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Patient experience in the digital age: An investigation into the effect of generational cohorts

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ABSTRACT

This research examines how patient experience is affected by various generational cohorts’ perceived ease of use and usefulness of healthcare patient portals and how this experience, in turn, shapes cohort technology use. Results suggest that digital technology needs to be designed and implemented with cohorts in mind. This study complements research in digital technology and customer experience by highlighting the relevance of generational cohort differences, that is whether they adopted digital technology (i.e., Generation X) or always had digital technology, (i.e., Millennials) on a patient’s experience.

1. Introduction

Globally, healthcare is listed amongst the most expensive, complex, and critical services that significantly affects economies worldwide and the quality of peoples’ lives (Berry and Bendapudi, 2007). Healthcare touches everyone at some point in their life, thereby instilling the perception that it is the backbone of individual and societal wellbeing (Danaher and Gallan, 2016). As such, the World Health Organization calls for more people-centered health services (WHO, 2016). This is directly in line with the view of healthcare shifting beyond “What is the matter with the patient?” to “What matters to the patient?” (Barry and Edgman-Levitan, 2012). Emerging digital technologies offer immense opportunities for healthcare, but the potential of these technologies in the era of people-centered care remains unfulfilled (Kellermann and Jones, 2013). Thus, understanding how new technologies are affecting the patient’s digital experience is of paramount importance for a number of reasons. First, healthcare costs in the United States are growing at an alarming rate, with recent estimates projecting an increase from $3.5 trillion in 2017 to $6 trillion by 2027 (O’Brien, 2019). There is also a greater reliance on telehealth. This reliance is especially apparent in light of the COVID-19 pandemic as people across the globe are advised to physically distance themselves from others, including those that are capable of helping them, such as healthcare workers (Augenstein, 2020).

In addition, there is an inherent need for digital measures in light of the shortage of medical professionals around the world (Liu et al., 2017).

Digital technology can arm patients with information that gives them the ability to be in greater control of their healthcare. For example, a healthcare patient portal (HCPP) is a secure website that provides patients convenient access to personal health information (e.g., recent doctor visits, medications, lab results) and the ability to communicate with healthcare providers securely, request prescription refills, schedule non-urgent appointments, make payments, among other features (HealthIT, 2019). Though digital technology can empower patients, it can also alter their overall experience (Bolton et al., 2018), which, in turn, will affect their usage. Hence, managers and policymakers need to recognize and better understand how patients perceive and experience these technologies (Larivière et al., 2017).

A largely neglected research area in better understanding the patient experience and, in turn, behavior (i.e., usage of digital technology) is the role of age. Age-related literature streams suggest that individuals become more emotional, less functional, and more reliant on others’ help and companionship as they get older (Charles and Carstensen, 2007; Carstensen et al., 2006). We also know that patients’ involvement (e.g., using preventive care, digital health use, decision making) in healthcare varies by generational cohort. This is in line with Generational Cohort Theory’s (Inglehart, 1977) premise that people born...
during specific time periods go through similar life experiences and, consequently, share similar values and beliefs, setting them apart from other generational cohorts. For instance, Gen Xers (born between 1961 and 1981) identify themselves as the chief health decision-makers in their families (NHWS, 2017), making high-impact health decisions, not only for themselves but also for their aging parents (i.e., baby boomers born between 1943 and 1960) and teenage children (i.e., Gen Z born after 2000). Millennials (also known as Generation Y - born between 1982 and 2000), on the other hand, are labeled the most “health-conscious generation” (The Halo Group, 2019), heavily relying on technology (Harvard Pilgrim Health Care, 2019) and social media (Bolton et al., 2015) to address their healthcare needs. As such, we posit that these generational differences should be further explored when studying patient experiences.

We propose that ignoring generational differences in how individuals perceive and experience digital technology in a healthcare context would be a serious oversight and could lead to flawed generalizations. To address these gaps in the literature, our research considers the role of patients’ shared formative experiences, suggesting that their collective experiences as they age will affect future experiences and behavior. Thus, the purpose of this research is to investigate how a patient’s experience and, in turn, usage of digital health technology varies by the potential differences across generational cohorts.

Building upon the Generational Cohort Theory and technology acceptance research (Davis et al., 1989; Venkatesh and Davis, 2000; Venkatesh and Bala, 2008; Venkatesh et al., 2003), we develop a conceptual model that explains potential differences in a patient’s digital experience across different generational cohorts. The results of a nationwide study show that perceived ease of use and usefulness of digital technology have a larger impact on the digital health experience for the Generation X cohort as compared to Millennials.

This study makes three notable contributions. First, we contribute to the experience and age-related literature streams. Specifically, we show how patient experiences with healthcare technology are shaped by perceptual differences based on the generational cohort. Specifically, we propose that a patient’s perception and experience with digital technology will vary by whether they, as a cohort, adopted digital technology (i.e., Generation X) or always had digital technology (Prensky, 2001) (i.e., Millennials). Considering how one’s age affects one’s digital health experience and usage is especially important in light of the elusive “generation gap” that plagues technology usage. That is the varied way technology is adopted and used by a generational cohort. Second, our research sheds light on attitudes and behavior in a unique service context (i.e., healthcare), where more research is needed (Berry and Schwager, 2007). Finally, we provide practical managerial implications to healthcare professionals and technology designers for better technology development and implementation, which can positively affect the healthcare experience and, in turn, its usage.

This article is structured as follows. We first review the extant literature relevant to this study, followed by the development of research hypotheses. We then report the findings of an empirical study conducted to test the proposed hypotheses. Finally, we conclude by presenting the main conclusions, limitations, and suggestions for future research.

2. Conceptual background & research hypotheses

2.1. Customer experience

Research on customer experience has been growing exponentially (e.g., Kranzbuehler et al., 2018) and is currently a top priority of business executives globally (Imbof and Klaus, 2019). The customer experience concept was first introduced by Holbrook and Hirschman (1982), who suggested that consumers are not always rational in their decision-making processes and, as such, emotions, feelings, and their subconscious affect their consumption behavior. From the age-related literature streams, we know that emotions and feelings change over time (e.g., Carstensen and Mikels, 2005; Carstensen et al., 2000). We also know that consumer behavior changes over time (Kuppelwieser et al., 2014; Kuppelwieser and Klaus, 2020). In the same vein, we argue that patients’ (i.e., healthcare customers) experiences change over time, resulting in differences in generational cohort behaviors.

Numerous holistic definitions of customer experience have been proposed. For example, De Keyser et al. (2015, 15) define customer experience as “the cognitive, emotional, physical, sensorial, and social elements that mark the customer’s direct or indirect interaction with a (set of) market actor(s).” Similarly, customer experience is defined as any contact with a service provider, brand, or product, across multiple touchpoints during the entire customer journey (Bolton et al., 2014; Meyer and Schwager, 2007). A touchpoint refers to any verbal or nonverbal occurrence between an individual, a firm, or a brand (He et al., 2017). With the advent of digital health technology, new touchpoints, and, therefore, experiences are being created. Whereas traditional encounters were centered around face-to-face interactions between service customers and providers (Bitner et al., 1990), through the growing infusion of frontline service technology, today’s consumers have been afforded the opportunity to have numerous and novel touchpoints with their service providers (De Keyser et al., 2019), thereby lending itself an apt context to study patients’ digital health experience.

2.2. The digital health experience

Within the healthcare setting, there is an increased focus on the notion of “patient experience.” The Beryl Institute defines the patient experience as “the sum of all interactions, shaped by an organization’s culture, that influence patient perceptions across the continuum of care” (The Beryl Institute, 2019). Two key developments mainly drive the increased interest in the patient experience: First, the latest shift in public policy emphasizes the importance of the patient experience to receive federal reimbursements and incentives (Center for Medicare and Medicaid Services, 2018; Doran et al., 2017). Second, the emergence of engaged and well-informed patients and family members who are more involved and engaged in their healthcare decisions (Barello et al., 2012). As such, patient experience has become a top priority for healthcare managers (Wolf, 2017). Despite being a research priority, the term “patient experience” is still at its infancy in both research and practice and therefore requires further exploration. Given the recent developments in the field of customer experience and service technology, this paper adopts a multidisciplinary perspective by bridging the fields of service and healthcare to better understand the patient’s experience in the digital age.

Digital healthcare is a broad term, including categories such as mobile health (mHealth), health information technology (IT), wearable devices, telehealth and telemedicine, and personalized medicine (FDA, 2019). Additional emerging technologies are likely to be included, such as new applications of artificial intelligence for diagnostic purposes, robotic medical assistants, virtual-reality medical visualization systems, and a whole slate of similar products (Deloitte, 2019). For the purposes of this paper, we conceptualize “digital health” as the use of technology to either replace or complement existing interactions within healthcare between a patient and healthcare provider. As a medium that offers multiple touchpoints to shape the customer journey, we focus on HCPPs. By providing immediate access to health information at anytime from anywhere with an Internet connection, HCPPs are designed to empower patients while also improving communication between patients and providers (HealthIT, 2019). Despite the seemingly positive outcomes of HCPP implementation, research shows that, while some patients desire more information than provided, others suffer from information overload, miscommunication, or misinterpretation of sensitive information, and a multitude of technical issues (O’Leary et al., 2016). Furthermore, Ariens et al. (2017) state that patients are worried about reduced
personal contact with the healthcare provider and are increasingly alarmed about the security, privacy, and transparency of digital healthcare. These conflicting views and outcomes offer a rich ground to explore the impact of HCPPs on a patient’s digital health experience and subsequent behavior.

2.3. Perceived usefulness and ease of use

With respect to technology infusion, much of the academic research has focused on users’ acceptance and adoption, which primarily focuses on enablers or the positive antecedents of technology adoption; e.g., Technology Acceptance Model (TAM) (Davis et al., 1989), the TAM2 (Venkatesh and Davis, 2000), the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003) and the TAM3 (Venkatesh and Bala, 2008). These models assume that an individual’s technology acceptance is determined primarily by the individual’s (1) perceived usefulness and (2) perceived ease of use of that technology.

Consumers’ decision on whether they will use technology depends on whether they believe that it is useful in that it will help make a task better or easier to complete (Davis, 1986). Davis (1989, 320) defines perceived usefulness, a core construct of the TAM, as “the degree to which a person believes that using a particular system would enhance his/her job performance.” It includes aspects such as the efficiency of the experience, the level of productivity of the experience, and whether or not it can enhance the user’s effectiveness during the experience. Perceived usefulness has been shown to positively influence consumers’ online attitude and behavior, such as online loyalty (Caruana and Ewing, 2010), online shopping (Gefen et al., 2003), as well as online brand experience (Morgan-Thomas and Veloutsou, 2013). In a healthcare context, perceived usefulness was found to be an important construct in many instances including the acceptance of Web-based electronic medical records (Liu and Ma, 2006), physician acceptance of telemedicine technology (Chau and Hu, 2002; Hu et al., 1999), adoption of M-Health (Wu et al., 2007, 2011), and Internet-based health applications (Chrisman and Wiley-Patton, 2003).

Perceived ease of use, on the other hand, represents the degree to which a person believes that using a particular system would be free of effort (Davis, 1993). It has been found that perceived ease of use affects perceived usefulness, which means that if users feel the system (i.e., HCPP) is easy to use, they will feel that it is more useful and will subsequently be more likely to use the technology. A number of empirical studies have demonstrated the relationship between these two constructs (e.g., Davis, 1993, 1989; Venkatesh and Davis, 1996; Raza et al., 2017; Smith et al., 2014).

Despite the established links between perceived usefulness and perceived ease of use, not everyone perceives their healthcare experience in the same way, particularly when it comes to interacting with technology (Shannon-Missal, 2014; Patrick, 2016). From prior research, we know the important role generational differences play in areas such as workplace values and beliefs (Smola and Sutton, 2002), leadership style and organizational success (Salahuddin, 2010), and customer shopping orientation (Brosdahl and Carpenter, 2011). For example, problems attributed to generational differences have been shown to hinder effective and efficient collaboration between healthcare leaders and the workforce (Stanley et al., 2007). Despite the established generational differences, research on healthcare technology largely ignores these differences. The majority of studies on digital health rarely consider age in general and generational cohorts in particular. Drawing from these findings, we argue that there is a need to understand how different generations perceive their healthcare experience within a digital context. To do so, we refer to the Generational Cohort Theory.

2.4. Generational Cohort Theory

Coined by Inglehart (1977), Generational Cohort Theory was commonly used by academics and practitioners alike to segment markets (Tsui, 2001). The main premise of this theory is that people born during specific time periods go through similar life experiences and, therefore, share similar values and beliefs, setting them apart from other generational cohorts. These in-group similarities affect members’ attitudes and behaviors regarding career, money, orientations, and life priorities (Chen and Choi, 2008). Strauss and Howe (1991) explain that a generation is defined by the years of birth, usually extending 20–25 years, where the members of the cohort are born, raised, and start having children of their own. Subsequently, Strauss and Howe (1991) categorized the US population into four cohorts: the Silent Generation (also referred to as the Matures or Veterans - born between 1925 and 1942), the baby boomers (known as Boomers - born between 1943 and 1960), the 13th Generation (known commonly as Generation X (Gen X) - born between 1961 and 1981), and the Millennial Generation (also known as Generation Y - born between 1982 and 2000). The next generation proposed is Generation Z (Gen Z), the demographic cohort succeeding Millennials, with birth years starting in the late 1990s and early 2000s. Although this classification has seen a number of iterations and revisions (see Brosdahl and Carpenter, 2011; Olson, 2008), there is no agreement on the concrete start and endpoint of each cohort. Nevertheless, key definitions and distinctive characteristics have been mostly agreed upon and are used as a generic roadmap both in academia and practice to study different cohorts.

This study focuses primarily on the Generation X and Millennial cohorts. Our reasoning for this focus is four-fold. First, we wish to better understand how experience and behavior vary between those who adopted digital technology (i.e., Gen X) versus the Digital Natives (i.e., Millennials) (Prensky, 2001), those who always had the technology. Second, the focus must be placed on those who identify themselves as the chief health decision-makers in their families (i.e., Gen Xers) (NHWS, 2017), making high-impact health decisions, not only for themselves but also for their aging parents (i.e., baby boomers) and teenage children (i.e., Gen Z). Third, we believe the focus must be placed on Millennials due to the sheer size of the group (73 Million; Pew Research Center, 2018), making it the largest living generation in the United States. Finally, by opting to compare these two generations, we are taking a forward-thinking approach to the future of healthcare provision, as Millennials and Gen Xers are, or will be, the future thought leaders around the world, which will afford managerially relevant practical implications.

2.4.1. Generation X

Generation X (Gen Xers) grew up with financial, family, and societal insecurity (Smola and Sutton, 2002). They were the first generation to grow up in homes where both parents worked or with only one parent due to higher divorce rates (Kupperschmidt, 2000). Family, religion, and government support programs were weak during their formative years. These experiences resulted in the development of key characteristics of this group, including being self-reliant, informal, cynical, not intimidated by authority, rules, and the chain of command, and are subsequently mistrustful of institutions (Thielfold and Scheef, 2005).

Generation X grew up with the rapid advancement of technology. This generation is largely responsible for the explosion of personal computers, videogames, and unlimited access to information as they were the first adopters of the Internet, which became available to the public in 1992 (Brosdahl and Carpenter, 2011). Since the majority of Gen Xers are currently at a stage in their life where they are working and raising a family simultaneously, convenience is a highly sought-after benefit. According to a report by the Convenience Store News (Swain–Wilson, 2018), Generation X is more likely to buy products from online retailers, such as Amazon, than any other generation due to their busy and hectic schedules. Generation X’s need for convenience has led to their preference for email marketing, over other marketing agents, with promotional content that gets “straight to the point” (Bedgood, 2019).

On the health front, Gen Xers are the first generation to grow up in the Internet-available health information age. They are also the first to
experience direct-to-consumer advertising for prescription drugs and the resulting consumer activism in healthcare. They witnessed the spreading of AIDS and the opioid crisis. As a result, they tend to be less passive and more skeptical towards healthcare systems than the generations that preceded them (O’Connor, 2017). Their skeptical nature motivates them to look for a variety of sources for information, including family members, co-workers, doctors, pharmaceutical company websites, medical journals, television programs, news websites, and books, more so than Millennials, who want quick answers and instant gratification. While Gen Xers tend to be mistrustful, they also tend to trust their physicians more so than Millennials (NHWS, 2017). Finally, Gen Xers prefer communication that is more transparent, more immediate, and more actionable from their healthcare providers. They do not take diagnosis for granted and want evidence-based recommendations. Even though they rely on the Internet to gather health information, Gen Xers are concerned about their privacy and security and still believe that doctors are the preferred source of information about keeping themselves and their loved ones healthy when compared to Millennials (O’Connor, 2017).

### 2.4.2. The Millennials

According to the research by Brookings Institution demographer William Frey (2018), Millennials are considered the most educated and diverse cohort. Key characteristics of this generation include being independent, entrepreneurial, economically optimistic, culturally skilled, globally oriented, demonstrating positive social habits, and valuing diversity (Winograd and Hais, 2014; Martin, 2005; Brosdahl and Carpenter, 2011; Howe and Strauss, 2000; Pew Research Center, 2014). This cohort also tends to be more impatient and has a desire for instant gratification resulting in being known as the “want it all” and “want it now” generation (Ng et al., 2010). They have also been called “Generation Whine” for being over-indulged and protected (Hershatter and Epstein, 2010). Many have attributed some of these negative characteristics to the fact that Millennials grew up with social media and consumer-centric technology (Kaifi et al., 2012).

Millennials are the first generation to grow up with the Internet – allowing limitless access to information and connectivity. They, consequently, earned the title of “Digital Natives” (Prensky, 2001). Bolton et al. (2013) stress the fact that Millennials were heavily exposed to technology at an early age, making them social media savvy and prone to relying on technology for entertainment and communication. As such, they have been labeled as the “look at me” and the “Me” generation; they commonly share “selfies” and their personal life on social media, as such being criticized for being overly self-confident, narcissistic, and self-absorbed (Stein, 2013). Millennials also tend to be more comfortable with technology when compared to Generation X (Pew Research Center, 2017) and know how to solve problems and shorten the learning curve using collaboration tools.

On the health front, Millennials are labeled the most “health-conscious generation” (The Halo Group, 2019), heavily relying on technology and social media (Bolton et al., 2013) to address their healthcare needs. Moreover, 74% say that they would rather see a doctor through telemedicine than in person (Harvard Pilgrim Health Care, 2019). Millennials’ ease with and reliance on technology (Bolton et al., 2013) has granted them unprecedented access to health-related information coupled with their quick adoption of health-related technology such as fitness trackers and healthcare apps. Nevertheless, their impatient nature leads them to want instant feedback and replies. Thus, this group relies heavily on technology apps for communication with their healthcare providers (e.g., appointments, confirmations, test results).

Based on the above analysis of the constructs and Generational Cohort Theory, we argue that the extent to which patients’ experience with digital healthcare technologies (i.e., HCPPs) is affected by characteristics of the technology may vary amongst generational cohorts. Specifically, we build on the Millennials’ aspect of being “Digital Natives” and propose that Gen Xers are more affected by perceived ease of use and usefulness because digital technology is not innate to them as they did not grow up with these technologies. Therefore, their level of comfort with these technologies will be less when compared to Millennials. Also, due to Millennials’ ease with technology, their sensitivity to the ease of using these technologies will be less. Similarly, the perceived usefulness of the technology will likely have a stronger impact on the experience of Gen Xers when compared to Millennials primarily due to their approach to the healthcare system, tending to be less passive and more critical (O’Connor, 2017). Therefore, we propose the following moderating effects:

**H1.** The effect of perceived ease of use of digital health technology (i.e., HCPPs on its’ perceived usefulness varies between Generation X and Millennials, such that this relationship will be stronger for the Generation X cohort than for Millennials.

**H2.** The effect of perceived usefulness of digital health technology (i.e., HCPPs) on patients’ digital experience varies between Generation X and Millennials, such that this relationship will be stronger for the Generation X cohort than for Millennials.

**H3.** The effect of perceived ease of use of digital health technology (i.e., HCPPs) on patients’ digital experience varies between Generation X and Millennials, such that this relationship will be stronger for the Generation X cohort than for Millennials.

### 2.5. Behavior

Although healthcare customers are encouraged to use an HCPP, most still have the option to communicate with their providers in more traditional ways. For instance, a patient can still call a clinic to schedule an appointment or to receive test results. They can also choose not to upload or view sensitive information (e.g., images of a physical ailment) online, but rather go to the office/clinic in person to meet with a doctor face-to-face for a physical examination or discussion of test results. In this way, the individual would not be using the HCPP to its fullest potential. As favorable prior experiences with a service provider have been shown to enhance customer loyalty (Reichheld, 1996), it can be argued that patients’ experiences with HCPPs will directly influence their behavior, that is, their usage frequency of the HCPP. We further argue that this effect will vary by one’s generational cohort (i.e., Gen X versus Millennials). As detailed above, prior research showed that Gen Xers and Millennials have different attitudes, preferences, and usages of technology. Specifically, given that Millennials tend to be more confident and comfortable with using digital technologies (i.e., Digital Natives) than the Generation X cohort, which tends to be rather reluctant in using digital technologies to manage health-related issues, their behavior might be less affected by their experience with HCPPs when compared to Gen X. Thus, we propose:

**H4.** The effect of patients’ experience with digital health technology (i.e., HCPPs) on usage varies between Generation X and Millennials, such that this relationship will be stronger for the Generation X cohort than for Millennials.

Fig. 1 summarizes all the hypotheses in a conceptual model.
3. Method

3.1. Data collection and sample characteristics

We conducted a national online survey on U.S. customers' perceptions of their experience with HCPPs to test our conceptual model. A third-party research vendor that utilizes a panel for consumer research purposes administered the survey. Respondents were informed that the goal of the research was to understand how digital health technology, specifically HCPPs, relates to digital healthcare experiences. In sum, we collected 268 responses, 138 responses from Generation X participants born, and 130 responses from Millennials participants.

3.2. Survey measures

All scales used in this survey to capture the model constructs were adapted from existing literature (see Table 1). Specifically, we measured perceived ease of use and perceived usefulness with items proposed by Davis (1989) on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Patients’ digital experience was assessed using a scale from Verleye (2015). Finally, we captured participants’ usage frequency on a seven-point scale with higher values indicating less frequent use and reversed this measure for our analyses. The questionnaire was pre-tested on a sample of 30 individuals prior to field administration for validation purposes.

3.3. Evaluation and adjustment of measurement models

The measurement, as well as structural parameters, were tested using partial least squares (PLS; Ringle et al., 2015). For our estimation, we used 5,000 bootstrap samples (Hair et al., 2017). We assessed our measurements by examining individual item reliabilities as well as convergent and discriminant validity (see Hair et al., 2017 for an overview). As shown in Table 1, we removed three items from further analysis because the loadings on their respective constructs did not reach the critical value of 0.7. Both composite reliability (CR ≥ 0.7) and average variance extracted (AVE ≥ 0.5) of all model constructs surpassed their critical values. As depicted in Table 2, discriminant validity can be confirmed because the highest squared correlation between the model constructs (all squared correlations ≤ 0.268) did not exceed the lowest AVE value (all AVEs ≥ 0.668; Fornell and Larcker, 1981) and all heterotrait-monotrait (HTMT) ratios of construct correlations were smaller than 0.85 (Henseler et al., 2015; all HTMT values ≤ 0.635).

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**Table 1**

| Model Constructs and Indicators | Loading | t-value |
|--------------------------------|---------|---------|
| **Perceived Ease of Use (CR = .861; AVE = .675)** | | |
| Learning to use the Healthcare Patient Portal would not be easy for me. (r) | .781 | 17.128 |
| I would find it easy to get the Healthcare Patient Portal to do what I need in my patient care and management of my health. (r) | Eliminated | |
| I find the Healthcare Patient Portal inflexible to interact with. (r) | .773 | 17.400 |
| It is not easy for me to become skillful in using the Healthcare Patient Portal. (r) | .904 | 59.466 |
| **Perceived Usefulness (CR = .829; AVE = .618)** | | |
| Using the Healthcare Patient Portal enables me to complete my patient care more quickly (e.g., pay bills, schedule appointments, check test results. | .798 | 21.235 |
| Using the Healthcare Patient Portal does not improve my patient care and management of my health. (r) | Eliminated | |
| Using the Healthcare Patient Portal increases my participation in my own care. | Eliminated | |
| Using the Healthcare Patient Portal makes my patient care and management of my health easier. | .787 | 21.557 |
| I do not find the Healthcare Patient Portal useful for my patient care and management of my health. (r) | .773 | 20.727 |
| **Patients’ Digital Experience (CR = .923; AVE = .800)** | | |
| How would you describe your overall experience with the Healthcare Patient Portal that you are currently using? | | |
| Dissatisfactory - Dissatisfactory | .878 | 43.758 |
| Negative - Positive | .898 | 42.693 |
| Poor - Excellent | .908 | 58.351 |
| **Usage Frequency** | | |
| On average, how often do you access the Healthcare Patient Portal? | – | – |

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U.S. customers were selected for our study as HCPPs have become a requirement for healthcare organizations seeking federal incentives (Center for Medicare and Medicaid Services, 2018). Only respondents who were 18 years of age and older and currently use a HCPP qualified for participation in this survey. Participants were informed that a HCPP, such as Epic My Chart, My Chart, Allscripts, and Next Gen, is a form of technology-enabled healthcare platforms used by patients and healthcare providers to communicate information online. Respondents were told a HCPP is a tool where they could complete forms on line, communicate with healthcare providers, request prescription refills, pay bills, review lab results, or schedule medical appointments.
Table 2
Construct correlations.

| Model Constructs                  | 1  | 2  | 3  | 4  |
|-----------------------------------|----|----|----|----|
| (1) Ease of Use                   | .268|    |    |    |
| (2) Perceived Usefulness          | .518| .268|    |    |
| (3) Patients' Digital Experience  | .240| .484| .234|    |
| (4) Usage Frequency               | -.233| .034| .077| .054|
|AVE                               | .675| .018| .800| -  |
|Highest HTMT value                | .663| .663| .635| .266|
|R²                                | .268| .292| .254| .083|
|Q²                                | .151| .184| .068|    |

Note: Italic numbers on the diagonal represent highest squared correlation with another variable.

3.4. Structural model evaluation and hypotheses tests

To evaluate the model’s quality on the structural level, we examined coefficients of determination (R²) of the endogenous constructs and the model’s predictive relevance (Q²; Hair et al., 2017; see Table 3). R²-values ranged from 0.083 (usage frequency) to 0.292 (perceived usefulness), indicating that other variables, apart from patient experience, may explain this construct to a significant extent. Nonetheless, the model had predictive relevance (all Q² values ≥ 0.068).

In order to test the hypothesized effects, we first estimated the conceptual model using the total sample, including both generational cohorts, Gen X and Millennials, and examined the proposed moderating effects of generation through interaction effects (Model 1). To better understand the detected interactions, we then estimated the basic model for each of the two-generation cohorts separately (Models 2 and 3).

As shown in Table 3, we found that generational cohort moderated the relationship between ease of use and perceived usefulness (β = -.148, t = 2.519, p < .05). In line with H1, this relationship was stronger for Generation X respondents (β = .594, t = 9.640, p < .01) than for Millennial respondents (β = .491, t = 6.262, p < .01). Consistent with H2, we found a significant interaction effect between perceived usefulness and generation on patients’ experience (β = -1.52, t = 2.218, p < .05), such that the relationship between usefulness and experience was stronger for Generation X respondents (β = .629, t = 7.017, p < .01) than for Millennial respondents (β = .305, t = 2.377, p < .05). Furthermore, as proposed in H4, the interaction effect of patient experience on usage frequency is statistically significant (β = -1.36, t = 2.268, p < .05). Specifically, while the frequency to which Gen X patients use the portal is determined by patients’ experience (β = .199, t = 2.263, p < .05), this relationship was not significant in the Millennial cohort (β = -.086, t = .925, p = .36). Finally, contrary to our prediction in H3, the relationship between ease of use and patient experience was not different between Gen X and Millennials. In addition to the described effects, we also found a significant effect of generation on usage frequency (β = .243, t = 4.248, p < .01) indicating that HCPPs are more frequently used by the Millennial cohort when compared to Generation X.

4. Discussion

This study compares patients’ digital experience across two different generational cohorts (Generation X and Millennials) (Strauss and Howe, 1991) and extends past research on customer experience (e.g., De Keyser et al., 2015) by empirically showing that the dependence of digital healthcare experiences upon technology characteristics varies by generational cohort. In support of H1, our results suggest that there is a stronger link between perceived ease of use of digital technology and its usefulness for Generation X respondents when compared to Millennials. This is in line with the age-related literature streams suggesting that Gen Xers, although familiar with technology, require technology training as their individual comfort levels differ when compared to Millennials. Whereas Millennials, the generation that has always had digital technology, have an unprecedented ease with health-related technology and know how to solve problems and shorten the learning curve resulting in less questioning of the perceived ease of use of such technology.

Similarly, in accordance with H2, the usefulness of the technology has a bigger impact on the experience of Gen Xers when compared to Millennials. This finding could be explained by the skeptical nature of Gen Xers, who tend to be less passive and more critical of healthcare systems (O’Connor, 2017). As such, they need to see concrete positive results from using this technology. This finding supports prior research suggesting that Gen Xers want better communication that is more transparent, more immediate, and more actionable from their healthcare providers.

However, the proposed difference in the strength of the direct relationship between ease of use and healthcare experience across these generational cohorts is not supported (H3). Thus, only the indirect effect of ease of use on digital experience through perceived usefulness is affected by generational cohort.

Finally, in accordance with H4, our results show that Millennials tend to use HCPPs more often than Gen Xers and that their use of such technologies is independent of experience. This can be explained by the reluctant nature of Gen Xers, as they tend to choose other means of communication with their healthcare provider, seek different informational sources, and are not fully dependent on the technology. Whereas
Millennials, who want quick answers and instant gratification, will continue to rely heavily on technology to address their healthcare needs, regardless of their experience.

In addition to our contributions to the literature, findings from this study provide new directions for technology designers and healthcare providers to pursue in their effort to enhance the patient’s experience. Our findings suggest that it is highly important to manage digital healthcare experiences for Gen X patients because their usage of HCPPs is determined by their experience with the technology. We invite technology designers to consider the various ages and generational cohorts of patients when designing specific features of HCPPs. It is perhaps wise to keep generational cohorts in mind when designing HCPPs, especially for those cohorts who had to adopt digital technology (i.e., Gen Xers) as compared to those who always had it (i.e., Millennials). The finding that the relationships between perceived ease of use, usefulness, and digital healthcare experiences are stronger for Gen X patients indicates that these two technology characteristics (i.e., ease of use and usefulness) constitute important parameters in driving and, thus, managing digital healthcare experiences of Gen X patients.

Nevertheless, albeit we encourage technology designers to keep generational cohorts in mind, this can pose a challenge as most technology designers are Millennials, and they are designing technology with Millennials in mind (Morry and Schoop, 2015). Not only is this resulting in a backlash from a number of researchers claiming that age variations do not matter and are old fashioned stereotypes, but most importantly, it is resulting in “excluding” the rest of the population (Barrett and McCarthy, 2019). We stress that generational cohorts should not be used to “exclude” but rather to “include” various types of customers. Knowing generational differences should help designers consider the many rather than the few. This is in line with the idea of “service inclusion” (Fisk et al., 2018), calling for designing technology that overcomes the digital divide and ensures service inclusion rather than service exclusion for all types of customers.

In addition, as more technology is being infused at the frontline, we are witnessing many organizations opting for a total replacement of various communication channels and relying solely on frontline technology. As such, we stress the need for healthcare providers to offer patients a choice in a communication channel, giving them the right to decide how to manage their healthcare experiences, as people vary in their communication and technology preferences.

5. Limitations and directions for future research

There are several limitations to this study. Specifically, this research considers only two generational cohorts living in the United States. Prior research shows that cohort groups living in various countries experience different events in their formative years; as such, the cohort groups’ values, attitudes, behaviors, and cultures/sub-cultures in other countries may be different than those found in the U.S. (Fam et al., 2008). Therefore, future research that looks at variations in healthcare experience by generational cohort should consider other countries, cultures, and cohorts in their analysis.

In addition, although our findings document key differences between the two-generational cohorts of interest, we make no assumptions regarding the dynamic nature of healthcare experiences. Thus, for a more conservative test of potential changes over time, we encourage future research to study the development and evolution of patients’ digital experiences by employing a longitudinal study design.

Furthermore, in any study of group differences, there will always be outliers and exceptions. Certainly, our results will not explain the healthcare experience for every subject within the two chosen cohorts. Rather, the results are generalized based on the average differences between Gen Xers and Millennials. We hope to support previous research on generational groupings, which have proven to be a useful tool in explaining differences among people (Campbell et al., 2015). We encourage future research to consider generational differences to design inclusive solutions and avoid blunt generalizations as generational differences are proven to be real and useful.

Furthermore, in this study, we studied the experience of patients using an HCPP for themselves (i.e., they are the patient). We invite future researchers to look at the experience of users who might not be the patients themselves. For instance, the experience of parents using the portal on behalf of their younger children, older parents, or other dependents. These findings could provide interesting insights for technology designers as well as to healthcare providers when making medical decisions.

Additionally, this study focuses on the patient’s experience with HCPPs, which is just one form of digital health technology. As these technologies continue to emerge and evolve, future studies are encouraged to investigate a wide range of technologies in the healthcare context. For example, future research could consider wearable, implanted, or inserted biosensors that monitor health, artificial intelligence, and robots and how their usage affects the patient experience. Specifically, as stated by Pennie (2019), AI-empowered technology in the healthcare industry can assist in transforming various health processes and improve healthcare delivery around the world. Future research could look into the generational cohort experiences with these AI-empowered technologies. This is particularly important when we are seeing a shortage of healthcare professionals and exorbitant healthcare costs. Case in point, pandemics such as COVID-19, have illustrated the need to focus on digital health technologies to ensure patient access to care.

Further, we want to emphasize the role of ethics and privacy in digital health. We encourage future researchers to consider patients’ concerns related to digital privacy. Specifically, given that different generational cohorts seem to have different levels of expertise and experience with technology, some cohorts might be more vulnerable to information theft or privacy breaches than others. Similarly, different generational cohorts might have different threshold levels of what they wish to share digitally regarding their health. Future studies could look at techniques and tools for enhancing communication and transparency in the implementation and usage of HCPPs while considering the privacy preferences and implications for various cohorts.

Finally, while the use of an online survey provided an effective way to capture samples from both cohorts, other methods of data collection, including multiple and mixed methods, are encouraged. Specifically, we urge future research to consider health experiences amongst generational cohorts from a qualitative perspective. For example, ethnographies and interviews would allow for a more in-depth understanding of patients’ experiences with healthcare technologies.

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References

Ariens, L.F., Schusler-Raymakers, F.M., Frima, C., Flinterman, A., Hamminga, E., Arents, B.W., Bruijnzeel-Koomen, C.A., de Bruijn-Weller, M.S., van Os-Medendorp, H., 2017. Barriers and facilitators to eHealth use in daily practice: perspectives of patients and professionals in dermatology. J. Med. Internet Res. 19 (9).
Augenstein, J., 2020. Opportunities to expand telehealth use amid the coronavirus pandemic. https://www.healthaffairs.org/do/10.1377/hblog20200315.319008/.
Barello, S., Graffigna, G., Vegni, E., 2012. Patient engagement as an emerging challenge for healthcare services: mapping the literature. Nurs. Res. Pract. 2012.
Barrett, C., McCarthy, M., 2019. How to Design Workplaces for Humans, Not Generations. Workdesign Magazine.
Barry, M.J., Edgman-Levitan, S., 2012. Shared decision making — the pinnacle patient-centered care. N. Engl. J. Med. 366 (9), 780–781. https://doi.org/10.1056/NEJMp1109283.
Bedgood, L., 2019. Consumer Shopping Trends and Statistics by the Generation: Gen Z, Millennials, Gen X, Boomers and the Silents. Business 2 Community. https://www.
Gefen, D., Karahanna, E., Straub, D.W., 2003. Trust and TAM in online shopping: an integrated model. MIS Q. 27 (1), 51–65.

HealthIT, 2019. Multigenerational workplace: managing and understanding millennials. Int. J. Bus. Manag. 7 (24), 102221.

Howe, N., Strauss, W., 2000. Millennials Rising: The Next Great Generation. Vintage.

Henseler, J., Ringle, C.M., Sarstedt, M., 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. J. Acad. Market. Sci. 43 (1), 117–136.

Hershatter, Andrea, Epstein, Molly, 2010. Millennials and the world of work: an organization and management perspective. J. Bus. Psychol. 25 (2), 211–223.

Holbrook, M., Hirschman, E.C., 1982. The experiential aspects of consumption: consumer fantasies, feelings, and fun. J. Consumer Res. 9 (2), 152–160. https://doi.org/10.1086/208906.

Hoge, D., 2019. The digital health marketplace: a patient portal. https://www.healthit.gov/fact/what-patient-portal.

Hooi, N., 2015. Service quality and health outcomes: an empirical study. J. Health Serv. Res. Policy 20 (1), 27–34. https://doi.org/10.1258/jhsrp.2014.014031.

Howe, N., Strauss, W., 2000. Millennials Rising: The Next Great Generation. Vintage.

Hu, P.J.H., Chau, P.Y.K., Sheng, O.R.L., Tam, K.Y., 1999. Examining the technology acceptance model using physician acceptance of telemedicine technology. J. Manag. Inf. Syst. 16 (2), 91–112. https://doi.org/10.1080/07421222.1999.11518247.

Ingham, R., 1977. The Silent Revolution: Changing Values and Political Styles Among Western Publics. Princeton University Press, Princeton.

Kaifer, B.A., Nafel, W.A., Khanfar, N.M., Kaifer, M.M., 2012. A multi-generational workforce: managing and understanding millennials. Int. J. Bus. Manag. 7 (24), 1–13. https://doi.org/10.5539/ijbm.v7n24p1.

Keller, R., 2002. Marketing research: methods for effective management. Health Care Manage. Rev. 19 (1), 65–76.

Keller, R., 2012. Customer experience management: an integrated approach. J. Mark. Manag. 28 (10/11), 1037–1054. https://doi.org/10.1080/02672225.2012.712870.

Keller, R., 2012. The role of context and motivation variables in mobile commerce usage — a further perspective on Chong (2013). Technol. Forecast. Soc. Change 88, 156–161.

Kuppelwieser, V.G., Sarstedt, M., Tuzovic, S., 2014. The multilevel nature of customer experience research: an integrative review and research agenda. Int. J. Manag. Rev. 20 (2), 433–456.

Kuppelwieser, V.G., Kaifer, M.K., Tuzovic, S., 2013. Beyond technology acceptance: brand relationships and online brand experience. J. Bus. Res. 66 (1), 21–27. https://doi.org/10.1016/j.jbusres.2012.04.023.

Kraft, L., 2012. Marketing research: methods for effective management. Health Care Manage. Rev. 19 (1), 65–76.
Raza, S.A., Umer, A., Shah, N., 2017. New determinants of ease of use and perceived usefulness for mobile banking adoption. Int. J. Electron. Commer. Relatsh. Manag. 11 (1), 44–65. https://doi.org/10.1108/IJECDM.2017.086751.
Reichheld, F.F., 1996. The Loyalty Effect. Harvard Business School Press, Boston.
Ringle, C.M., Wende, S., Becker, J.M., 2015. SmartPLS 3. Boenningstedt: SmartPLS GmbH. http://www.smartpls.com.
Salahuddin, Mecca M., 2010. Generational differences impact on leadership style and organizational success. J. Divers. Manag. 5 (2).
Shannon-Missal, L., 2014. Majority of americans ready to consider virtual healthcare visits, but concerns do exist. https://www.prnewswire.com/news-releases/majority-of-americans-ready-to-consider-virtual-healthcare-visits-but-concerns-do-exist-283163291.html.
Smith, J.S., Gleim, M.R., Robinson, S.G., Kettinger, W.J., Park, S.H., 2014. Using an old dog for new tricks: a regulatory focus perspective on consumer acceptance of RFID applications. J. Serv. Res. 17 (1), 85–101.
Smola, K.W., Sutton, C.D., 2002. Generational differences: revisiting generational work values for the new millennium. J. Organ. Behav. 23 (4), 363–382. https://doi.org/10.1002/job.147.
Stanley, K.M., Martin, M.M., Michel, Y., Welton, J.M., Nemeth, L.S., 2007. Examining lateral violence in the nursing workforce. Issues Ment. Health Nurs. 28 (11), 1247–1265.
Stein, J., 2013. Millennials: the Me Me Me Generation, pp. 1–8.
Strauss, W., Howe, N., 1991. Consumer Behavior. The Dryden Press, London.
Swain-Wilson, S., 2018. 10 ways Gen Zs spend money differently than their Gen X parents. http://static4.businessinsider.com/gen-z-vs-gen-x-spending-habits-2018-11/#both-generation-x-and-gen-x-tend-to-spend-a-lot-of-money-on-food-1.
The Beryl Institute, 2019. About the Beryl Institute. https://www.theberylinstitute.org/page/About.
The Halo Group, 2019. How Can Your Brand Resonate With Millennial Foodies?.
Thieoldt, D., Schoef, D., 2005. 13th generation and the millennials: what you need to know about mentoring the new generations. Law Pract. Today. November.
Tsui, B., 2001. Generation next. Advert. Age 72 (3), 14–15.
Venkatesh, V., Bala, H., 2008. Technology acceptance model 3 and a research agenda on interventions. Decis. Sci. J. 39 (2), 273–315. https://doi.org/10.1111/j.1540-5915.2008.00192.x.
Venkatesh, V., Davis, F.D., 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. Manag. Sci. 46 (2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926.
Venkatesh, V., Davis, F.D., 1996. A model of the antecedents of perceived ease of use: development and test. Decis. Sci. J. 27, 451–481.
Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D., 2003. User acceptance of information technology: toward a unified view. MIS Q. 27 (3), 425–478.
Verleye, K., 2015. The co-creation experience from the customer perspective: its measurement and determinants. J. Serv. Manag. 26 (2), 321–342. https://doi.org/10.1108/JOSM-09-2014-0254.
WHO, 2016. Framework on Integrated, People-Centered Health Services. World Health Organization.
Winograd, M., Hais, M., 2014. Washington, D.C. In: Jacobs, C., Stone, B. (Eds.), How Millennials Could Upend Wall Street and Corporate America, Governance Studies at Brookings.
Wolf, Jason A., 2017. The state of patient experience 2017: a return to purpose. In: A Report on the Beryl Institute Benchmarketing Study. The Beryl Institute.
Wu, L.L., Li, J.Y., Fu, C.Y., 2011. The adoption of mobile healthcare by hospital’s professional: an integrative perspective. Decis. Support Syst. 51 (3), 587–596. https://doi.org/10.1016/j.dss.2011.03.003.
Wu, J.H., Wang, S.C., Lin, L.M., 2007. Mobile computing acceptance factors in the healthcare industry: a structural equation model. Int. J. Med. Inf. 76 (1), 66–77. https://doi.org/10.1016/j.ijmedinf.2006.06.006.
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