me. Like I know I saved it, that's why like I sometimes hate the push notifications for certain apps.

Perception of the Smartphone: Transition from Entertainment to Tool

As previously discussed in Research Question One, several participants observed that how they now use their smartphones, and which apps they now prefer to use, has changed from when they first began using smartphones at all—stating that they now see their smartphones as a tool, rather than a fun toy or piece of entertainment. Sarah, for instance, noted specifically that she viewed her phone as a tool to complete tasks, and that often times she would perform tasks on her phone that otherwise would be completed on her computer. For those who did not specifically reference this change, some mentioned that they no longer receive game notifications because they do not primarily use their phones to play games anymore.

When asked whether there have been changes in how they view app notifications since they first began using a smartphone, everyone mentioned that they went through a transition period during which they learned how to customize their notifications through social media privacy prompts, iPhone prompts (to control notification settings at the time of download), trial and error, and/or searching how to change notifications for an app once they became bothered by notifications.

As previously mentioned, as this group of app users matured into young adulthood, and took on more responsibilities in their academic, work, and social lives, the way they saw and used their smartphones changed.

User Experiences and Feelings Reflect on the Brand

Many people understand that apps furnish a connection between a user and a brand's website. However, there are others who view apps as separate entities that exist primarily, if not exclusively, on their smartphones, rather than as providing a direct, interactive experience with a

brand. It is important for marketers and app developers to understand how users interact with apps and how they individually perceive them during their interactions, since this will impact their attitudes towards the brand as a whole. The data collected in this study suggest that participants' interactions, including experiences and feelings, with app notifications reflect broadly on the app's brand. Six of the participants (Zoey, Jack, Sarah, Luke, Becky, and Amy) indicated that their interactions with app notifications reflect on the app as a brand.

Zoey stated that when she interacts with an app, she has an expectation for the app notifications to work properly, and if the app does not function the way she expects, she becomes frustrated because she cannot complete the desired task to which she was alerted. When this happens she considers deleting the app altogether, and she associates the negative experience with the brand.

ZOEY: Interactions with the notifications definitely have an impact on my perception of the app. Cause if the notifications don't work as they're intended, if they don't click and open the actual app. I just, I get to the so frustrated, I just delete the app. It's like, if I can't do it on my phone, I might as well just do it on my computer. There's been times where I get really frustrated with the app because of the notifications [especially if the app fails to launch after she gets a notification]...it been very frustrating and so that has definitely had [a] negative impact on my perception of the app.

Jack also mentioned that when he receives unwanted notifications, such as user engagement game notifications or marketing messages, he gets frustrated and deletes those types of apps if he doesn't need the app, or turns off all notifications, if he does need the app. Jack explained that the motivation to delete these types of apps stems from the importance of the app; when he doesn't value the information within the app, he does not want to be reminded of irrelevant or pointless information via notifications.

JACK: Yes [interactions reflect on the brand], 'cause I'd just be like I don't want this game anymore and delete it. [An example of this is] Clash of Clans reminding me

that I still have like a, account or a game or whatever. [It] made me want to just delete that app cause I didn't feel like having it anymore, I didn't feel like getting notifications if I didn't care about it, and a lot of games have done that too.

Sarah also discussed how notification messages reflect on the brand, specifically with reference to bad experiences. She noted that when she perceives an app feature as annoying (such as an unwanted app notification message), she transfers that feeling of annoyance towards the brand as whole.

SARAH: I think so. I think as a brand they're trying to set this certain image and if their image is being constantly annoying I would probably categorize them as, oh they're kind of an annoying brand. Like they keep pestering me. I would say mostly like with games is where I find that or news apps, where they will flood you and then I'm just kind of like, Oh my gosh [annoyed]. I've talked to a lot of people with like news apps now, we don't really have those apps anymore. Because they are, like ESPN I was talking to someone, they were just kind of like "they just tell me irrelevant information now that I just don't really want to have it being like, oh so-and-so scored this, like I don't care I just care about the end results." 'Cause I think like what they're branding [style is] trying to be like social media branding of their company. Kind of reflects about how they do their notifications as a company. 'Cause then I would categorize them as oh, they're annoying social media. I only go online on my laptop, whereas when you can subtly make them like Instagram or Snapchat.

Luke also opined that notifications are an extension of a brand, and that he recognizes when marketing tactics are designed to engage him. However, he stated that these marketing strategies not only do not work, but generate a perception of the brand as having less credibility than it once did.

LUKE: To me it does. I don't know if it should, but when I'm getting pointless notifications from an app I'm gonna like, in my head, the app is going to lose credibility. And it's gonna be more meaningless to me, whereas it still has the same purpose it did when I downloaded it, but when they're just sending me crap, it's like getting junk mail, and I'm not gonna [keep the notifications and possibly delete the app]. You know if I bought clothes from a website and they send me all this junk mail, I'm not gonna want to use the website as much. And it probably works on some people which is why they do it, [or] they wouldn't do it. But obviously on me and the other people who aren't is like influenced by the app and don't need it as much, it's gonna turn them away from it.

Becky mentioned that she stopped using the Pandora app because of the irrelevant messages that she was receiving. She weighed the importance of the app against the annoying app notifications she was receiving from Pandora, and decided that the app was not worth experiencing annoying notifications.

BECKY: Yeah, I really think it does. 'Cause I know that if an app will just keep sending me things, like Pandora, I got kinda annoyed with it and I stopped using Pandora a little bit. And all of their advertisements and everything kinda bugged me and so that's why I don't use it. So it does [impact the brand]. Oh Groupme, because my sorority, I have like eight different Groupme's I'm a part of, so that's constantly going off and so I had to turn it [app notifications] off even though its kinda important and I should look at it. So I have to remind myself to go into it, but it kinda annoyed me and now Groupme kinda annoys me as a brand, as a company. I get it, it's like a messaging thing and not the company that's doing it, but I was just checking every Groupme.

Amy expressed that she considers brands as being unprofessional when she has negative interactions with notifications. A few negative experiences with one feature of an app led her to delete the app entirely, even though she enjoyed the app and was making money during her interactions with the app.

AMY: Yeah, I think so, maybe like on a subconscious level. Like I used to have this app, and I had two of them, they were survey apps. So that you can take surveys and make money to get like a gift card or something. So I used to have those and there was this one and it would always send me like three notifications in a row, and it was so annoying and it was the same message three in a row and I just, like, this is kinda unprofessional to me. It just made me feel like the people that designed the app weren't really conscious of the people that were using it, I don't know it was just kinda annoying. And so I guess it translated into me not liking that app and then deleting that app.

Jennifer, Sam, Rebecca, and Megan thought that their interactions did not reflect on the brand *per se*, but rather reflected on the design of the app itself, separate from the brand it served. For communication apps, such as Groupme, these participants supposed that their negative experiences were the fault of other active users in the app communicating with the them.

Jennifer stated that when she has bad experiences with app notifications, she associates it as the app itself, rather than the brand. The specific team that is handling app marketing messages is doing a bad job.

JENNIFER: I don't know if it negatively influences my, like, per idea of the brand. It definitely like, gives me a sense of like, stress and like overwhelming. I'm like okay, whatever. As far as my phone goes, I'm like, oh my god, your app really sucks, really sucks. This app sucks, but Starbucks is fine. Like, just fire your app team or something.

Sam mentioned that communication apps, like Groupme, are annoying because users receive too many notifications, but that this is not a result of Groupme sending too many notifications, but happens rather because too many people are talking at the same time.

SAM: I think its just kinda a function of the app, cause like we have a lot of people in that group message. So when I do start asking questions or something like that, a lot of people are going to respond. So it's not my fault, but, like, it does [get] annoying.

Rebecca shared that for app platforms she enjoys, like Pinterest, the benefit outweighs the cost of annoying notifications. Although she is annoyed by the number of notifications and their irrelevant messages, the brand is not affected, but rather whether or not the app itself should be on her phone, if she does have bad experiences with its notifications.

REBECCA: Yeah, definitely like I think that's influenced me, like as a brand. I think it's I would never go to the extreme of like I dislike the brand, 'cause I like what Pinterest does. I guess for me it's like, it's not necessarily changed how I felt about the brand itself but it's changed about how I feel about like having an app on my phone. I guess yeah, when it comes to that app, but like the brand as a whole I'm okay with it.

However, some participants stated that they liked notifications from certain apps, and their interactions positively reflected on the brand. Sam explained that when he has positive experiences with an app that he frequently uses and likes, his positive experiences reflect on the brand, and he appreciates the app team's efforts.

SAM: I like the sound, I'm not gonna lie, like Instagram will send a Direct Message, and Instagram has the same sound. So I feel like they're smart for doing that just because now people are gonna be like, you wouldn't know if its Twitter or Instagram if your phone's like

this [faced down] and you get that notification. Yeah I feel like Twitter, I feel like they doing a good job.

Amy shared that she too appreciates when app marketing teams send notifications she enjoys receiving.

AMY: I have this silly game, its called Tap Tap Fish. It's literally an aquarium. I love the ocean. So it was like I'm downloading this. So it'll notify me sometimes, like oh the Valentines Day event is almost over, 'cause like you can buy these Valentines Day's themed fish. I like their notifications and I would be, like, good job. 'Cause it's the perfect amount, and it's not overbearing, and it's just little nudge.

CHAPTER 6. CONCLUSIONS

This final chapter discusses and analyzes the collected data, in an effort to draw conclusions and recommendations. Ten smartphone app users were interviewed in order to understand and unveil the individual differences that lead users to have different experiences with, and emotional responses to, app notifications. Understanding users' experiences with app notifications, and understanding accounts that indicate pleasurable experiences after receiving a notification can be expected to assist application developers when customizing applications to serve an individual user's needs and desires, and for users to engage with particular applications more effectively than they otherwise would. Elements of media use, uses and gratifications theory, literature from neuroscience, the theory of hierarchy of human needs, smartphone user engagement literature, and information design were used to guide the overall study. To examine app users' experiences with and feelings toward app notifications, the following research questions were evaluated:

Research Question 1: How do app users describe their experiences with app notifications?

Research Question 2: How do app users describe their feelings toward app notifications?

Research Question 3: How do these experiences and feelings inform or shape the overall app-user experience?

Conclusion and Implications

Overall, the participants in this study expressed both positive and negative experiences, feelings, and overall perceptions of app notifications. This sample of participants represented a small but diverse spectrum of app users. Through the convenient sample method, all of the participants were recruited from Colorado State University, with majors in journalism and communication, with interests in public relations. Despite all participants being between the ages

of 18-24 years old, users had varying experiences and feelings that helped enrich the data gathered. While gathering data, and more so after analyzing them, the researcher identified several common themes across participants' responses.

Research Question One

When asked to share how they used their phones on a daily basis, respondents reported having similar and contradictory experiences. The majority of participants said that they mostly use their phones and phone apps to communicate via text/call/email/and social media, with heavy emphasis on social media. The age of the participants could be a factor, however, since over half of people ages 18-65 use at least one social media site (Pew, 2017). On the other hand, two participants mentioned that they mostly use their phones as daily planners that help them schedule tasks, and that their notifications help them to remember those scheduled tasks. Jack said that he primarily used his email calendar to help him, and Jennifer said that she used several travel apps to keep track of her boyfriend's schedule since he travels for work. Most of the other participants mentioned using similar apps for similar reasons; however, their reflections on the use of their smartphones were focused primarily on social media. The use of a smartphone mainly for self-planning purposes can be attributed to the fact that such users do not want to be notified of social media updates because they check their apps regularly enough to stay at their preferred level of being 'up-to-date.' These users are more concerned about the cost to their productivity (whether academic or work related), than about receiving social media updates as they happen.

When asked to share some of their experiences with notifications, the participants in this sample reported having experiences that were fairly similar, but somewhat mixed. Six participants mentioned perceiving their notifications as being important, or discussed occasions

of opening an important notification. Four participants reported regarding notifications in general as being annoying or frustrating because of having had particular negative experiences. Some notable features that were mentioned as contributing to experiencing annoyance or frustration were: notifications interrupting a current activity; concern for privacy when a notification pops up and someone in the room can see one's phone; receiving notifications that are not deemed important, relevant, or time-sensitive; receiving too many notifications; and having 'constantly' to evaluate notification messages and to end up ignoring them or deleting the banner, (because the badge serves as a reminder). Four participants mentioned that they customized their notifications so as to avoid situations in which they receive unwanted notifications. These negative experiences can be linked to a lack of notification settings that help users filter out information to which they know they do not want to be exposed (Brush et al., 2002). Unsurprisingly, perhaps, the participants in this study uniformly reported frustration with receiving advertisements, especially advertisements from brands to which they have little or no connection.

A minority (two participants) said that they either got excited when receiving numerous notifications, because this indicated a busy day and made them feel popular, or that they didn't really think about their notifications, because they were a routine part of their day at this point in their experience with smartphones. While these two participants experienced happiness or indifference, the majority of participants dwelt on having had significantly negative experiences with notifications, despite mentioning that the notifications that they do care about were important to them and helped them be productive and stay informed. Understandably, since people generally enjoy being liked by other 'in-group' members (Katz & Lazarsfeld, 1966),

users who feel excited about their notifications tend to see these notifications as reflections of being liked by others (Mehrotra, Pejovic, Vermeulen, Hendley, & Musolesi, 2016).

Additionally, users who are indifferent to notifications appear to be either unconcerned to respond to their notifications, or do not give notifications enough weight to care about them.

When asked whether their interactions with notifications influenced their interactions with their apps, every participant responded affirmatively. Almost everyone described notifications as serving the purpose of getting the recipient to acknowledge the notification, to open the app, and then to increase their activity once in the app. However, several participants observed that, for them, this only occurs because the notifications they have turned on are deemed important ones. For notifications that are deemed unimportant, but are still received, these users stated that they often times acknowledged the notification, but then ‘swiped it away,’ meaning that they deleted the banner reminder, but kept the badge. The customization of notifications, and the perceived control over notifications through options to turn off and on specific messages, helped create more positive and productive experiences for these participants (Kuhl & Koole, 2004).

When asked to assess the advantages and disadvantages of app notifications, participants found more disadvantages to explore than advantages. Among the advantages, a majority of the participants reflected similar notions: that notifications were useful because they kept them up to date, or served as good reminders, and because users were immediately informed of new activities. The disadvantages of notifications discussed by a majority of the participants included: distraction, issues of privacy, receiving too many unwanted notifications, needing to evaluate over 100 notifications every day, feeling obligated immediately to respond so as not to offend a communication partner, cost to productivity; and because of these experiences many described

notifications as being annoying or frustrating. The general agreement was that notifications cons outweighed the pros; but participants still felt that wanted notifications were important to their social, academic, and work lives. When users are alerted to something that they deem important, (such as a notification that is communicating an important message) they will often times ‘deal with’ or learn how to adapt to other negative aspects of the experience because certain positive features of the alert are too valuable to reject outright (Lyubomirsky, 2010).

Finally, when asked to discuss any changes in how participants have come to view app notifications since they first began using a smartphone, the majority of participants stated that when they first received their smartphones, they had all their notifications turned on. This sentiment is understandable because smartphone technology was still very new to these users. When users received push notifications, at the time they did not have much control over what they received because there were no control options. Additionally, many of the users mentioned that if there were ways to control their notifications, they were not aware of how to adjust their settings because they were new to the technology.

Every participant stated that they went through some type of transition from having all of their notifications turned on to a highly customized arrangement, which was dictated by what each individual user found to be important. For the most part, these arrangements concerned prioritizing social connections, access to academic information, or app notifications that helped their productivity at work. This transition can clearly be seen by the age of the participants—from when they first received a smartphone (middle school/high school) to now being sophomores or seniors in college. Several cited that they once saw their phones as toys or entertainment devices, whereas now they view their phones as tools to help them achieve desired

goals throughout their day: to assist them in successfully completing academic work or maintaining productivity at work, or fostering the continuity of online social ties.

Overall, participants provided illustrations of experiences that had both positive and negative components. Many experienced frustrations because they could not control the number of notifications they received, even if they wanted notifications from a given app. Now that users see smartphones as tools, features of the smartphone, such as notifications, are also perceived as tools that are devised to help users filter out unimportant messages as well as to be made aware of important information. When app notifications fail to achieve these expectations, users become disgruntled and upset, understandably. From the expressions and desires of these participants, it may be concluded that additional customization of notification settings would further help users to filter between important and unimportant information, and to allow individual users to schedule the best time to receive notifications, based on their particular schedules.

Research Question Two

When asked if app notifications were important to participants, each participant mentioned customizing their notifications in accordance with the importance of the applications from which these notifications originate. However, as each conversation progressed, the participants all recalled having had experiences in which they were still receiving notifications, which they disliked, in part, due to being unable to turn those specific notifications off (e.g. marketing notifications). Users ultimately don't want to be disrupted for an advertisement on a device they use to stay up-to-date with important or relevant information (Shekhar, Dietz, & Wallach, 2012). The distraction is deemed frustrating because the notification ends up wasting their time.

I speculate that participants use their notifications to filter out online information that is not perceived as important, and prefer to only receive (or pay attention to) notifications that transmit data relevant to the user. Thus, although notifications were perceived as important features of smartphone technologies, several participants also mentioned in the same breath that notifications were still annoying. This feeling of annoyance or frustration with notifications, despite their perceived importance, can be attributed to their constant and ever-present appearance. While notifications (alerts, banners, or badges) serve as valued reminders for users to complete tasks, some users find the sheer volume of their notifications so daunting that their tasks seem likewise unending (Sahami Shirazi, Henze, Dingler, Pielot, Weber, & Schmidt, 2014).

Notifications help create visual categorical ‘to-do’ lists, but for some users, these lists leave them feeling a need to evaluate and react to over 100 tasks (or notifications) every day. Accordingly, the frustrations many users experience upon receiving a particular notification may not have much to do with the content of that particular notification, but may stem instead from receiving far too many reminders at once—so many that receiving reminders at all ends up engendering an overall negative attitude towards notifications in general (Sahami Shirazi, Henze, Dingler, Pielot, Weber, & Schmidt, 2014).

When asked to discuss their feelings about app notifications, participants shared having mixed feelings. Many participants said they felt annoyed and frustrated with notifications because they received irrelevant messages (such as engagement messages) or because they were otherwise busy, so that the message overly distracted them. One participant mentioned that she would delete her apps when she received messages from them that were not useful or perceived as wasting her time. However, two participants stated that they felt notifications were fun to

receive, with specific reference to social media notifications. The social acceptance implied by someone liking a post or retweeting a tweet is exciting; and the activities that social media users enjoy knowing about typically involve solidifying their online social bonds with other social media users (Quan-Haase, & Young, 2010). Positive reactions to social media notifications can be attributed to the philosophy that humans are social animals that take joy in other ‘in-group’ members accepting, appreciating, and praising their activities in public spheres (Lin & Lu, 2011). Negative reactions to notifications can, in part at least, be attributed to receiving notifications when they are unwanted and inopportune, or to receiving information that is not perceived as useful (Sahami Shirazi, Henze, Dingler, Pielot, Weber, Schmidt, (2014, April-May). These sorts of negative experiences arise when users are being forced to acknowledge and evaluate information that they otherwise would ignore completely. It is consequently not difficult to see that these experiences of being forced to address information that is not useful on multiple sequential occasions would be perceived as ‘annoying’ to an app user.

As previously discussed, it is apparent that communication apps are prioritized and used more than any other app genre for this group of app users. While they stated they had other apps on their phones, and had notifications turned on for them, the majority of participants in this study emphasized the importance of their communication with others via notifications. However, it should be noted that while these users value communication apps and their notifications, not all app users would feel similarly. The importance of apps and their subsequent notifications is ultimately impacted by what the app user values most, which is influenced by a plethora of factors such as culture, age, sex, interests, access to technology, profession, etc. (Cao et al. (2013).

Users weigh the importance of their apps differently, and the factors that contribute to this are primarily age and experience with smartphones. As previously mentioned in the literature review, the theory of hierarchy of needs is indeed in play as regards how users react and respond to notifications (Maslow, 1954). However, in this instance, users demonstrated having a more inverted pyramid, where psychological and self-fulfillment needs were mentioned more, and prioritized more than other app activities. The hierarchy of needs is present in app users' behavior in responding to app notifications; however, a more comprehensive model is needed, taking into consideration age, culture, profession, etc. in order to help determine specifically how notifications are prioritized.

When asked if their interactions reflected on the app as a brand, the group was almost split down the middle, where six of the participants said that their interactions with app notifications reflected on the app as a brand, while the other four expressed that their interactions did not reflect on the brand, but rather reflected on the app itself, separate from the brand, or, for communication platforms, that it was the fault of others using the app to notify the user. Users who do not attribute negative experiences with app notifications to the corresponding brand are separating the brand from their experience, and see it as a function of the app itself. This appears to happen in large measure because the notification appears on a phone, rather than in a physical location. Because the format is viewed as separate, users perceive the driving force behind their frustrations as the technology, not necessarily the brand of their phone or phones; in other words, they regard the source as simply the electronic medium itself. Users who do attribute their interactions to the brand see their experiences with a brand as comprehensive, so that whenever they are exposed to information published by the brand, regardless of where they experienced it, they automatically associate that experience with the specific brand. It is especially important for

app developers and marketers to remember that people tend to remember more bad experiences (Baumeister, Bratslavsky, Finkenauer, and Vohs, 2001) with an app notification, which could permanently remove a relationship with an app user.

Users trust that their interactions with notifications will be, or should be, tailored to their preferences, which is to say that users want notifications to help them to be productive by communicating important information efficiently (Felt, Engelman, and Wagner, 2012). When marketers take advantage of that trust to send engagement messages (to boost their online traffic) or advertisements, as a result, some users have bad experiences and feelings with and towards that brand. In addition, users weigh the pros and cons of keeping an app, because they can control their interactions with their online world through the customization of their apps on their smartphones. If they use an app, like the app, or need the app, but tend to have negative experiences with some of the app's features, this pushes them into a reflective state where they evaluate the benefits and costs of having the app at all.

App marketing teams need to be especially sensitive to users who associate their interactions with app notifications with the overall brand. If control to turn off or on marketing messages is not given to the user *and* the control features are not clear or user-friendly then marketers run the risk that users will delete their apps.

When asked how participants might feel if they received no notifications, participants reacted similarly. Almost all of the participants said they would feel “bummed,” “terrible,” “weird,” “sad,” “awkward,” “paranoid,” or unsure of themselves, frustrated that no one responded to them, and that they would find it tedious to go through and check all of their apps for possible updates. Zoey was the only participant who said that she would be happy not to receive notifications because then she could relax, knowing that she didn't have to experience

feeling the need to respond immediately to her notifications, which often derived from work expectations to be always on-call. The mixed feelings that come from not receiving notifications can be linked to: the habit of expecting to respond to notifications but then there being none; fears that one's activity on social media was not received well; fear of missing out or being excluded from the group without knowing it; and frustration that the phone is possibly not working properly. These specific users find themselves reacting to and evaluating roughly 100 notifications in a single day. The dramatic change in their routines, expectations, habits, and behaviors, were they not to receive any notifications, would naturally spark some amount of questioning as to why there was such a striking difference in the number of notifications they received. Feelings after this realization (of not receiving any notifications) will naturally differ based on the user and their personal insecurities. For example a user who only receives 30 or fewer notifications a day (many of which are for work) may a) panic that they did something wrong with their settings or social media posts or b) be excited that there are fewer tasks that need to be addressed. Forming plausible reasons to count for the sudden shifts in activity are performed by the user with self-reflection as part of the process.

Research Question Three

In discussing what role notifications played in their daily use of, or interaction with, their phones, participants shared similar feelings. Six participants shared some indication that app notifications increased their engagement with an app, by drawing their attention, and once in the app, discovering new information. Three participants mentioned that without notifications they wouldn't check their phones as frequently. Three participants mentioned that their notifications were increasingly distracting. Two participants expressed feeling compelled to see and evaluate the notification upon its immediate receipt. Participants also mentioned: that they found

notifications to be frustrating because they received too many; that they received so many that they missed important information; and that these negative experiences made them want to delete apps. These negative experiences and perceptions of app notifications as the causes of their disgust or disappointment can be attributed to a lack of perceived control over information (Wang, Xu, and Grossklags, 2011) that is expected only to help users, rather than hinder their activities, productivity, and attention.

When discussing whether participants wanted to experience more or fewer notifications, six participants said they didn't mind if they had more as long as they were relevant, while the remaining four stated that they wanted fewer notifications because they find them distracting and overwhelming. I speculate that the motivation to receive more can be linked to customization: participants who stated being comfortable with receiving more notifications indicated this because they customized their notifications so as only to receive important information; whereas participants who did not want to receive more notifications mentioned wanting to distance themselves from their phones because they were too attached or overwhelmed by the sheer volume of their notifications and because of the energy and time it takes to be interrupted by a notification and then to evaluate it to determine whether a subsequent action is required of them.

When asked to discuss important characteristics of notifications, participants reported that they wanted notifications to: inform the user in a timely fashion, but not go off all the time (suggesting a preference for total updates rather than individual ones); have user-friendly settings; have concise messages; send only time-sensitive/relevant/important messages; be customizable as regards the sound options and appearance on the screen (at the top of the page so as not to interrupt current activities); have a preview of the message and source, and a reply button within notifications concerning communication messages; and have more personalized

options. Several of the participants desired these specific characteristics for notifications because these advances would help them save time on evaluating the messages/sources and to be more productive, or because they believed that these were already functions of the smartphone that should be further extended to its features, such as app notifications.

Features that allow users to control exactly what they want to be notified of, how they want to be notified, and when they want to be notified would create a) a better user experience, and b) create better relationships between users and brands. But beyond better experiences with our smartphones and more loyal customers, customized notifications would help filter irrelevant information so users can effectively and efficiently integrate their phones into their lives. If smartphones are referenced as “personal planners”, “personal helpers”, and “extensions of ourselves” then smartphones need features that help us filter out all the possible information that exists on the web. This is similar to how our brains filter out stimuli in our immediate environments so that we are able to focus on only the information we deem fit (Cowan & Morey, 2006).

Overall, the general perception of app notifications that are formed from experiences with and attitudes towards, notifications is that they should help not hinder the user. Users would like more control through more options to customize their notifications because, as each of the participants in this study expressed, apps users are all different. They each use their phones for different purposes, have differing gratifications from their interactions with notifications, and have different schedules for when and how they respond to app notifications. Limited standard notification settings for all users creates a pigeon hole effect, where every user is expected to be satisfied with the options that they have, despite the range of differences that are present in each user (Wang, Xu, and Grossklags, 2011).

Impact for Marketers and App Developers

After collecting data, analyzing participant responses, and drawing conclusions, the following advice is suggested for app marketers and app developers.

To reduce the frustration that users experience in receiving irrelevant messages, marketing teams should reduce the amount of engagement and advertisement messages, or should give users more options to control when they want to receive them.

In an effort to create a better relationship with app users, app marketers and developers should provide more options as to when app users will receive notifications. Many users complain about receiving too many notifications, and one solution to this problem would be pairing down the number of individual updates users receive. Another suggestion would be to allow users to control exactly when they receive notifications, i.e., whether between designated hours, or immediately, or when the app user is actually active in an app, or has recently clicked out of one, and before continuing on to another task.

App developers should also be sensitive towards the design of notification alerts themselves. Due to the overwhelmingly large population of app users worldwide, preferences for the aesthetics of a banner or badge notification, as well as the sounds and vibrations that accompany a notification will vary dramatically. Currently, users feel limited by the options for customization for their notification alerts. Control over the notification alert affords the user the opportunity to evaluate the message and source more efficiently. The lack of control over this feature can lead users to become frustrated, despite their liking of an app.

Finally, smartphones are considered extremely powerful tools. However, if they are not user-friendly (that is, if users are not able to navigate them easily and quickly), then their technological functions and powers are not useful. App developers should devise more ways to

inform users of changes to app notifications (or any other app related feature) by showing them how to control and customize their notifications features.

Summary of Conclusions

Upon careful examination of the data, the several conclusions discussed above regarding users' experiences with, attitudes towards, and overall impressions of, app notifications may be summarized as follows: the data imply that app users would prefer more control than they now have over their notification settings because such control can help them to filter out information that is not wanted and to include information that is desired, while also helping the user to determine when it is best time to receive a notification, based on each user's individual schedule, so as to avoid receiving a 'flood' of notifications, which can negatively impact a user's notification evaluation productivity. Many factors may be seen as warranting this overall conclusion, but the individual statements from the app users surveyed in this study provide a serviceable range of compelling reasons.

One factor is the phenomenon of simply receiving too many notifications. This is in turn due to the overwhelming number of individual updates (rather than total updates), to receiving unwanted notifications (including marketing updates, engagement messages, and reports of other people's activity on social media sites), and to the inopportune times users receive notifications; all of which were reported as being factors that impeded positive experiences with notifications. Having more control over how updates are received (i.e. individual vs. total), control over what messages users receive (e.g., marketing updates and engagement messages), and control as to when users receive notifications (i.e. setting time preferences to receive specific types of

notifications) are enhancements that are likely to ameliorate the problem of receiving too many notifications.

Another emerging factor that impacts users' experiences with notifications are the alerts themselves. Users expressed wanting to have more control over the sounds, vibrations, and visual (banners and badges) alerts of app notifications. The aesthetics of notifications are the first contact with users. If users find a sound or visual unpleasing, this will incline the user to experience the app notification from a negative viewpoint, and may alter the user's overall experience with that specific application. App developers need to be sensitive to users' sensory systems by providing more options to customize how they would like to experience their notification alerts.

Finally, because humans are animals, keen to anticipate future experiences, we are prone to remembering the negative aspects of our past experiences, which influence our feelings, and which in turn help to shape our overall perception of a given phenomenon. If users meet with obstacles that they a) do not like, b) do not perceive they can control, but c) are forced to accept in order to adapt to the situation, users may adopt a negative attitude towards the experience and to expect their future encounters to be equally unsatisfying. App developers should remember that function does not follow form, but rather that form follows function, and that function follows the user. This means that the use is not in the tool, but rather in the user. So, if users find a given app unhelpful, they will no longer use or find use for the app.

In conclusion, the features of uses and gratifications theory, behavioral conditions, hierarchy of needs and desires, notification association (or source) and context of receipt can be used to demonstrate that users would like more control over their notification settings.

From uses and gratifications theory, we can see that users have varying experiences and feelings towards the same phenomenon, despite sharing many characteristics with other users. One rule seems to remain constant: users all want to be able to perceive that they have control over their situations. To increase or promote positive experiences with apps, app developers should offer more customization features (such as notifications) to their users.

Behavioral conditioning demonstrates that users will develop a stimulus-reward pattern, or habit, towards notifications. Several of the participants discussed that they have grown accustomed to evaluating notifications immediately because the reward could be a great one, but then are disappointed when the anticipation is not met, leaving the user with a less than positive experience. App developers are advised to devise better ways immediately to inform users of the source and components of a message so they can better evaluate the notification; this is suggested to reduce anticipation let-down. Brand marketers need to be more sensitive about sending users information, knowing that users may have developed a stimulus-reward pattern, so as to avoid creating messages that leave users displeased with the brand. Providing more control over if and when users receive these notifications may foster better user experiences, and therefore greater brand-loyalty.

Hierarchy of needs and desires is still present; however, modifications concerning how the theory is applied must be made in order to account for the differences that emerged after analyzing participants' responses. App users, as whole, vary dramatically because there are so many smartphone users across the world. Culture, sex, age, profession, etc. are influential factors that contribute to how users interact with their apps and why users control specific settings of their app notifications. As previously discussed, there is a tension between notifications being perceived as generally important, but at various times being perceived as annoying. This tension

can best be explained as a disruption in users' hierarchy. Users cannot yet control all of the messages they receive, nor how and when they receive them. A user may enjoy and want a social media update when they are at home or not busy, but in class or at work, the same notification may be perceived as disruptive and annoying because the user does not have time to focus on the update. Additional filters within app notification settings will help users create their own notification hierarchy based on source, message, current activity, and perceived importance of both the notification and the current activity. Offering these seemingly small adjustments to users' settings may have dramatic effects on their experiences with, attitudes towards, and overall impressions of app notifications.

Future Projects

Although this study's primary methodology used the hermeneutic phenomenological approach and the implementation of in-depth interviews to understand what makes an app notification rewarding and when, within the 18-24 age demographic, future research should incorporate a mixed method approach. Future studies that incorporate the use of telemetric apps to track the number of notifications, frequency received, and the time it took for participant to respond would provide researchers with quantitative data that reflect behavioral mannerisms with app notifications. Short survey questionnaires after notification receipt would provide researchers with qualitative data that could be compared to the quantitative findings.

Scholars should also examine studies that look at national statistics to determine what features of app notifications people respond to most. A quantitative study with a larger sample size that includes a more diverse population will provide data regarding app notification preferences that are more generalizable.

Media researchers should also devote entire studies to specifically examine the message content of app notifications in order to identify what core features, components, and information design factors make notification messages more engaging than others. This feedback would behoove both consumers and app developers, as a more customizable product is likely to increase the satisfaction perceived by the user and high engagement levels for the app developers.

Inferences

As outlined in the discussion of the hermeneutic phenomenological approach, the researcher was not specifically looking for any predetermined factors, examples, or themes provided by the participants. The researcher remained bracketed while gathering data garnered from the in-depth interviews to ensure that the phenomenon unfolded naturally from the participants, rather than the researcher looking for specific features or experiences within the phenomenon.

Critical Analysis of Project

This research explored app users' experiences with, and feelings towards, app notifications in order to understand and unveil the individual differences that lead users to have different experiences with, and emotional responses to, app notifications. Understanding why users experience a pleasurable reward after receiving some notifications and not others can be expected to assist application developers to customize applications to better serve individual users' needs and desires, and for users to engage with particular applications more effectively than they otherwise would.

Instrument Limitations

Like all research, this study had limitations. First, the interviews were conducted with audio recording. It is possible that the recording instrument might have technical difficulties during the interview, which would negatively impact the amount of data gathered for transcription and analysis. To avoid this problem, the researcher tested the audio recording equipment before the interview to ensure it was working properly. Additionally, it is the responsibility of the researcher to build rapport with the participants, so they feel comfortable opening up and discussing their experiences with app notifications. I believe I did my best to be open and welcoming to help participants feel comfortable.

Data Sampling and Analysis Limitations

This study may have also been limited by the sample selection and size. The recruitment method for this study used a convenient purposive sample that is relatively small. However, a smaller sample size in which the participants have characteristics that are of particular interest should provide the study with transferability to future studies. A smaller sample size allowed the researcher to gain an in-depth examination of the individual differences that lead users to have different experiences and emotional responses to app notifications, which may have been more difficult to achieve with a larger sample size.

Inferences Limitations

In addition to procedural limitations, the inferences the researcher drew on to gather data may also have limitations. Some of my assumptions about app notification rewards are a result of my own personal bias. These assumptions may have led me to make inaccurate inferences about the participants' experiences with app notification rewards. In order to reduce these personal biases, I bracketed my own personal experiences, theories and ideas about notifications, but also

asked the participants to clarify their answers with follow-up questions, to ensure that the participants' personal views were reflected in the data, rather than my personal biases.

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APPENDICES

Appendix A: Interview Announcement Script

The in-depth interview announcement script is for Madeline Bombardi to speak briefly to Instructor Jill Goodwin's JTC 351 Publicity and Media Relations class section 001. After she speaks to the class, participants who indicate they are interested will be emailed to schedule appointment times.

Hello! My name is Madeline Bombardi-Mount and I am a graduate student in the Journalism and Media Communication program. For my thesis, I am working on a study to examine what makes a mobile phone app notification enjoyable and wanted.

I am recruiting roughly 10-17 people to participate in a 60-90 minute interview that will be conducted on campus, most likely in a study room in the library. To be eligible to participate, you must: be between the ages of 18-24 years old and have had experiences with smartphone apps and app notifications. These interviews will ask questions about how you view app notifications and your experiences with them. By participating in this interview, you will receive **20 extra credit points in this class**. If you choose not to participate, a 6-page paper discussing the history of mobile phone applications and their socio-cultural impact will be accepted for extra credit. I would love to hear your feedback on your experience with your app notifications.

If you are interested in participating and meet the eligibility requirements, go to this Google Doc to sign up by March 20, 2017. If you do not want to participate or do not meet the eligibility criteria, you can still earn extra credit by submitting your 6-page paper (see above for details) to your instructor by March 20, 2017. If you have questions please contact me via email at madeline.bombardi-mount@colostate.edu. I look forward to speaking with you!

Appendix B: Interview Guide

The following are the proposed interview questions to examine what situational factors contribute to an app user experiencing a notification as rewarding and when not. Participants will be asked to bring their smartphones to the interview. They do not have to show the interviewer any personal information if they do not wish, however, the presence of the object from which the phenomenon is regularly experienced may help participants think more clearly, offer examples, and/or clarify their responses.

Interview Questions

Thank you for participating in this interview. Please know that you are not obligated to answer any of the following questions, and that you may skip a question or terminate the interview at any time if you are uncomfortable and you will still receive the extra credit for participating. As I have previously mentioned, I am interested in learning about and understanding your experiences with app notifications and feelings towards them in rich detail to better understand user's experiences and attitudes towards app notifications. Please describe your experiences and feelings in whatever way are most comfortable to you. Please note that when I ask you about app notifications, I am referring to app alerts, banner messages, and badges or the red circle on the top-right hand corner of the app. To begin, I'd like to ask you a few questions about your smart phone use and confirm you meet the criteria to participate in the full interview.

Preliminary/Screening questions:

- I. Are you between the ages of 18 and 24? Y/N
- II. Do you have a smartphone? Y/N
 - a. What type? (Iphone, android, blackberry, windows)

III. Have you download apps on your phone? Y/N

IV. Are you able to receive notifications for apps? Y/N

(Notes: Terminate the interview if the answer is “No” for any one of the three questions and thank the participant for taking part in the study.)

Open-ended questions:

1. How do you use your phone on a daily basis?
 - a. Prompt: Think about how you used it yesterday as an example.
2. What role does your app notifications play in your daily use or interactions with your phone?
 - a. What kinds of notifications do you get or notice on your phone?
3. Talk to me about your interactions with app notifications.
 - a. What are some of your experiences with app notifications?
 - b. Are interactions with app notifications important to you?
 - c. Tell me how you feel about some of your app notifications.
 - d. Describe how you structure or manage your app notification settings. What is your decision making process?
 - e. Would you like to experience more or fewer interactions with app notifications and why?
 - f. Have your interactions with app notifications influenced your interactions with the app?
 - g. Have your interactions with app notifications influenced your feelings about the app as a brand?

- h. What are some examples?
- 4. What is your first response when you see an app notification on your phone?
- 5. Reflecting on past experiences, what were some of the advantages and disadvantages of receiving app notifications?
- 6. What are important characteristics for an app notification to have?
 - a. Why are these important to you?
- 7. As an app user, what do you expect of app notification?
 - a. Why do you have that expectation?
 - b. Have you heard other app users say the same or other things?
- 8. Have there been any changes in how you view app notifications since you began using a smartphone?
 - a. If so, what influenced your view?
- 9. What's your strongest memory involving app notifications?
 - a. Why is that a strong memory?
 - b. So what impact did that have?
- 10. How might you feel if you received no app notifications?
- 11. Given everything you have shared, if you had the opportunity to talk with any app developer whose app you have downloaded on your phone, what are some things you would want them to know or change?
- 12. That's all the questions I had planned for you today. Is there anything on your mind related to phone app notifications that I haven't asked you about, but you'd like to share?
 - a. Is there anything we've talked about today you want to reiterate as particularly important?