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GEN Z'S PERCEPTIONS AND USE PATTERNS OF SMARTPHONES IN NATURE-BASED RECREATION

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ABSTRACT

GEN Z'S PERCEPTION AND USE PATTERN OF SMARTPHONES IN NATURE-BASED RECREATION

By

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Generation Z (Gen Z), individuals born between 1997 and 2012, are often defined by their relationship to technology, specifically smartphones. Gen Z is defined as the first digital natives, those who grew up with and had early access to smartphones. As Gen Z comes into adulthood, they represent the largest demographic of those who participate in nature-based recreation (NBR), and are the future of NBR participation. **Purpose:** The purpose of this study was to investigate how prevalent smartphone use is amongst Gen Z individuals while participating in NBR and how smartphone use potentially enhances or diminishes ones' NBR experience. This study investigated how likely an individual was to carry and use a smartphone while participating in NBR, how smartphones were being used, and how smartphone use potentially enhances or diminishes the recreational experience. **Methods:** Data was collected through surveys distributed to college age Gen Z individuals over a one-month period. Data was analyzed using descriptive statistics to determine use type and perception of use. **Results:** This study found that 95.7% of participants carried a smartphone on their last NBR experience, 91.3% claiming they are likely to carry a smartphone and 60.5% saying they are likely to use them. Photography, navigation and safety were the top three uses of smartphones while participating in NBR. The majority of those surveyed claimed personal use of smartphones enhanced their NBR experience, while others' use diminished their NBR experience.

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This thesis follows the format prescribed by American Psychological Association (APA) 7th edition.

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INTRODUCTION

This study investigated how smartphone use could potentially enhance or diminish an individual's nature-based recreational experience. Additionally, this study explored how these devices are being used during participation in nature-based recreation. Smartphones and other digital technologies are relatively new to society and may affect our interactions with the natural world and our perception of experience while participating in nature-based recreational activities.

Background

Nature-based recreation (NBR) is a form of recreation that takes place in the natural environment. The natural environment is generally accepted and described as "nature as the physical and biological world not manufactured or developed by people" (Sandifer et al., 2015. p. 2). Natural environment may be interchanged with other terms such as nature, natural world, natural landscapes, outdoor places and greenspace. The natural environment includes all living and nonliving aspects of an area such as plants, animals, landscapes, mountains, waterways, forests, etc. Semi-natural areas such as parks, managed forests, wildlife sanctuaries and agricultural land can also be included in nature-based recreation areas (Sandifer et al., 2015).

There are many benefits often associated with participation in NBR such as benefits to emotional, mental and physical health including reduced stress, improved concentration, positive mood, lower blood pressure and reduced obesity and morbidity (Ewert et al., 2014; Kaplan, 1992). Current trends in outdoor and nature-based recreation are forecasting increased participation which may lead to increased visitation to National Parks, State Parks, National Forests, along with other natural areas (Clark et al., 2019; State Outdoor Business Alliance, 2021). As the group of people known as Generation Z (Gen Z) are coming into adulthood, it is becoming increasingly important to look at their recreational habits and desires in order for

resource managers to effectively cater to and manage resources for this upcoming generation. Gen Z is often defined by its use of technology and its reliance on digital technology, particularly smartphones with their wide array of mobile applications (apps).

While NBR has historically been a way to escape pressures of modern society, it has provided an opportunity in recent years to escape the wired, technologically driven world we live in. (Martin, 2017). However, more recently there are increasing instances of participants relying on and desiring to be able to use new digital technologies while participating in NBR, mainly in the form of smartphones (Carlson et al., 2016; Valenzuela, 2020). Smartphones are capable of providing recreationists with a wide variety of unique apps which can potentially enhance or diminish the quality of their recreational experience. Having access to these apps and using smartphones while recreating may change perceptions of an area, desire to visit certain locations, and impact decisions about activities in which they may decide to participate in. Because of this, resource managers should be aware of current and future generations' use of these technologies and how it may affect their natural resources and future visitation to sites.

Statement of Problem

The problem of this study is how smartphones are being used by individuals while participating in NBR. This includes the number of individuals using smartphones, how smartphones are being used during NBR, and individual perception of smartphone use. How smartphones are being used could potentially enhance or diminish the recreational experience.

Purpose of Study

This study has two specific goals. The first is to compliment the research by Clark et al. (2022) in determining how smartphones and their related applications may diminish or enhance the recreational experience amongst Gen Z participants. This will be done by investigating

perceptions of personal use as well as perceptions of others' use of smartphones while participating in NBR. The second goal of this research is to examine smartphone use patterns amongst the emerging Gen Z population while participating in NBR. Lepp et al. (2021) investigated smartphone use amongst thru hikers on the Pacific Crest Trail and delineated five use categories; communication, navigation, photography, boredom alleviation, and safety. Using these five categories, this research will look into how smartphones are used amongst college aged Gen Z individuals while participating in NBR and how that may enhance or diminish their recreational experience.

Significance of Study

This research will have implications for resource managers, recreation providers, app developers, and policy makers in regards to NBR and natural recreational areas. As the first generation of digital natives (Bennet, 2012) becomes independent adults, how, where, and with whom they recreate will likely have impacts that will affect resource managers and recreation providers. This can include but is not limited to: visitation numbers, distribution of use, desired activities and digital connection present in recreational areas or facilities. Resource and recreation providers can use google searches to predict visitation (Clark et al., 2019) and social media is becoming the number one driver of visitation trends (Wengel et al., 2022). Gen Z is reliant on these technologies for guiding them in making trip planning decisions (Singh & Kealey, 2019), creating potential that Gen Z will also be reliant on these technologies while participating in NBR and will be more attracted to areas that can offer the connectivity they desire while recreating. This has potential to enhance or diminish the recreational experience, but will most certainly alter participants interaction with the natural world. Because of this, resource

managers and recreational providers should understand use trends and the perceptions of smartphone use in NBR.

Hypotheses

Based off of the review of literature, the author hypothesizes that; **H1:** While participating in NBR, at least 90% of Gen Z carry and use smartphones, **H2:** The majority of those who use their smartphones while participating in NBR find that it enhances their recreational experience. **H3:** Based on the findings of Lepp et al. (2021), the main uses of smartphones during NBR will be navigation, boredom alleviation and safety.

Assumptions

This study was conducted based on the following assumptions: 1. Subjects of this study are college age Gen Z between the ages of 18-26. 2. Subjects' responses were accurate and honest. 3. The subjects of this study own and use smartphones. 4. The subjects of this study actively participate in nature-based recreation.

Definition of Key Terms

The following terms are defined to clarify there use in this study:

Nature-based recreation (NBR): outdoor activities in natural settings or otherwise involving in some direct way elements of nature—terrain, plants, wildlife, or water bodies (Cordell, 2008). This can be differentiated from outdoor recreation which encompasses all forms of recreation performed outside even if it is not focused in nature such as soccer, sports spectating and gardening (Freysinger & Kelly, 2004).

Generation Z (Gen Z): Individuals born between 1997-2012 (Dimock, 2019).

College students: Individuals enrolled in a college or university pursuing degrees of higher education.

Smartphone: A mobile phone that performs many of the functions of a computer with an operating system capable of running and downloading applications and accessing the internet. Typically, with a touchscreen interface (Kirvan & Provazza, 2013).

Applications (apps): A mobile software application developed specifically for use on wireless computing devices such as smartphones and tablets.

Resource manager: An individual charged with managing nature-based recreational resources such as national, state, or local parks and forests.

Recreation provider: Individuals or companies that facilitate NBR for paying customers or clients. This could include experiential education, nature-based therapy or education, outfitters and guiding services.

LITERATURE REVIEW

This chapter reviews literature relevant to defining Generation Z (Gen Z) and provides insight into how technology has shaped their personalities and daily life. Furthermore, it will examine implications of technology use in nature-based recreation (NBR) and will provide additional insight into perceptions of technology use to either enhance or diminish the NBR experience. Additionally, this chapter will investigate research gaps that will be the basis of this study.

Defining Generation Z

When discussing general use phenomena, it is often helpful to organize a population by generations. A generation is defined by historical events and related phenomena that creates a distinct generational gap (Parry & Urwin, 2011). Furthermore, the identification of a generation requires "some form of social 'proximity' to shared events or cultural phenomenon" (Parry & Urwin, 2011, p. 84). Organizing the population into generations allows researchers the opportunity to look at Americans in relation to their place in life cycle and by their membership in a cohort born at a similar time (Dimock, 2019). Generational cohorts allow researchers to analyze changes in viewpoints over time as well as to provide insight into how different formative experiences interact with life-cycle and their aging process to shape worldviews (Dimock, 2019). According to the Pew Research Center, there are five generations who are currently in adulthood; the Silent Generation born between 1928-45, the Baby Boomers born between 1946-64, Generation X born 1965-80, Millennials born 1981-96, and Generation Z, or Gen Z, born 1997-2012 (Dimock, 2019). Additionally, Gen Z is followed by Generation Alpha, which includes anyone born after 2010 (Eldridge, 2023). However, it should be noted that other

sources have varying date ranges for generational breaks. For the sake of this study, the Pew Research Center's date range for Gen Z as being born between 1997-2012 will be used.

Gen Z is one of the most racially and ethnically diverse as well as best educated generations in U.S. history (Fry & Parker, 2018). Biracial and multiracial children make up a larger percentage of this generation than earlier generations, and have more members of the LBGTQ community (Turner, 2015). More members of Gen Z were raised in urban settings than previous generations which can lead to a variety of cultural perspectives and can increase tolerance of others (Turner, 2015). Gen Z are more likely to have parents with college degrees, attend college themselves, and have lower high school dropout rates than all earlier generations (Fry & Parker, 2018).

Gen Z can be differentiated from other generations by their relationship with technology. Gen Z has also been referred to as the i-generation, net-gen, and digital natives due to their relationship with and use of digital technology (Dimock, 2018; Turner, 2015). Digital natives are those who have been immersed in digital technology from birth, highly technologically literate and engaged, and think and learn differently than older generations (Bennet, 2012). Gen Z would qualify as digital natives since “no generation has demonstrated a level of proficiency or comfort with technology at such an early age as Generation Z” (Turner, 2015, p. 105). As Dimock (2018) points out, the iPhone came out in 2007, when the oldest members of Gen Z were only 10 years old. Unlike earlier generations, Gen Z was connected to the web through mobile devices, Wi-Fi, and cellular data by at least their early teens and can be thought of as growing up in an always on technological environment (Dimock, 2018). Due to the fact that Gen Z are the first true digital natives, studying this generation can give us interesting insight into future perceptions and use of technology as it has become a significant part of their daily life.

Generation Z Smartphone Trends, Use and Addiction

Generation Z is often characterized by their technology use. There is an abundance of information about cellphone use in the literature, but the focus of this review is specifically limited to smartphone use. Smartphones are an indispensable tool used to communicate via calling, texting and email, connecting to and browsing the internet, playing games, listening to music, watching videos and as a means to relax (Ozkan & Solmaz, 2015). Smartphones have replaced many digital technologies by combining them into one interface and users no longer interact with multiple devices at a time (Turner, 2015). Historically, T.V. was watched on a television set, music was played on an MP3 player, CD player or other format, video games were played on a console and pictures were captured by a film or digital camera. The smartphone has made it possible to have all of this accessible in a small, handheld device, that is portable and fits easily in the pocket (Turner, 2015). All of these features can now be used almost simultaneously from a single device. On average, 97% of American adults own cell phones with 85% owning smartphones. In comparison, 100% of adults aged 18-29 have cell phones with 96% of those owning smartphones (Pew Research Center, 2021).

As previously noted, the first iPhone came out while most Gen Z members were relatively young, with the oldest being 10 years old and the youngest not born yet. Because of their familiarity with smartphones, Gen Z can be thought of as the first mobile mavens, and they have a strong preference for wireless, touch-operated screen devices such as tablets and smartphones (Ozkan & Solmaz, 2015). Consequently, college students have been identified as the largest target market for smartphones since they represent the most active users of the device (Fook et al., 2021). Due to their familiarity and use of smartphones, Gen Z members can be labeled as digital natives, being familiar and comfortable using and understanding the digital

technology offered from smartphones (Bennet, 2012). This demographic is also the most frequent smartphone users out of any generation (Fook et al., 2021).

Being a generation that grew up with touchscreen devices and smartphones, there are some interesting trends to note about Gen Z's usage of these devices. Unlike other generations, Gen Z's adolescence had early access to and reliance on smartphones and similar digital devices. Anderson & Juang (2018) found that 95% of teenagers have cell phones or access to them, and that 45% reported being online almost constantly. These are the same teenagers that are now the focus of this study as college age, Gen Z, adults, of which 96% claim to have smartphones and 100% having cell phones (Pew Research Center, 2021). The Covid-19 pandemic also played a role in shaping Gen Z's perspective and use patterns in relation to smartphones (Villa et al, 2020). During the pandemic, many young individuals used smartphones more than any other device to stay connected with friends and for entertainment, and this may have lasting effects on their smartphone usage. It was found that 65% were more dependent on streaming services and 63% more reliant on wi-fi, connected devices, and social media than before the pandemic (Villa et al., 2020). Villa et al. (2020) also reported that a third of Gen Z surveyed believed they would use streaming, Wi-Fi and social media more than they did before the pandemic. Out of nine categories measured, Gen Z was found to be more reliant in every category of smartphone use than Millennials, with a significantly higher usage in terms of social media and video games (Villa et al., 2020).

Another interesting topic concerning Gen Z and smartphone use is mobile phone addiction or problematic use. With a look at Gen Z as teenagers, Turner (2015) found that 90% would be most upset if they lost internet connectivity as a form of punishment, and that most teenagers would be more upset to lose cellphone privileges than any other form of punishment.

This could be in part due to the fact that social apps are reaching a level closer to embodying social life than real life connection and can be viewed as an addiction that can have an effect on social life and psychology (Ozkan & Solmaz, 2015). Fook et al. (2021) found that prolonged smartphone use can indicate an obsession with the virtual world and that many college aged smartphone users use their device without compelling reasons, at all hours of the day, and that smartphone use provides emotional stability. Fook et al. (2021) go on to describe smartphone addicts as individuals who have a strong desire to use the applications on their phones such as: making calls, sending messages, streaming videos, posting online, and will be constantly preoccupied with these activities. Furthermore, they will feel a need to increase time and frequency of use and can create a psychological need to always be connected. This can result in feelings of irritability and feeling lost if separated from their phone (Fook et al., 2021).

However, Wickord and Quaiser-Pohl (2022) argue that addiction is not the right term and instead use the phrase "problematic use" to describe the phenomenon. This differentiation is made because the consequences of problematic smartphone use does not have the severity and intensity of addiction consequences. When discussing problematic use, excessive smartphone use can be assumed and can have symptoms similar to substance abuse including functional impairment and withdrawal, and can be characterized by an inability to regulate one's use leading to negative consequences in daily life. It can be argued that Gen Z has formed what is described as a digital bond with the internet which can have feelings of emotional attachment and can lead to separation anxiety without it (Wickord & Quaiser-Pohl, 2022).

It is clear that Gen Z has been raised with a reliance on digital technology and that smartphones are a part of their daily lives. Looking at ownership and use statistics, it is also clear that more Gen Z cohorts own smartphones compared to any other generation and rely on them

for communication, entertainment and in their daily lives. In regards to NBR, it can be assumed that this trend will be similar and that digital technology and smartphone use will be highest amongst Gen Z participants. As Gen Z will be the next generation of NBR participants, it is important to understand the uses of, and implications of smartphone use while engaged in NBR.

Digital Technology in Nature Based Recreation

There is an extensive amount of literature about the effects of digital technology on our daily lives but less when it comes to the way digital technology affects our interactions with nature and each other during nature-based recreation. Common topics in the literature are personal locator beacons (PLB), global positioning systems (GPS), satellite or cell phones, drones, sharing information via the internet, and social media. Literature on social media is somewhat limited, however, it does appear that most social media literature is relatively recent indicating a current interest in the effects it may be having within NBR. Similarly, smartphone use in outdoor recreation has limited representation in the literature, again most research being relatively recent showing a growing trend to find out more about smartphone use in NBR.

It has been argued that technology has helped increase access to diverse recreational opportunities by providing better, lighter and more specialized equipment and food (Martin, 2017). This has changed outdoor recreation by making it easier and safer to participate, however, the equipment is still fundamentally the same as it was a decade or more ago (Martin, 2017). More attention and possible concern have been placed on the modern proliferation of digital technology such as PLBs, GPS and cell phones, as these technologies have the potential to alter the recreational experience causing behavioral and psychological changes of participants (Martin, 2017). The focus of the effects of digital technology in nature-based recreation can impact activity decision making (where, how and what to do), risk perception, perception of the

experience and the connection with the natural world in which nature-based recreation takes place (Dustin et al., 2019).

Valenzuela (2020) points out that these digital technologies can have an effect on an individual's decision making by influencing recreation participants in five interrelated categories; access, safety, comfort, communication and information. Social media can have a big impact on decision making by providing information and communication used when planning an activity. Wengel et al. (2022) state that modern tourists rely on social media platforms such as Tik Tok, Facebook and Instagram to inform their decision making. This can influence participants into wanting to see or experience certain things that can cause sudden increase in popularity and increase visitation to recreation sites (Wengel et al., 2022). This may have a negative impact on the resource and the visitor experience by causing crowding and unreal expectations, reducing the leisure benefits of the activity. Social media can distort our expectations of a place before we even get there, sometimes setting unrealistic expectations for the participant (Wengel et al., 2022). An issue with social media is that different filters and saturation in digital photographs can enhance what nature looks like, even when individuals would not be able to experience this with the naked eye (Valenzuela, 2020). Social media can attract interest to certain areas but often the experience doesn’t go deeper than the participant wanting to get their picture to share on a social media platform (Martin, 2017).

GPS is now commonly accessed through map applications on smartphones and can influence recreational habits by making it easier to find unique locations and by making travel to and during activity easier. This can increase access and visitor use while also lowering stress while trying to travel and navigate (Carlson et al., 2016; Martin, 2017). While GPS and map apps can make travel easier, less stressful and more enjoyable, it can also create reliance on

technology and remove the knowledge required for route finding which can detract from the leisure experience by reducing new skills learned (Carlson et al., 2016). Velenzuela (2022) states “The use of GPS physically changes the activity of the brain, reducing the role of the hippocampi in creating internal maps of our environment and planning journeys to future possible destinations" (p. 102). This can also create anxiety and safety issues if this technology fails due to limited service or battery life.

Some applications combine map or GPS functions with personal performance monitoring technology which can alter an individual’s experience in the outdoors by providing a consumption of data to compare oneself against others, as well as themselves (Valenzuela, 2022). This can create competition which can detract from the experience and can create the desire to push oneself further which can cause a safety risk as limits are being pushed. There can also be benefits to this as it provides motivation to hike further, run faster, and conquer new sections of the map (Valenzuela, 2022).

Personal locator beacons (PLBs) can also affect decision making, and is a focus of literature concerning technology in the outdoors. Companies have made a variety of devices to call for help, or send coordinates out for rescue and emergencies. Smartphones have replaced the need for many of these devices due to built-in GPS and location finding tools. It is found that PLBs can provide a perceived increase in safety due to the ability to contact the outside world as well as the ability to experience the activity more worry and guilt free than without the device (Blackwell, 2015). The feeling of having less guilt was associated with allowing loved ones back home to worry less about one’s safety. PLBs also encourages recreators to travel alone as the device takes away some of the need to travel with others (Martin & Blackwell, 2016). This can have two impacts. One is that it can be empowering for the recreational user because they can

now feel comfortable and confident traveling alone (Shultis, 2015). The other impact however, is that it can take away from the social bonding aspect of participating in outdoor recreation with others.

Digital technologies and smartphones can also have an effect on risk perception while participating in NBR, and is also a common theme in the literature. Two main effects were noticed: individuals felt more empowered when traveling alone or into challenging natural areas, and visitors had a false perception of security by having communication technology with them (Martin & Blackwell, 2016; Pope & Martin, 2011; Shultis, 2015). Being able to communicate with rescue while recreating allowed individuals to feel more comfortable, confident and more willing to take bigger risks or tackle more challenging terrain (Shultis, 2015). Shultis (2015), found that digital technology made individuals feel more empowered due to the ability to look at maps, choose more challenging adventures, and worry less knowing they could call for help if needed. However, there is some concern about the reliance of technology overcoming self-rescue skills and that users should be aware that increased technology may not actually make the activity safer (Pope & Martin, 2011). Blackwell (2015) found that visitors did not let devices influence their decision making and that having such technology with them did not lead to participation in riskier activities. While PLBs might not change in the moment decision making, it did have an influence on pre-trip decisions such as traveling solo, off trail travel or travel into difficult or remote terrain, and can improve the experience by removing uneasiness and worry (Martin & Blackwell, 2016). However, Pope and Martin (2011) came to a different conclusion stating that these devices made individuals more likely to take chances if they have them with them, and that they are more likely to request rescue, whether truly needed or not. This shows a false sense of security, since while you may be able to get a message out, rescue can still be time

consuming and difficult in many locations. These technologies can cause unrealistic expectations and can create a false sense of security that can compromise self-reliance (Pope & Martin, 2011). It should be noted that these devices can provide an empowering perception for individuals and allow them to push their personal boundaries and to travel to new and remote spots with less stress, worry or guilt, which can enhance the recreational experience (Shultis, 2015).

The area that received the most attention in the literature was the barrier that is put up between an individual and the natural world when digital technology is introduced into natural settings. Martin (2017) relates this to self-reliance being replaced by technology, which leads to a distancing from the experience. Martin (2017) goes on to note that technology can decrease self-sufficiency, solitude and remoteness, many of the benefits of being in nature. Carlson et al. (2016) note that digital technology can change the way in which we perceive nature and the wilderness. This can, in effect, change our perception of what value wilderness and nature have on society (Carlson et al., 2016). It's also noted that many individuals start to rely on technology for information on where to recreate and if there is not sufficient information, may choose not to go to an area. Many of these areas are natural, undeveloped wilderness areas and there has actually been a decline in wilderness recreation (Carlson et al., 2016). Those who travel into nature for the psychological benefits of solitude may find this altered by the ever-present connection with the outside world (Martin & Blackwell, 2016). Valenzuela (2022) does not view technology as helping individuals form positive perceptions of nature and the experience provided by wilderness. “The concern is whether technology deepens these connections and helps visitors better enjoy these benefits of physical and mental well-being or if technology itself becomes the focus of the recreation experience and even replaces nature as some believe is

already happening" (Valenzuela, 2022. p. 106). This raised important questions about whether growth of technology will bring about the end of the true wilderness experience.

A notable piece of research by Amerson et al. (2020) gathered information about smartphone use by hikers of the Pacific Crest Trail. It was found that 97% of thru hikers of the trail carried smartphones and reported using them an average of 3.5 hours a day (Amerson et al., 2020). Interestingly, Amerson et al. (2020) found increased smartphone use was significantly associated with the number of days on the trail, showing that the longer an individual was out the more they used their device. Building on this, Lepp et al. (2021) put smartphone use behaviors into five logical groups: communication, navigation, feeling safe, boredom alleviation and photography. Navigation and boredom alleviation were significant predictors of smartphone use on trail. Additionally, it was found that women were more likely than men to use smartphones for feelings of safety (Lepp et al., 2021).

Clark et al. (2022) found that technology use was high in nature-based tourism and the majority of use were mobile apps, games, music devices, social media and cameras. It should be noted that the majority of users said they prefer to wait until after the experience to post pictures to social media although some participants actively post to social media while participating in nature-based recreation (Clark et al., 2022; Clark & Nypaupane, 2023). Furthermore, GPS, digital cameras, video cameras and music apps, all accessed from smartphones, enhanced the tourism experience (Clark et al., 2022; Clark & Nypaupane, 2023).

Perceptions of Technology Use in Nature Based Recreation

After looking at how technology defines Gen Z, their adaptation to and familiarization with technology, potential addiction to or problematic use of smartphones, and the role these technologies play in nature-based recreation, it is important to look at their perception of

smartphone use. While discussing perception of smartphone use, it is important to view use trends outside of nature-based recreation as this may give insight into perceptions of use while participating in nature-based recreation (Clark & Nypaupane, 2023). There is also interesting research between how recreationists perceive the need or desire to be digitally connected, and recreational providers' perception of users desire to have these technologies present (Clark et al., 2022; Clark & Nypaupane, 2023). Finally, the perception of personal use vs. others' use is mentioned in the literature but is of limited breadth making it an interesting topic for further research.

Rainie and Zickuhr (2015) looked at public cell phone use etiquette amongst adult users and found that the majority (77%) found it acceptable to use a cellphone while walking down the street with 75% saying it was acceptable to use while using public transportation. This shows that using cellphones in public settings is for the most part deemed acceptable. Furthermore, 89% of respondents reported using cellphones during their last social gathering, with 61% claimed using it to read a message, 58% using it to take a photo, 52% sending messages and 52% to receive a call (Rainie & Zickuhr, 2015). Finally, Rainie and Zickuhr (2015) found that younger adults have a higher tolerance and are more accepting of cellphone use in public and were more likely to have used them during their last social gathering.

Looking at the research of Amerson et al. (2020) and Lepp et al. (2021) it is clear that smartphone use is acceptable and commonplace amongst distance hikers for activities such as navigation, boredom alleviation and safety. However, literature regarding the perception for the need of digital technology can differ between recreational users and providers (Anderson & Baker, 2015; Clark et al, 2022; Clark & Nypaupane, 2023). Anderson and Baker (2015) found that technology has been used by resource managers to connect with tech savvy visitors,

allowing them to reach new audiences and deliver up to date information. However, it was found that technology escape was a main motivation for visitors and was moderately important to their recreational experience and suggested a management approach that provided technology escape without excluding it all together (Anderson & Baker, 2015).

Similarly, Clark et al. (2022) found that millennial recreationists supported the idea of digital detox zones where they can unplug from the wired world. This is supported by the idea that nature-based tourists perceive an escape from technology to be a main motivator for participation. However, there is conflict between the need to escape technology while feeling a need to stay connected to basic technology for social, work and safety reasons (Clark et al., 2022; Clark & Nypaupane, 2023). The desire to be unplugged ran contrary to previous research of young adults' reliance on technology and lack of experience in nature (Clark et al., 2022). Of important note, Clark et al. (2022) found that talking on cellphones was found to diminish the recreational experience, with mixed results on desire for Wi-Fi or internet access.

Martin (2017) found that few visitors identified their own technology use as impacting their recreational experience, but instead pointed to others' use of technology. Amerson and Baker (2015) also pointed to visitors being annoyed by other visitors' use of technology as well as potentially serious links between social media, vandalism, and risk-taking behaviors. Clark and Nypaupane (2023) similarly found that nature-based tourists expressed concern with technology use from other users and found it bothersome when they used devices such as selfie sticks or virtual reality.

Management Implications

The number of individuals participating in outdoor and nature-based recreation has been growing over the past decade, and trends are calling for continued growth in the field (State

Outdoor Business Alliance, 2021). With continued growth in NBR, resource managers are going to have to decide how to best accommodate and serve the needs of more tech reliant participants. While there is extensive literature about the potential negative effects of technology use in NBR (Blackwell, 2015; Carlson et al., 2016; Martin, 2017; Martin & Blackwell, 2016; Pope & Martin, 2011; Valenzuela, 2020), it is clear that smartphone and other digital technologies have become part of the recreational landscape (Anderson & Baker, 2015; Amerson et al., 2020; Lepp et al., 2023). While National Park visitation is set to increase by an average of 1.2 million visitors per year (Bergstrom et al., 2020), the use or desire of use in these areas may become a future concern for resource managers. While many nature-based recreationists claim they want to participate in the activity to escape technology or to experience digital free zones (Clark et al., 2022), research shows that they still carry smartphones and use them frequently while participating in NBR (Lepp et al., 2021). Similarly, with Gen Z being the next generation reaching adulthood and participating in NBR, their potential reliance on and desire to use these technologies may cause management concerns for recreation and resource managers.

Resource managers may have to look into how these technologies can affect the area they manage and how it may conflict with management goals. Wilderness, for example, is designed as an area that has outstanding opportunities for solitude and provide primitive forms of recreation and are meant to be an escape from society and mechanization (Dawson & Hendee 2009; Dustin et al., 2017) Since 16-27 year old, or Gen Z, is the age group that participates most in wilderness recreation (Dawson & Hendee, 2009), there could be a desire to bring these technologies into recreation areas, potentially compromising the management goals of these locations. Similarly, Gen Z may change their recreation habits or locations in which they recreate to be able to access these technologies while participating in NBR. Because of this, more research is needed to

understand the desire to have these technologies, the perceptions of their use on nature-based recreation, and how this may shape decisions on where to visit.

Research Gap

The research of Amerson et al. (2020) and Lepp et al. (2021) point to smartphone use on the Pacific Crest Trail (PCT), but does little to look at generalized smartphone use in NBR. Their research shows a trend of increased smartphone use the longer an individual is on the trail and provided staggering numbers that 97 % of thru hikers carried smartphones and on average reported using them almost 3.5 hours a day (Amerson et al., 2020; Lepp et al., 2021). This research however does not show a direct reliance on smartphones nor desire to use smartphones while participating in other forms of NBR. Additionally, this research investigates five different use categories, but does not illustrate if this enhances or diminishes an individual's recreational experience. Finally, the research on PCT hikers does not show use trends by any certain demographic. Since individuals between the ages of 16-27-years are the most likely to participate in NBR (Dawson & Hendee, 2009), it would be of value to look specifically at use trends of this age range. By looking specifically at this age group, which is almost exclusively members of Gen Z, we can get a better understanding of use patterns and potential for future trends.

While Amerson et al. (2020) and Lepp et al. (2021) researched use, but not perceptions of use, the knowledge gap is partially filled by Clark et al. (2022) and Clark and Nypaupane (2023). However, these studies focus on millennial participants and does not give insight into Gen Z's perception of smartphone use in NBR and nature-based tourism. After establishing that more research could be done to look at use patterns, specifically in regards to the age group represented by Gen Z (16-26), it would similarly be beneficial to look at their perception of smartphone use. By combining the research of Amerson et al. (2020), Lepp et al. (2021), Clark et

al. (2022) and Clark and Nypaupane (2023), we could look at how the five categories of smartphone use represented on the PCT could enhance or diminish Gen Z's recreational experience.

METHODS

Observational Study Design

Participants were surveyed using convenience sampling to test for smartphone use and perceptions of smartphone use in NBR. Perception was measured using a 5-point Likert scale developed by Clark et al. (2022) anchored with 1- greatly diminishes the recreational experience, to 5- greatly enhances the recreational experience. Use was also measured using a 5-point Likert scale anchored with 1- extremely unlikely, to 5- extremely likely to use smartphones while participating in NBR. Use was separated into the five categories used by Lepp et al. (2021).

Adapted from the categories used by Lepp et al. (2021), this research investigated how smartphones were being used in NBR quantitatively. First, the researcher asked participants whether or not they carry and use smartphones while participating in NBR. If "yes" was selected for smartphone use while participating in NBR on the survey, participants were directed to respond to questions about how they use their smartphones. The five categories we investigated were: communication, navigation, photography, boredom alleviation and feeling safe. Communication was defined as using a smartphone for calling, texting and responding to emails. Navigation included using smartphones for GPS, map apps and performance tracking apps. Photography included using smartphones for taking pictures and video. Boredom alleviation encompassed using smartphones for social media (active use: scrolling and posting), music, podcast and watching videos. Feeling safe encompassed using smartphones to communicate with others, calling for rescue and weather forecasting. After confirming smartphone use and how smartphones were being used, the survey questions aimed to measure each participant's feelings on how the aforementioned uses enhanced or diminished their experience.

The survey was created using Qualtrics and advertised in person through flyers with QR codes and email during February of 2024. Smartphone use was the independent variable with perceptions of an enhanced or diminished experience, and types of use being the main dependent variables. Additional dependent variables to be explored include, gender, years of experience participating in NBR, types of activities participating in, and professional experience in NBR.

Instrument

The questionnaire consisted of 62 questions and was split into three categories: 1) demographic information, 2) smartphone use, and 3) perceptions of use to enhance or diminish the experience. The first section examined demographic information and recreational history. The demographic section included 11 items which asked about age, identity and recreational history. Recreational history specifically was comprised of participants NBR experience level, preferred forms of NBR, and frequency of participation.

Smartphone usage was measured using a 5-point Likert scale anchored with 1- extremely unlikely to use, to 5- extremely likely to use. Use type was determined using 28 questions with 2-6 self-developed questions per category in relation to the five categories developed by Lepp et al. (2021); communication, navigation, photography, boredom alleviation and feeling safe. Measures of smartphone use was self-reported and investigated both active uses, referring to screen time, and passive use, where the phone is running an application but not being actively looked at.

Perception of smartphone use was also measured using a 5-point Likert scale anchored with 1- greatly diminishes the experience, to 5- greatly enhances the experience. Perception of use was divided into the same five use categories developed by Lepp et al. (2021) and consisted of 20 questions developed by the researcher. Additionally, this section was split into two parts 1)

smartphone use pertaining to personal use perceptions, and 2) perceptions of others' smartphone use

Population

The target population of the study was college aged Gen Z students attending a mid-sized midwestern public university who meet the criteria of being born between 1997 and 2005 (18-26 years old). Surveys were distributed to students around campus through various departments, clubs, organizations and locations via email and in person. Additionally, surveys were handed out locally to recreational participants and professionals. Surveys were distributed over a one-month period from January 31st through March 1st at Northern Michigan University.

Data Analysis

Data was cleaned to ensure accuracy and reliability at the conclusion of data collection. Survey responses were reviewed to ensure surveys were adequately completed, included valid responses (e.g. no outliers), and had appropriate completion times (5-10 minutes). A total of n=117 responses were downloaded from Qualtrics. Out of the 117 responses, n=24 responses were deleted due to incompleteness or not meeting the study inclusion criteria. Of the 24 responses that were discarded, n=4 were not aged 18 or older, n=14 indicated they were not enrolled in college courses, n=5 did not answer any questions beyond consent to take the survey and n=1 indicated not owning a smartphone. There were n=2 participants who filled out either the perception-based questions or the use-based questions but these results were kept as they provided valuable insight into perception and use. In total, n=93 responses were included in this analysis, with n=92 responses for use questions and n=92 responses for perception questions.

Descriptive statistics for categorical and continuous data were reported as n(%) or mean ±standard deviation. To determine the overall frequency of participants who were unlikely to use

smartphones while partaking in NBR, the responses of “extremely unlikely” and “somewhat unlikely” were added together and expressed as a percentage. Frequencies of “somewhat likely” and “extremely likely” were combined to get a percentage of those likely to use smartphones while participating in NBR. Responses that indicated “neither likely or unlikely” were classified as neutral. We condensed the Likert-scale responses for the type of smartphone use items in the same described above. After calculating the frequency of responses classified as “unlikely to use a smartphone while participating in NBR”. “likely to use a smartphone while participating in NBR” and “neutral” for each individual item, we added the frequencies for each of these three classifications together for all items within a specific category and divided by the total to obtain the average response for each category. For example, responses for all 6 of the items describing the category “boredom alleviation” were grouped together into “unlikely to use a smartphone”, “likely to use a smartphone” and “neutral” and averaged to display the overall behavioral patterns of the sample in terms of using smartphones while participating in NBR for boredom alleviation. One survey subject failed to fill out this portion of the survey giving 92 usable responses for this section

To determine the overall frequency of participants who found smartphone use to diminish the NBR experience, the responses of “greatly diminished” and “diminished” were added together and expressed as an average. Responses of "enhanced” and “greatly enhanced” were combined to get a percentage of those who found smartphone use in NBR to enhance the experience. Responses that indicated “neutral” were classified as such, and suggested use neither enhanced or diminished their NBR experience. This process was used to calculate general smartphone use by adding all perception questions together to find percentages of overall smartphone uses. The aforementioned process was also performed on each use type category to

determine how specific smartphone use could enhance, diminish or be neutral to the NBR experience. Perceptions of others' use was analyzed in the same manner. One respondent failed to fill in this section of the survey giving 92 usable responses

RESULTS

Demographics

Of the 93 valid responses, 42 were male (45%), 46 female (49%), 3 non-binary (3.2%) and 2 (2.2%) did not specify. The mean age of respondents was 21.13±1.78 years old, with the youngest being 18 and the oldest at 26. The mean number of years respondents claimed to have participated in nature-based recreation was 15.94±5.9 years with a minimum of 2 and maximum of 25 years. Respondents who are currently employed in a NBR job were 22(23.7%), with an additional 48(51.6%) claiming to have previously worked a NBR job. The most popular NBR activities respondents reported participating in were hiking, camping, kayaking, backpacking and biking (Table 1). Respondents who participated in NBR within the last 24 hours was 39.8%, 30.1% within the last 3 days, 17.2% within the last 7 days, 5.4% within the last month and 4.3% within the last year. The vast majority of participants, (87.1%), participated in NBR within one week of completing the survey. Additionally, the average amount of time spent participating in NBR was 6.54±6.65 hours a week.

Table 1.
Types of NBR participation n=93.Data shown as n(%).

Hiking	89 (95.7)	Hunting	25 (26.9)
Camping	86 (92.5)	Geocaching	19 (20.4)
Kayaking	64 (68.8)	Ice climbing	12 (12.9)
Backpacking	62 (66.7)	Nordic skiing	10 (10.8)
Biking	57 (61.3)	Slacklining	9 (9.7)
Nature/wildlife viewing	54 (58.1)	Rafting	9 (9.7)
Fishing	50 (53.8)	Horseback riding	8 (8.6)
Canoeing	43 (46.2)	Surfing	7 (7.5)
Alpine skiing	37 (39.8)	Mountaineering	6 (6.5)
Rock climbing	34 (36.6)	Other	12 (12.9)
Photography	29 (31.2)		

Use Patterns

In regards to smartphone use, 89(95.7%) claimed that they had their smartphones with them during their last NBR experience. Additionally, 84(91.3%) claim they are likely to carry their smartphone with them while participating in NBR (Table 2). However, 55(60.5%) claim they are likely to use their smartphone while participating in NBR (Table 2).

Participants use of smartphones while participating in NBR is displayed in Table 2. The majority of participants (77.7%) indicated photography was the number one reason they used their smartphone while participating in NBR, with 79(85.9%) saying they are likely to use a smartphone to take pictures, and 64(69.2%) claiming they are likely to use a smartphone to record video. Additionally, 65(69.9%) claimed they do not carry another type of camera to capture photos.

Navigation was the second most predominate category for use of smartphones in NBR, with 62.6% of respondents claiming they are likely to use a smartphone for navigation (Table 2). Additionally, 83(89.2%) respondents claimed they prefer to use a navigation app on their smartphone over a map and compass for navigation and route finding. Although 87(93.5%) participants indicated they knew how to use a map and compass, it appeared that the majority of participants overwhelmingly preferred to use a map application or GPS. Approximately 70.4% of participants also reported they use map apps to plan their activity.

Safety was ranked as the third highest category for smartphone use during NBR with 61.2% of participants claiming to use smartphones for feelings of safety. The most common use of smartphones for feeling of safety was being able to check the weather before an activity (94.5%). Checking weather during the activity was the next most common use of smartphones

classified under feelings of safety (54.4%). Lastly, 32(34.4%) indicated having used a smartphone to call for help while participating in NBR.

On average, respondents were slightly more unlikely at 40.8% to use smartphones for communication than they were likely, at 40.25%, with 19% claiming to be neither likely or unlikely. Boredom alleviation ranked as the lowest use for smartphones while participating in NBR with 68.7% of participants claimed they are unlikely to use smartphones for boredom alleviation with only 19.8% indicating they are likely to do so (Table 2). Furthermore, 93.5% or participants responded they are unlikely to use a smartphone to watch a video while partaking in NBR and 89.2% claiming they are unlikely to use a smartphone to read a book or article.

Table 2.
Smartphone use patterns while participating in NBR n=92. Data shown as n(%).

	Activity	Extremely unlikely	Somewhat unlikely	Neither likely or unlikely	Somewhat likely	Extremely likely
	Carry a smartphone	1 (1.1)	5 (5.4)	2 (2.2)	14 (15.2)	70 (76.1)
	Use a smartphone	6 (6.6)	17 (18.7)	13 (14.3)	40 (44.0)	15 (16.5)
Communication	Answer or respond to a call	14 (15.2)	11 (12.0)	20 (21.7)	31 (33.7)	16 (17.4)
	Read a text or email	17 (18.5)	16 (17.4)	17 (18.5)	28 (30.4)	14 (15.2)
	Respond to a text or email	22 (23.9)	20 (21.7)	18 (19.6)	23 (25.0)	9 (9.8)
	Make a call or send a text or email	19 (20.7)	31 (33.7)	15 (16.3)	22 (23.9)	5 (5.4)
Navigation	Use a map application to plan a NBR activity	4 (4.4)	11 (12.1)	12 (13.2)	42 (46.2)	22 (24.2)
	Use a map application while engaged in NBR	9 (9.8)	15 (16.3)	11 (12.0)	45 (48.9)	12 (13.0)
	Use a tracking application to track distance or route	12 (13.0)	16 (17.4)	13 (14.1)	25 (27.2)	26 (28.3)
Safety	Use a smartphone to check weather before activity	1 (1.1)	2 (2.2)	2 (2.2)	29 (31.5)	58 (63.0)

Safety	Use a smartphone to check weather during activity	8 (8.7)	16 (17.4)	18 (19.6)	31 (33.7)	19 (20.7)
	Actively check in or share location with others	16 (17.4)	16 (17.4)	14 (15.2)	26 (28.3)	20 (21.7)
	Use a smartphone to call for help while participating	12 (13.0)	12 (13.0)	26 (28.3)	24 (26.1)	18 (19.6)
Photography	Use a smartphone to take pictures	1 (1.1)	6 (6.5)	6 (6.5)	23 (25.0)	56 (60.9)
	Use a smartphone to record video	7 (7.6)	9 (9.8)	12 (13.0)	27 (29.3)	37 (40.2)
Boredom Alleviation	Use a smartphone to listen to music	24 (26.1)	19 (20.7)	14 (15.2)	19 (20.7)	16 (17.4)
	Check social media	54 (58.7)	17 (18.5)	10 (10.9)	10 (10.9)	1 (1.1)
	Post to social media during participation	48 (52.2)	16 (17.4)	14 (15.2)	11 (12.0)	3 (3.3)
	Watch a video/movie	75 (81.5)	11 (12.0)	2 (2.2)	2 (2.2)	2 (2.2)
	Read a book or article on a smartphone	65 (70.7)	17 (18.5)	6 (6.5)	3 (3.3)	1 (1.1)
	Use Identification apps (plants, animals, etc.)	13 (14.1)	20 (21.7)	18 (19.6)	30 (32.6)	11 (12.0)

Perception

Perception data investigated how personal use of smartphones could enhance or diminish the NBR experience as well as how others' use of smartphones could enhance or diminish ones' recreational experience. On average, 49.9% of respondents claimed personal use of smartphones enhanced their recreational experience, with 26.8% claiming personal smartphone use to diminish the experience, and 23.3% feeling neutral about personal smartphone use enhancing or diminishing the experience (Table 3). The uses that enhanced perception of the experience were; the ability to contact others or feelings of safety (91.3%), added sense of safety (79.3%), checking weather or radar (78.3%), using map applications to plan the activity (76.1%) and

taking pictures (70.9%) (Table 3). The uses that diminish perception of the experience were; watching videos or movies (91.3%) and actively using social media (87%).

Table 3.
Perception of personal smartphone use to enhance or diminish NBR experience n=92. Data shown as n(%).

	Greatly diminishes	Diminishes	Neutral	Enhances	Greatly enhances
Using a smartphone	12 (13.2)	28 (30.8)	28 (30.8)	19 (20.9)	4 (4.4)
Being able to call, text or email	14 (15.2)	26 (28.3)	35 (38.0)	16 (13.4)	1 (1.1)
Using map applications to plan activity	0 (0.0)	2 (2.2)	20 (21.7)	47 (51.1)	23 (25.0)
Using map applications during activity	0 (0.0)	10 (10.9)	22 (23.9)	46 (50.0)	14 (15.2)
Using self-tracking apps	2 (2.2)	4 (4.3)	37 (40.2)	35 (38.0)	14 (15.2)
Taking pictures	1 (1.1)	3 (3.3)	20 (21.7)	41 (41.6)	27 (29.3)
Listening to music	11 (12.0)	22 (23.9)	33 (35.9)	17 (18.5)	9 (9.8)
Actively using social media	61 (66.3)	19 (20.7)	11 (12.0)	1 (1.1)	0 (0.0)
Watching videos or movies	69 (75.0)	15 (16.3)	7 (7.6)	0 (0.0)	1 (1.1)
Using identification apps	1 (1.1)	7 (7.6)	25 (27.2)	44 (47.8)	15 (16.3)
Checking weather or radar	1 (1.1)	1 (1.1)	18 (19.6)	49 (53.3)	23 (25.0)
Ability to contact others or feelings of safety	0 (0.0)	1 (1.1)	7 (7.6)	35 (38.0)	49 (53.3)
Added sense of safety by having a smartphone present	1 (1.1)	3 (3.3)	15 (16.3)	43 (46.7)	30 (32.6)

By applying the same five categories for smartphone use, safety is found to enhance the experience the most with 83% of participants claiming it enhances or greatly enhances the experience. Taking pictures also enhanced or greatly enhanced the experience (70.9%), as well as navigation (64.8%). Communication was found to diminish the experience, with 43.5% indicating it diminishes or greatly diminishes the experience. Boredom alleviation was found to diminish the experience the most with 55.7% claiming it diminishes or greatly diminishes the NBR experience.

This study also investigated others' use of smartphones and found on average others' use diminished ones' NBR experience, with a mean score of 50.6% of participants claiming it

diminishes or greatly diminishes the experience (Table 4). Only 18.6% found others' use to enhance their own experience, and 30.8% felt it neither enhanced or diminished their NBR experience (Table 4). Others' use of social media was found to diminish ones' experience the most with 88.1% or respondents indicating this diminishes or greatly diminishes their experience. Others using smartphones to answer calls, text and email also diminished ones' recreational experience with 75.9% indicating it diminished their experience. Others listening to music on speakers also diminished or greatly diminished their experience (68.5%). Others taking pictures was found to enhance participants experiences with 52.2% claiming in enhances or greatly enhances their experience, and 43.5% feeling neutral about other's picture taking. Others' taking pictures of respondents while participating in NBR also slightly enhanced ones' experience with 44.6% claiming it enhances or greatly enhances their experience and 35.9% feeling neutral.

Table 4.
Perceptions of others' use of smartphones to enhance or diminish NBR experience n=92. Data shown as n(%).

	Greatly diminishes	Diminishes	Neutral	Enhances	Greatly enhances
Using a smartphone	22 (23.9)	24 (26.1)	38 (41.3)	7 (7.6)	1 (1.1)
Answering calls, texts or emails	26 (28.6)	43 (47.3)	19 (20.9)	2 (2.2)	1 (1.1)
Taking pictures	3 (3.3)	1 (1.1)	40 (43.5)	34 (37.0)	14 (15.2)
Taking pictures of you	11 (12.0)	7 (7.6)	33 (35.9)	30 (32.6)	11 (12.0)
Listening to music on headphones	21 (22.8)	23 (25.0)	39 (42.4)	9 (9.8)	0 (0.0)
Listening to music on a speaker	38 (41.3)	25 (27.2)	19 (20.7)	8 (8.7)	2 (2.2)
Actively using social media	55 (59.8)	26 (28.3)	10 (10.9)	1 (1.1)	0 (0.0)

DISCUSSION

The goal of this study was to investigate Gen Z's general smartphone use while participating in NBR, types of smartphone use while participating in NBR, perceptions of personal smartphone use while participating in NBR and perceptions of others' use while participating in NBR. It was clear the majority of Gen Z who participate in NBR do carry their smartphones with them, and actively use them for a variety of uses. Additionally, it was found that using smartphones in NBR did enhance the recreational experience, however, some uses were found to diminish the experience. Others' use of smartphones was found to diminish one's overall recreational experience.

This study found that 95.7% of Gen Z individuals carried smartphones with them the last time they participated in NBR, with 91.3% claiming they are likely to carry smartphones in future NBR experiences. While this number fell slightly short the 97% of participants carry cellphones discovered by Amerson et al (2020) on the PCT, it did support H1 that at least 90% of participants would carry smartphones while participating in NBR. In contrast to this, only 60.5% of participants claimed they were likely to use a smartphone while participating in NBR. It could be that some participants carry smartphones out of habit, or as a backup emergency device that they do not plan to use but would like to have with them.

Data showed photography to be the most common use of smartphones in NBR, followed by navigation and safety. The majority (77.7%) of respondents claimed they are likely to use their smartphones for photography while participating in NBR, with 85.9% claiming they are likely to use a smartphone to take pictures. Additionally, 69.9% claim they do not carry another type of camera with them. This shows that smartphones are the preferred way to capture photos

in NBR. Results differed from the results of Lepp et al. (2021) who found navigation, boredom alleviation and safety to be the main uses of smartphones in NBR and did not support H3. Boredom alleviation was reported as the least likely use of smartphones in NBR but both studies found navigation and safety to be in the top three use categories. The difference in smartphone use categories could be accounted for by the type of NBR being investigated in this study and that of PCT thru hikers. Lepp et al. (2021) focused on individuals participating in lengthy backpacking trips on the PCT which could account for their use of smartphones for boredom alleviation. This study focused on general NBR which typically has less down time than those participating on a lengthy, multi-day thru hike. In this regard, boredom alleviation is not as prevalent amongst day use NBR participants. However, it is interesting to see that navigation and safety were amongst the top three uses of smartphones in both studies, showing that these categories are predominate uses for both single outing and multiday NBR experiences. It should be noted that 70.4% of participants reported using map apps to plan their activity which may not be correlated with using smartphones during NBR.

Personal smartphone use was found overall to enhance an individual's NBR experience, however, some uses were found to diminish the experience. Half (49.9%) of participants indicated that general smartphone use enhanced their experience, 23.3% found it neither enhanced or diminished, and 26.8% found it diminished their experience. This supports H2 that smartphone use enhances an individual's NBR experience. Using smartphones to increase safety was found to enhance the NBR experience the most, with 91.3% claiming being able to contact others or call for help enhanced their experience. Photography and navigation uses were also found to enhance the NBR experience and is a direct correlation to predominate smartphone uses. While these uses enhanced the experience, communication and boredom alleviation were

found to diminish the NBR experience. Boredom alleviation was found to diminish the experience the most with 91.3% saying watching a movie or video diminished the experience, and 87% claiming using social media diminishes the experience. This also correlates to use patterns as boredom alleviation is the least common use of smartphones, and is found to diminish the experience the most.

This study also investigated how others' smartphone use can potentially enhance or diminish the NBR experience. Amerson and Baker (2015), Martin (2017) and Clark and Nypaupane (2023) all found that while personal cellphone use is typically accepted and enhances recreational experiences, others' use tends to diminish ones' recreational experience. This study supported this claim with 50.6% of respondents claiming others use diminishes their NBR experience. Others actively using social media and answering calls or text were found to diminish the NBR experience the most. However, it was found that others taking pictures enhanced the NBR experience. This study did not specify whether others' use pertained to strangers, family members or friends and could potentially change the results based upon interpretation of the question.

Implications

Recreational resource and natural resource managers should pay attention to the use patterns of smartphones in NBR and how this may impact individual's perceptions of the activity. By understanding what type of digital connection and uses are desired, resource managers will be able to better meet the needs of recreationists. Alternatively, by understanding what actions diminish the NBR experience, resource managers may be able to better regulate or educate about technology use. With navigation and safety enhancing perceptions of NBR, and being amongst the most common uses of smartphones in NBR, it is important to manage NBR

spaces to provide service for individuals to access these functions on their smartphones. While this may go against management strategies for some locations, having access to smartphone service or wi-fi for navigation, weather and emergency communication is shown to enhance Gen Z's experience. Smartphone use in planning activities was also shown to enhance the experience and resource managers should make sure that maps are accurate and accessible online. Gen Z's use patterns and perceptions are important to understand as they are the next generation that is actively participating in, and shaping the future of NBR.

Limitations

There were a few limitations that may have impacted the results of this study. First, this study aimed to acquire 385 responses but was only able to generate 117 responses, of which only 93 were usable. A limiting factor for responses was the short data collection period of one month. If the data collection period was longer, this survey could have generated more responses enhancing the generalizability of the data. The stipulation that individuals had to be enrolled in college classes further limited the sample pool. Of the 117 responses, 14 were not usable as the participants were not enrolled in college classes but did match the age criteria. If this study was open to all Gen Z individuals, and not just those enrolled in college classes, it could have increased the sample size of the survey. Additionally, many of the questions in the survey involved participants to self-report on smartphone usage and due to individual biases, may not have been reported accurately. Wording concerning others' use also could have been clearer indicating whether others were friends, family of strangers. Finally, identification apps may not have been appropriately put in boredom alleviation category and could potentially be part of a new category for active learning while participating in NBR.

Suggestions for Future Research

More research could be conducted in this field to determine what other types of use may enhance or diminish the experience, as well as what specific apps may help enhance or diminish the experience, including learning based apps. Future research could open this up to all Gen Z individuals, not just those enrolled in college courses, to get a broader sample size and more diverse demographic. This research does not have to be limited to Gen Z. It would be valuable to gain perception and use input from all active users of NBR to understand how different generations perceive smartphone use, and how different generations use smartphones in NBR. As discovered in this research, use patterns differ between day use and multi-day use of smartphones and comparing the use patterns of both could provide interesting data for future research. Additionally, this study asked participants to self-report smartphone use. Future research could look at screen time compared to NBR activities and specific app use to get more accurate data on smartphone use and usage types. Finally, future research could also investigate further how others' smartphone use impacts perception of the experience. It would be interesting to look at strangers use, friends use and families use of smartphones and how this could impact an individual's perception of the experience.

CONCLUSION

Gen Z is the first generation of digital natives and have more familiarity and reliance on smartphones than any generation before them. While nature-based recreation is forecasted to increase in upcoming years, it is important to understand how this generation will use smartphones and how they perceive smartphone us while participating in these activities. Photography, navigation and safety were the top uses of smartphones by Gen Z while participating in NBR, and overall smartphone use was found to enhance their experience. Being able to check the weather, call for help, plan trips and use map applications for navigation were found to enhance the NBR experience for Gen Z. Resource managers should be aware of use pattern and perceptions of use in order to create the best possible experience for those visiting natural areas for recreational purposes.

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APPENDIX A: IRB APPROVAL

Marquette, MI 49855
nmu.edu/sponsoredprograms

Jan 19, 2024 5:27:43 PM EST

To: Ryan Hines
HEALTH/HUMAN PERFMNCE, SCHL OF

Miles Glendening
HEALTH/HUMAN PERFMNCE, SCHL OF

From: The Northern Michigan University Human Subjects Review Board

Dr. Lisa Schade Eckert, Dean of Graduate Studies and Research
NMU Institutional Official

Re: Approval - Initial - HS-24-53 Glendening Thesis Research: Gen z's perception and use patterns of smartphones in nature-based recreation
IRB Study Number: HS-24-53

The Northern Michigan University Human Subjects Review Board has approved your study, Glendening Thesis Research: Gen z's perception and use patterns of smartphones in nature-based recreation. Include your study number, HS-24-53, on all research materials and any correspondence regarding this project.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and the research participant.

Study Modifications:

If you find that modifications of investigators, methods, or procedures are necessary, you must submit a modification submission through Cayuse IRB. Any changes or revisions to your approved research plan must be approved by the IRB prior to implementation.

Incident Reporting Responsibilities:

If any unanticipated problems arise involving human subjects, such as a subject suffers an injury during research or if there is an incident of non-compliance with IRB policies and procedures, you must take immediate action to assist the subject and notify the IRB at (hsrr@nmu.edu) and NMU's IRB Institutional

Official (leckert@nmu.edu) within 48 hours. Additionally, you must complete an Incident Form in Cayuse IRB.

APPENDIX B: GEN Z PERCEPTION AND USE PATTERNS OF SMARTPHONES IN NATURE BASED RECREATION SURVEY

ANONYMOUS CONSENT FORM

Northern Michigan University
School of Health and Human Performance Project
Title: Gen Z's Perceptions and Use Patterns of Smartphones in Nature-Based Recreation
IRB APPROVAL NUMBER: HS-24-53

Purpose of the research study: The purpose of this research study is to investigate how smartphones could potentially enhance or diminish one's nature-based recreational experience. Additionally, this study seeks to explore how smartphones are being used during nature-based recreation participation.

What you will be asked to do in this study: We will ask you to complete a 25-item survey that will take 5-10 minutes of your time.

Compensation: No extra credit or compensation will be given for participation in this study.

Confidentiality: Your part in this study is anonymous. That means that your answers to all questions are private. No one else will know if you participated in this study and no one else will be able to find out what your answers were. Scientific reports will be based on group data and will not identify you or any individual as being in this project. Your identity will be kept confidential to the extent provided by law. Data will be stored no longer than one (1) year. Voluntary participation: Your participation in this study is completely voluntary. You have the right to withdraw from the study at any time without consequence or penalty. You have the right to omit any questions or decline any procedures.

If you have any further questions regarding your rights as a participant in a research project you may contact Dr. Lisa Schade Eckert of the Human Subjects Research Review Committee of Northern Michigan University (906-227-2300) leckert@nmu.edu. Any questions you have regarding the nature of this research project will be answered by the principal researcher who can be contacted as follows: Ryan Hines at rhines@nmu.edu.

I have read the above "Informed Consent Statement." The nature, risks, demands, and benefits of the

project have been explained to me. I understand that I may ask questions and that I am a volunteer who is free to withdraw from the project at any time without any consequences.

- ○ I am 18 years old or older and agree to voluntarily take part in this study
- ○ I am not 18 years or older and/or do not agree to voluntarily take part in this study

Do you own a smartphone?

- ○ Yes
- ○ No

Are you enrolled in college classes?

- ○ Yes
- ○ No

For the purpose of this survey, nature-based recreation (NBR) is defined as outdoor recreation that is focused around, and conducted in, aspects of nature or the natural environment.

During your last nature-based recreation experience, did you have a smartphone with you?

- ○ Yes
- ○ No

While participating in nature-based recreation, approximately how much time do you actively use your smartphone (actions that involve looking at the screen)?

- ○ None at all
- ○ A little
- ○ A moderate amount
- ○ A lot
- ○ A great deal

While participating in nature-based recreation, approximately how much time do you spend passively using your smartphone (i.e. smartphone in use but doesn't involve looking at the screen, e.g. listening to music, tracking apps, etc.)?

- ○ None at all
- ○ A little
- ○ A moderate amount
- ○ A lot
- ○ A great deal

Do you know how to use a map and compass?

- ○ Yes
- ○ No

If yes, how likely are you to use a map and compass

- ○ Extremely unlikely
- ○ Somewhat unlikely
- ○ Neither likely nor unlikely
- ○ Somewhat likely
- ○ Extremely likely

While navigating in the outdoors, which method do you prefer to use?

- ○ Map and compass
- ○ Map application/GPS

What map or tracking apps do you use? (list all that apply)

_____

Have you used your smartphone to call for help?

- ○ Yes
- ○ No

Do you carry another type of camera besides your smartphone?

- ○ Yes
- ○ No

For each of the following statements, please rate how likely you are to participate in the following activities while partaking in nature-based recreation (NBR) using the following scale:
1=Extremely Unlikely, 2=Unlikely, 3=Neutral 4=Likely, 5=Extremely Likely

	Extremely unlikely	Somewhat unlikely	Neither likely nor unlikely	Somewhat likely	Extremely likely
Carry your smartphone	○	○	○	○	○
Use your smartphone	○	○	○	○	○
Answer or respond to a call	○	○	○	○	○
Read a text or email	○	○	○	○	○
Respond to a text or email	○	○	○	○	○
Make a call or send a text or email	○	○	○	○	○
Use a map application to plan your NBR activity	○	○	○	○	○
Use a map application while engaged in NBR	○	○	○	○	○
Use a tracking application (such as Strava) to track distance or route	○	○	○	○	○
Check the weather/radar before the activity	○	○	○	○	○
Check the weather/radar during the activity	○	○	○	○	○
Actively check in or share your location with others	○	○	○	○	○
Use your smartphone to call for help	○	○	○	○	○
Use your smartphone to take pictures	○	○	○	○	○

Use your smartphone to record video	○	○	○	○	○
Listen to music (headphones or speaker)	○	○	○	○	○
Check social media	○	○	○	○	○
Post to social media during participation	○	○	○	○	○
Watch a video/movie	○	○	○	○	○
Read a book or article on your smartphone	○	○	○	○	○
Use identification apps (plants, animals, constellations, etc.)	○	○	○	○	○

Pertaining to your personal use, please rate how the following statements either diminish or enhance your nature-based recreational experience using the following scale:
1=Greatly diminishes, 2=Diminishes, 3=Neutral 4=Enhances, 5=Greatly enhances

	Greatly diminishes	Diminishes	Neutral	Enhances	Greatly enhances
Using a smartphone	○	○	○	○	○
Being able to call, text, or email	○	○	○	○	○
Using map apps to plan your activity	○	○	○	○	○
Using map apps during your activity	○	○	○	○	○
Using self-tracking apps (such as Strava)	○	○	○	○	○
Taking pictures	○	○	○	○	○

Listening to music	○	○	○	○	○
Actively using social media	○	○	○	○	○
Watching videos or movies on your smartphone	○	○	○	○	○
Using identification apps	○	○	○	○	○
Checking weather or radar	○	○	○	○	○
Being able to contact others for rescue or feeling safe	○	○	○	○	○
Added sense of safety provided by having a smartphone with you	○	○	○	○	○

Pertaining to other's use, please rate how the following statements either diminish or enhance your nature-based recreational experience using the following scale:
1=Greatly diminishes, 2=Diminishes, 3=Neutral 4=Enhances, 5=Greatly enhances

	Greatly diminishes	Diminishes	Neutral	Enhances	Greatly enhances
Using a smartphone	○	○	○	○	○
Answering calls, text, or emails	○	○	○	○	○
Taking pictures	○	○	○	○	○
Taking pictures of you	○	○	○	○	○
Listening to music on headphones	○	○	○	○	○
Listening to music on a speaker	○	○	○	○	○
Actively using social media	○	○	○	○	○

How old are you (in years)?

_____

What is your intended field of study?

_____

What is your gender identity?

- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Prefer not to say

How many hours a week do you participate in nature-based recreation?

_____

How many years have you participated in nature-based recreation?

_____

What forms of nature-based recreation do you participate in (select all that apply).

- Hiking
- Backpacking
- Camping
- Rock climbing
- Ice climbing
- Canoeing
- Kayaking
- Rafting
- Biking
- Nordic Skiing
- Alpine skiing
- Fishing
- Hunting
- Geocaching
- Horseback riding
- Surfing
- Nature/wildlife viewing
- Photography
- Mountaineering
- Slacklining
- Other (please specify) _____

What was the last form of nature-based recreation you participated in?

_____

When was the last time you participated in nature-based recreation?

- ○ Within the last twenty-four (24) hours
- ○ Within the last seven (7) days
- ○ Within the last year
- ○ Within the past three (3) days
- ○ Within the last month
- ○ More than a year ago

Identify your employment within the field of nature-based recreation

- ○ Currently employed
- ○ Employed within the last six (6) months
- ○ Previously employed, more than six (6) months ago
- ○ Never employed