In Smartness We Trust: How Consumers Experience and Balance Smart Device Personalization and Privacy Concerns

The applications of artificial intelligence (AI) technology in various aspects of marketing communications and management have increased exponentially in recent years. Among all the potential benefits, “personalization” has been said to offer one of the most powerful means of enhancing user experience and connecting with consumers in context through AI’s ability to recognize patterns from data (Huang & Rust, 2021; Montes, Sand-Zantman, & Valletti, 2019). At the same time, such systems increasingly raise privacy concerns as consumers worry about the risks associated with having their information used by companies to uncover their interests, history, and intent (Vimalkumar, et al., 2021). This predicament is reflected by an Accenture survey that found 83% of the responding consumers willing to share their data to enable a personalized experience, but, at the same time, about 40% of them felt most companies used their data to engage them in a “creepy” way (Accenture Interactive, 2018). Similarly, while half of the U.S. homes now have access to smart speakers (Loup Ventures, 2019), over 40% of the smart speaker users are concerned about issues related to trust, privacy, and passive listening (Perez, 2019). It is evident that consumers are conflicted between their needs for relevant customer journey through personalization and distrust of such smart systems/technologies.

While many scholars have attempted to understand the dynamics of this personalization-privacy paradox (PPP) (Cloarec, 2020; Karwazi, et al.; Zeng, et al., 2021) and the motivators for smart device adoptions (Lee & Cho, 2020), industry practitioners are trying to figure out the best strategies to utilize smart devices as personalized media or brand engagement platforms without alienating the consumers (Bullard, 2019; Kemp, 2019). The consensus thus far is that it is challenging to configure a service/device with desirable personalization while alleviating private concerns as there are many contexts of interactions and consumers have different valuation of privacy and therefore preferences (Karwatzki, et al., 2017; Lee & Rha, 2016). As smart home
devices continue to evolve and AI technology advances, consumers are experiencing such
Internet of Things in their daily lives with increasing frequency and extent (Consumer
Technology Association, 2020; Harbor Research, 2020), possibly shaping how they consider the
roles of privacy and personalization. The progressively more convenient and easier interactions
with these devices in consumers’ everyday life also suggest a growing intimacy with and even
trust of these devices when consumers balance the personalization benefits with their privacy
concerns (Ferraris, et al., 2020). In other words, as today’s consumers integrate more and more
smart devices into their daily lives, it is unclear how the newfound, deeper experiences with and
the motivations of using these devices play a role in the deliberation of the personalization-
privacy paradox. Another aspect of such human-machine interactions is the growing importance
of the “trust” construct in this process. Cannizzaro, et al. (2020) have consistently argued that
“trust” is the cornerstone of understanding the adoption of smart homes as it conveys value and
meaning. Yet limited studies have addressed trust in the content of both smart devices and PPP.

As Ameen, Hosany, and Tarhini (2021) suggested, consumer interaction with cutting-
edge technologies is still at an early stage, and there is evidence that consumers are increasingly
seeking to influence the technology around them rather than being passively affected by
technology. Such a dynamic has significant implications on the consideration of personalization
vs. privacy. Furthermore, consumers are likely to experience several technologies
simultaneously, but many studies have focused on interactions with one technology at a time
(Ameen, et al., 2021; Barwitz & Maas, 2018). This study attempts to examine the balancing act
of personalization and privacy concerns in the context of smart devices that consumers
experience regularly, both passively and actively. Using the qualitative method of in-depth
interviews, the current study explores thematically the interaction and dynamics of
personalization perceptions and concerns over privacy issues associated with the usage of single and multiple smart devices, and how motivation, experience, and trust might shape the process.

**Literature Review**

In this study, smart devices are defined as home-based, context aware electronic devices that allow for remote access, control, and management through networked, often AI-enhanced, smart technologies (Silverio-Fernandez, Renukappa, & Subashini, 2018). The smart home market is expanding rapidly in the United States with a household penetration rate of 40% in 2021 (Smart Home, 2021). As far as privacy issues are concerned, studies have found conflicting results regarding the role of privacy in consumers’ adoption of smart home devices. While some suggest that users’ desires for connectedness and convenience affect their privacy concerns and there is no significant relationship between resistance and privacy concerns (Hong, Nam, & Kim, 2020; Zheng, *et al*.), others indicate that privacy protection is a major challenge for smart device use (Cao & Liu, 2020; Niknejad, *et al*., 2020). From the perspective of personalization, which can be defined as the ability to proactively tailor products/experiences to individual consumers based on personal and preference information (e.g., personalized ad or services) (Karwatzki, *et al*., 2017), scholars have identified the benefits of personalized engagement through smart technology in enhancing customer-brand relationship (Kumar, *et al*., 2019), and concerns of privacy and exploitation as major barriers of technology enabled personalization (Riegger, *et al*., 2021). Overall, personalization itself does motivate information disclosure in general and personalization increases the perceived benefits of a service (Karwatzki, *et al*., 2017).

In terms of the PPP literature, researchers suggest that the paradox continues to exist because while consumers recognize the value of personalization, marketers’ extensive use of personal information to offer such personalization often raises privacy concerns, and information
technology is largely ineffective or too sophisticated for consumers (Cloarec, 2020). Different factors such as consumer characteristics and technology use contexts seem to affect the balancing act. For example, the so-called privacy fundamentalists have a high disposition to value privacy and thus are less likely to disclose information (Awad & Krishnan, 2006); consumer involvement, self-efficacy, and technology optimism tend to affect the paradox consideration (Lee & Rha, 2016); personalization declaration and privacy assurance are effective in tipping the balancing act (Zeng, et al., 2021); and a consumer’s privacy valuation often interact with situational characteristics (Karwatzki, et al., 2017). Nevertheless, while some studies in PPP have touched on users’ situational contexts and innate characteristics (Gerber, Gerber, & Volkamer, 2018; Karwatzki, et al., 2017), few have considered the factor of motivations in the process (Strycharz, 2019; Tyrainen, Karjaluoto, & Saarijarvi 2020).

The consideration of personalization vs. privacy when using smart devices is largely an act of risk-benefit trade-off assessment. Extant literature suggests that both consumer and technology characteristics influence consumers’ perceived benefits and risks of technologies. Specifically, literature in privacy calculus proposes that consumers calculate the costs and benefits of information disclosure and both personalization benefits and privacy costs should be examined concurrently for insights on the balancing predicament (Zhu, et al., 2017). While this risk-benefit assessment grounds the current study, our proposition is that as smart devices become more widely adopted, personally integrated, and easier to interact with, consumers might experience a greater sense of control (or greater desire for control) and therefore have different perceptions toward the risks and benefits associated with smart devices (Zhu, et al., 2017). The intimate and/or repeated experience in one’s daily life might also enhance the affective dimension when the user assesses the value of a smart device. In addition, the motivations
behind the integration of these smart devices into one’s life present interesting questions about how the personalization benefits might be evaluated differently.

Furthermore, as human-machine interaction literature suggests that humans form different human-like relationships with machines (e.g., virtual assistants) through anthropomorphism and the CASA (Computers As Social Actors) paradigm (Gehl & Bakardjieva, 2016), and expect reciprocity in such interactions (Sandoval et al., 2016), the relational construct of “trust” might play a larger role in the process. Indeed, Cannizzaro, et al. (2020), in their study of smart home devices, stressed the importance of consumer trust in creating meaning and value proposition for smart home technology, while Ferraris, et al. (2020) argued that trust is an enabler of IoT devices in today’s smart environment. To examine the balancing act of personalization and privacy concerns within the context of smart devices experiences and incorporating the role of trust, the following research questions are posited in this study: RQ1) how do consumers’ motivations and experiences of smart devices shape their perceptions of device personalization and privacy concerns? RQ2) how does trust play a role in the deliberation of device personalization benefits and privacy risks?

Method

The target population of the study is consumers who have at least one smart device at home and use it/them on a regular basis. Based on the aforementioned definition, smart device examples include speakers/displays such as Amazon Echo and Google Nest family, smart home security system, smart home appliances, and so forth. The regular basis means that consumers are using the smart device(s) at least once a week. In-depth interviews were conducted to collect data (Creswell & Poth, 2018). Specifically, the laddering interview technique (Reynolds & Gutman, 1988) was used to explore consumers’ experiences and perceptions regarding the
personalization and privacy concerns associated with smart device usage. Guided by Means-End theory, the laddering interview refers to an in-depth, one-on-one interviewing technique that is useful to understand how consumers translate the attributes of products into meaningful associations with respect to self (Reynolds & Gutman, 1988). The laddering interview technique has been proved to be an effective tool to uncover consumers’ motivations in the context of Human Computer Interaction (Abeele & Zaman, 2009). Based on the purpose of the study and the logic of laddering interview, an interview guide was developed including questions such as the following: Tell me about how you typically use the [SMART DEVICE]? What are some reasons that you decided to purchase the device? How is your experience so far using the [SMART DEVICE]? What do you like/dislike about the experience? What do you like about your [SMART DEVICE]? What is important about that? What does that do for you? What do you think about having a smart device that can personalize its functions/content according to your preferences? Why is personalization important/not important to you? What does that do for you? Do you have any privacy concerns over the use of the device? What are these concerns? Why is it important to protect your privacy when using these smart devices? What does that do for you? Do you trust your [SMART DEVICE] in terms of privacy protection? How so? Would you trust different home smart devices differently? How so? Are there situations that you would trust your [SMART DEVICE] more or less?

Since qualitative research is an emergent design (Creswell & Poth, 2018), during the interview process, the interviewer might change and adjust the interview questions based on participants’ responses. Given the pandemic situation, all the interviews were conducted, recorded, and transcribed via video conference software of Zoom. Previous research suggested that Zoom is an accessible, convenient, and effective tool to collect interview data (Gary, et al.,
Each interview lasted around one hour. Purposive sampling and snowball sampling were used to recruit participants (Creswell & Poth, 2018). Specifically, two researcher assistants’ social network was used to recruit initial participants, and after that each participant was asked to recommend other participants until the point of saturation was reached (Corbin & Strauss, 2008). In total, 30 consumers from 19 to 55 years old with diverse ethnic backgrounds participated in the study. Among the participants, 21 were women and 9 were men whose occupations include engineers, professors, communication professionals, programmers, doctors, managers, and so forth. All participants own 1-10 smart devices, with smart speakers as the most popular one, followed by home devices like smart pet camera, security camera, plugs/switches/lights/bulbs, TV, thermostat, vacuum, and so on (see Table 1).

Thematic analysis technique and NVivo 12 plus were adopted to analyze data (Miles, Huberman, & Saldana, 2018). Firstly, the researchers took extensive notes throughout the interviews, listened at least twice to each recording, input all the transcripts into the software of NVivo, and read each transcript at least two times. Secondly, the researchers identified and compared repeated or similar words, phrases, and sentences appearing in every transcript assisted by the exploration function of NVivo; generally, 20 to 30 codes were generated in each transcript. Finally, the researchers clustered the invariant codes into themes. During this phase, the researchers focused on the internal relationships and structures of the codes and grouped them into appropriate themes. Quality control measures include member checking, peer debriefing, and external auditing (Creswell & Poth, 2018).

Findings

Guided by the two general research questions, themes emerged from the current set of data with a focus on three domains: product experiences, personalization cost-benefit
perceptions, and privacy concerns/trust. The consumer journey with their smart devices starts with product purchase/reception, usage, and perceived benefits/drawbacks activated and sustained by the underlying product motivations which often existed in conflict with their privacy concerns that were heavily influenced by the type and amount of information their devices handled. In this context, the classic paradox is experienced: while users recognize the benefits of personalization in their use of smart devices, personalization also trigger privacy concerns. The existence of these privacy concerns (related to personalization or not) created the need for coping mechanisms in the users’ behavior. Alongside these coping strategies, potential solutions that would alleviate users’ privacy concerns were discussed (see Figure 1).

**Domain 1: Product Experiences**

**Product purchase journey: active acquisition vs. accidental ownership**

Smart device purchase motivations seemed to run along the projected uses of the device, and were also influenced by factors like price, brand, novelty, and peer influence, among others. However, an interesting finding arose regarding how often smart devices were gifted, as opposed to sought after by the user. The smart devices that tended to be offered as gifts were overwhelmingly smart speakers, suggesting that other smart home devices that have a more specific purpose (such as cameras or thermostats) are a more involved, purposeful purchase. Another interesting finding was the relationship between trust levels and the active acquisition vs. accidental ownership of smart devices. The general trend among participants was a significantly lower proportion of trust among those gifted a smart device, compared to more trust among those who sought the purchase themselves, suggesting that the levels of trust were shaped by the active involvement of the purchase decisions and ownership process. Like Katie and Robert indicated that their smart speaker was a gift from others and later in the interview they
both displayed a lower-level trust of their smart device compared to other smart device users.

Katie (20, undergraduate student, owner of one smart speaker): “I don't think that it's something I would have purchased myself just because the want for it wasn't enough for me to purchase it with my own money.”

Robert (28, graduate student, owner of one smart speaker): “I did not purchase it, it was given to me for Christmas last year, and I didn't want to put it up for a long time.”

**Product experience orientation: basic vs. desired but constrained full functionality**

As smart speakers are the most adopted smart devices, using their smart devices for music or entertainment was prevalent across participants. Some described their smart devices as “glorified speakers.” Interactions with the device for news, information, weather, and traffic was also one of the main uses of smart speakers. Setting up timers or reminders is another popular use. Among the users of both smart speakers and other smart device types, controlling the lights and checking in on their home while away were also frequent uses of the smart device. While the use of these devices as a “smart hub” to control different aspects of the house seems to be underway, particularly for power users, users of smart speakers seem to utilize their devices for the most basic functions without yet unleashing the whole potential of smart home technologies. Some users appear to not see the need, while other users like those applications but are unable to use them due to time, knowledge, or resource constraints. For example, they either feel the functions too complicated to set up, or are unaware of the possibilities offered by the device, or perceive them as too expensive as discussed by Caroline and Adam:

Caroline (19, undergraduate student, owner of one smart speaker): “I would use it for music stuff or setting alarms, reminders, things like that. It's kind of double like a speaker. Also, mostly for like, yeah like music, notes, checking weather, like simple things. Just as I need stuff and I don't really have the time or I'm moving around. And don't really want to look things up myself.”

Adam (21, undergraduate student, owner of 4 smart home devices): “I'd love to get to the point where I have an Alexa controlled room but those things are really cool but also like $600. The Smart blinds, things like that, I'd really like to fully automate my home because that can be pretty gnarly.”

**Product experience values: convenience, conservation, coolness, and control**
Users seemed to agree on one thing: the big thing these devices have going for them is the convenience they brought to their lives. Participants also consistently referenced the ability to multitask, conserving resources (ranging from money to environmental concerns to physical efforts), the immediacy of responses, and the novelty of having a cool device as the values of these devices. Additionally, the potential use of their devices as a one-stop hub to control other devices was very prevalent as a perceived benefit. The breadth of content these devices have, their ability to help users with planning and organization, the worry-free nature of adding tasks without interrupting what they are doing, and the visually pleasing aspect of their devices were also relevant to the participants. Overall, the values mentioned suggest a liking for uncomplicated devices that make life easier for the user as expressed by Felix and Peter.

Felix (30, communication specialist, owner of 10+ smart home devices): “It’s just something that I can do without having to reach into my pocket or, you know, if my phone is on the couch, somewhere else, it’s a convenience thing.”

Peter (37, postdoctoral researcher, owner of 4 smart speakers): “It’s just easier to ask it a question like what’s the weather or to set a timer for something than it is to look at a screen and punch buttons and try to figure it out that way so it’s- it’s convenient.”

Product experience frictions: un-smart operational challenges and lack of user-friendliness

Aside from the privacy concerns, the main drawbacks of smart devices from the participants’ perspective were functionality challenges and lack of user-friendliness. All participants at different levels of product usage appeared to have encountered experiences when their devices were glitchy, chimed in uncalled for, or they did not get them to do what they wanted. If they must work hard to troubleshoot their devices, they feel that the smart functions may not be worth the hassle. Kim, an owner of multiple devices, vividly described her frustrating experiences:

Kim (26, communication specialist, owner of two smart home devices): “You know, it’s kind of finicky-like sometimes you try to turn on the lights, and it doesn’t. It seems to be really finicky about when you push the button, it doesn’t always turn on the first time, and I just didn’t feel like
it added that much value to my life because you have to open up the app, find the, find the button to the outlet and then turn it on and then it doesn't turn on the first time, so you may have to like, turn your Wi-Fi on and off again on your phone, and then eventually you get it to connect and then your lights turn on. And it was like, for that much effort, maybe I could have just walked to the other side of the patio and plugged it in.

**Underlying motivations: peace and fulfillment - quality of life through “smart” things**

On a deeper psychological level, the interviewers revealed the underlying motivations for using smart devices to be to soothe anxiety and achieve peace of mind, to attain a sense of safety and protection, to feel fulfilled and accomplished, and to have time for meaningful things rather than menial tasks, among other motivations. Overall, these motivations seem to point out a desire to unload and feel at ease and truly at home through the use of “smart” things – things that would help the users to achieve better quality of life. Although these motivations are multi-dimensional and can be influenced by the type of device owned due to their inherent functions and complexities, there is a general feeling that these devices can free the users from daily-life concerns and help with their well-being in a variety of ways, which brings a sense of fulfillment or enrichment to them. Daisy’s and Luna’s quotes well demonstrated the above points.

*Daisy (46, program manager, owner of two smart home devices):* “Well, I think everyone wants to have a decent life and so it’s, it’s already tough enough this year. And yeah, so you want to have a better life and feel more comfortable whenever you can (...) because life is already tough enough, and if you can make it easier and simpler, why not?”

*Luna (24, graduate student, owner of one smart speaker):* “I guess it makes me feel good because I feel like I’m becoming more of a, like a well-rounded person, like I feel like I’m getting more information and knowledge on things that I wouldn’t have otherwise, so I feel like better educated and like better prepared for like conversations, if something like that were to come up.”

**Domain 2: Personalization Cost-Benefit Perceptions**

**Personalization benefits: tailored recommendation and high relevance**

When asked about the personalization aspect smart devices bring, users seem to understand the benefits of the concept and would be open to utilize personalization options to increase their convenience, but they take this ability with a grain of salt as it comes with some
associated concerns. Overall, pro-personalization attitudes were mostly observed among younger users, but were also prevalent among users over 40. These users reveal being impressed by the product’s capabilities and see the added convenience of these features. Among the positive aspects of personalization, they point out how it leads to better recommendations and to the device “feeding” users things that are important to them versus standardized or unrelated. Because their devices understand them better this way, personalization can make smart devices smarter. As the below quotes indicated, Daisy and Eve discussed how they enjoyed the tailored and relevant content their smart devices offered to them.

Daisy (46, program manager, owner of two smart home devices): “When I want to listen to music, I want to listen to the music I like. Echo knows which kind of music I like, instead of like if you use like regular radio to play like, you know, choose the station and play the music. And if you hear something you don't like you have to switch the station. It just takes time and- It's convenient. It's fast, because if you only have 10 minutes you don't spend 5 minutes to choose what you want to listen to.”

Eve (32, teacher, owner of 10+ smart home devices): “It also learns our patterns, which by the way, it now knows, usually, unless- I don't know how it figures it out, but now I don't ever really have to wake up to turn the air down because it already knows that I like the house at 72 at a certain time. So that's also lovely. I think that some people are bothered by technology or devices learning their behavior or witnessing parts of their behavior or speech or whatever; that has not ever been a concern for me. So I like it. I think it serves its purpose. I think when I bought it, that's one of the selling points was, that it would learn my behavior so that I didn't have to do the same thing each and every night.”

**Personalization risks: echo chamber and loss of control**

While the users enjoy the benefits of personalization, the ability of smart devices to personalize their functions and, even, infer user patterns, can trigger concerns. The two main concerns mentioned by users in this regard were the creation of echo chambers and their own agency in making choices. The creation of personalized bubbles or echo chambers was concerning for users because it can profile them in a certain way, or feed information to them in a way they do not feel necessarily comfortable with. Relatedly, users want to benefit from personalization but remain in control of their choices. They appear to like personalization as long
as it is something they actively input in the device, but overall do not like the idea of the device “taking over” certain decisions. Austin and Mia discussed each of the above-mentioned personalization drawbacks, respectively.

*Austin (27, graduate student, owner of two smart speakers):* “But in theory, how do I feel about it? At face value, I would say it's a good idea, but I would say eventually that it starts kind of becoming an echo chamber of what you want. For instance, I love horror stories. You know, and when I start initially stating, hey, you know, tell me a story. They're going to be more scary or spooky and themed. Cool. That's something I enjoy- However, what if I'm stating now ‘tell me the news’” and now they only tell me scary or bad news because maybe that’s something I like, that's not what I would want. You know, it just has to be a whole array of normal things going on in life. So, it just depends, their algorithm to be able to tailor to my needs, but it's not always the same thing, a hundred percent of all the time.”

*Mia (25, graduate student, owner of two smart speakers):* “I think it's cool, I think- I think it's cool to an extent, I want to be able to control that though, like I want to overtly tell him what my preferences are on the app on my phone. I don't want it to guess my preferences because it's been listening to me.”

**Domain 3: Privacy Concerns and the Role of Trust**

Privacy, or the lack thereof, is one of the main topics associated with smart home devices. It is also a multi-dimensional concept, with users’ understanding of privacy risks from a variety of perspectives. However nuanced, most users did acknowledge some level of concern regarding their privacy in their use of smart home devices. The general sentiment surrounding smart devices in this regard was a discomfort, uncertainty, and unfamiliarity with the process of data privacy and where their information goes once it is captured by the devices. A sharp juxtaposition exists between consumers’ perception of their right to privacy, alongside their acceptance for the ‘status quo’ of data protection, which has led to a certain measure of cognitive dissonance between device use and perception of safety. Logically, those use a large number of smart devices concurrently tend to exhibit the least sensitivity toward privacy risks.

**Privacy concern acknowledgement: social agreement and privacy calculus**

There is a general agreement of the existence of privacy concerns across users. Along these lines, users also acknowledge that these devices are always listening and scanning. Some
accept it as they understand companies need to do this to improve their products, and some
accept it as part of their privacy calculus, like Robert and Eve expressed in the following quotes.

Robert (28, graduate student, owner of one smart speaker): “I mean there’s a certain amount of
risk you incur with all smart devices, with anything that's connected to the internet. That's the
social agreement that we've all come to with smart devices in the age that we live in.”

Eve (32, teacher, owner of 10+ smart home devices): “I don't deny- I think that there's
information being collected about me. I do believe that. 100%, but do I care? No, not really.”

Main privacy concerns: over-commercialization, data vulnerability, and covert surveillance

Among the main privacy-related concerns expressed by users, advertising, data breaches
or mishandlings, a feeling of being exposed or uncomfortable in one’s own home and not
knowing exactly what the devices know about them were the most recurrent themes. Regarding
advertising, although there is a general understanding of marketing practices and targeted ads
“can be expected,” users still feel somewhat uneasy about this practice, particularly if it is things
that only their smart home devices would know compared to, for example, things they would
have willingly typed in their phone or computer. There is a distinction in the users’ eyes between
things they have actually searched for or just mentioned in conversation as to how they feel
about ads. For data breaches or mishandlings, there is a general worry that smart devices can be
hacked into. Users feel like their data are vulnerable, and the potential consequences of this,
whether it is financial fraud, stolen identity or location tracking, cause them to proceed with
cautions. For the feeling exposed or uncomfortable at home, users felt that smart home devices
might be menacing the perception of the home as one’s safe place, because there is an external
presence incorporated through the use of smart home devices. Finally, users are wary of smart
home devices because they are unsure of what information the device is collecting and storing.

Kim (26, communication specialist, owner of two smart home devices): “I already get really
really specific targeted ads. I get ads for things that they shouldn't know that I wanted that. And
so, you know, I try not to be conspiracy theory about it, but, you know, sometimes I do feel like
the device is listening when I get really specific targeted ads.”
Mia (25, graduate student, owner of two smart speakers): “Um, because, well, because potentially I guess they could get hacked into, and people can steal your information and use it in whatever ways... because I don't want people using my information, like stealing my identity or anything like that, or I don't know, you never know what bad people are going to do.”

Charlotte (24, engineer, owner of one smart home device): “So it's listening and, you know, I really have nothing to hide, but it just, it's almost a little eerie, you know it's like you have a third person sitting there listening to your conversations and, you know, a lot of people don't think twice about it or they don't really care but I didn’t like it. And I just didn't - it made me uncomfortable.”

June (20, undergraduate student, owner of one smart speaker): “The reason I feel strongly about it just has to do with the unknown, like if I kind of knew exactly like what these devices were capable of, why they would need certain information.”

Other concerns mentioned by participants included surveillance such as cameras seeing inside their home, which is perceived as more invasive than just listening. Physical safety concerns were also recurrent, with third parties potentially being able to cause them harm due to information learned through the smart devices. Overall, concerns seem to cluster around a lost sense of home as a safe space like Sydney stressed, (55, engineer, owner of two smart home devices) “Because your home is your castle...it's where you expect the most privacy.”

Concern determinants: types of information and levels of concern

The aforementioned concerns seem to be heavily determined by the type and amount of information the device knows about them. Participants expressed that some forms of data collection make them more or less uncomfortable than others. In essence, for those with privacy concerns working to balance them with their interest in personalization, three areas of information were identified that spark discomfort: financial information, identification/personal information, and medical information. Outside of these forms of data, most participants felt comfortable with sharing elements of their life with the smart devices. The litmus test for whether the impact of the information caused discomfort often involved two questions by the user: Is there potential for this information to cause me harm? Why does the device need to know
this information, and can the goals be accomplished without it? Interestingly, users seem less concerned about information that their phone would have known anyway, because they consider that information to be already “out there.” For them, the added-on smart devices do not represent an extra privacy threat if the information they learn is redundant with what is on their phones.

Caroline (19, undergraduate student, owner of one smart speaker): “I put you know my to do list or put my song choices and I see it around like it's not that big of a deal but printing like credit card information or addresses I think that's a little scary, and the fact that it has the IP address like of your home. It's a little scary too.”

Peter (37, postdoctoral researcher, owner of 4 smart speakers): “The amount of information that the smart speaker can gather about me is pretty minimal compared to my phone… I mean, a smart speaker can pick up audio but your phone can already do that, so like it's kind of redundant. Like your phone can already listen in to all kinds of things. And we know that the NSA, does it and can do it. Technically, we know that technologically it's possible, we don't know how often they do it or anything, but, like, the smart speakers are kind of redundant, they don't really add much to the equation like the phones are- the vast majority of the time the phones are much closer to us, and could hear a lot more.”

Trust variability by device and user types

Varying degrees of trust in their devices exist as a result of perceived privacy risks. Specifically, users displayed different degrees of trust across device types/brands and user types. For device type, there were slight differences in trust among participants and their chosen devices; however, no significant difference in trust across devices was found, suggesting that trust in smart devices may be highly personal, and less related to the product itself. For user type, power users within this study expressed low overall trust in their devices despite having 7 to 10+ smart devices within their home, implying that trust is less impactful on usage than the values the devices derived for this type of users. For smart device brands, strong differences exist among the makers of the most popular smart speakers. Users consistently referenced the differences in privacy practices among Apple, Amazon, and Google. While Apple seems to be regarded as the one with strongest data protection practices and appeared to be the most trusted, users had mixed attitudes toward Google, and generally negative ones toward Amazon in terms of their privacy
protection. One of the main reasons ventured by users was that Apple and Google, having an ecosystem of devices/services as their core business, had the most to lose from information breaches or mishandling of data, whereas Amazon is less bounded by this aspect, potentially causing the company to place less emphasis in user privacy protection. Google Home’s trigger word (Okay Google) also seems to offer some sort of perceived privacy protection as the structure is harder to come by in conversation than things sounding like “Alexa” or “Siri.” Kim compared Apple and Amazon and explained in detail why she trusted Apple more than Amazon.

Kim (26, communication specialist, owner of two smart home devices): “Well, I mean, Apple has made a really big deal lately, out of their privacy. And I feel like it's in Apple's best interest to protect our privacy because they're selling us devices. Right? And we want to be safe on those devices, whereas Amazon is selling me goods and services, like- goods, mostly, right? So what is their motivation for protecting my privacy, right? Like Apple, if, if people found out that they couldn't trust their Apple devices, then people wouldn't buy Apple devices, which is primarily what Apple does. Whereas with Amazon selling these echo dots, that's not their primary business, they're selling you products that they want to target to you.”

**Personalization-privacy balancing: value-driven acceptance vs. strategic coping mechanism**

Users are applying both passive and proactive strategies to cope with their privacy concerns. For the passive group that had a low level of concern toward their privacy while using the product leaned most into the sentiment that data collection is simply a fact of modern life, an acceptance of the ‘status quo.’ Additionally, participants reported their understanding of the data’s anonymity led to their comfort in using these products. These users seem to find comfort to cognitively disassociate with the privacy issues when using the devices. There is a general sense of hopelessness (it is just what these products are built to do) and of trying to forget about the privacy issues until something triggers the concern again. On the other hand, the active group adopted a selective privacy coping strategy by limiting the things their devices can know, mostly by not inputting certain information to their devices.

Spencer (21, sports journalist, owner of one smart speaker): “I'm not really sure if there is a way to balance that, to be honest. I mean I think it's really just like one or the other. Like if you have
one of these devices you kind of just got to accept the fact that it's, it's, collecting information on you. So yeah, I'm not certain that balance even exists.”

Adam (21, undergraduate student, owner of 4 smart home devices): “Nobody knows that specific thing, it's just all anonymous data.”

Mia (25, graduate student, owner of two smart speakers): “If I were to think about it and like really do do research on it and find out that it was listening all the time, I would- might get rid of it but at this point, it's something that I'm just letting myself be blissfully ignorant about.”

Felix (30, communication specialist, owner of 10+ smart home devices): “If you're being incredibly nefarious, like can you see this? It has a little switch where you can turn off the mic if you want to. So like if you really are doing something that you don't want them listening to like whatever intimate moments that you don't want them listening in on you can always just flip that switch and it's totally fine or unplug it.”

Personalization-privacy balancing enablers: education and control

According to the respondents, the most beneficial aspects that would help them feel more at ease in their use of smart home devices are user-friendly education (i.e., properly understanding the device and its capabilities via simple, short, and easy to follow means), improved transparency practices from the companies that manufacture these devices, and increased opportunities to consent, opt out or actively choose what the devices can do or learn. This suggests that users would be more comfortable in their use of these devices if an informative relationship could be established with the device makers, and if they felt they had their best interests in mind. Note that the means/format of information, interaction, and control assistance all must be easy to access and digest. Kim, Amy, Abigail, and Lily discussed the different solutions mentioned above.

Kim (26, communication specialist, owner of two smart home devices): “I feel violated when I don't give consent. So, I, I think, again, it's- it's not really like a positive-feeling but it's that lack of negative. It just- when I don't consent to things, and they do it anyway, I feel violated. And so, I like to be able to give consent, and to have control over that so I can protect myself from feeling violated by these devices.”

Amy (23, undergraduate student, owner of one smart speaker): “I think that that's also partially needing more education on my part as the consumer in terms of what is done to protect the privacy of the consumer and like how that auditory data is used. I think that if I understood the process better, I'd be a lot more comfortable.”
Abigail (21, non-profit manager, owner of one smart speaker): “Well, because most of the time it's very long, and I don't want to read a whole privacy statement. I feel like it was more like a gist of what privacy entails. I would be more intrigued by it but it's just too long and time consuming, so I just it's just something I skipped through because you're not required to read it.”

Lily (19, undergraduate student, owner of one smart speaker): “I feel like if there was more transparency and like I knew for an absolute fact that my information would not that type of information would not be shared, or like stored in a certain way, then I would feel a little bit more open. But I've just grown up with being taught like you know be hesitant with what you put online so things that you generally have hesitate with those types of things.”

Discussion

A key characteristic of digital marketing is its ability to customize product/service offerings intelligently. In recent years, an increasing number of AI applications in the form of smart devices are growingly ingrained in consumers’ daily lives. As such machine-human interactions expand in frequency, formats, settings, and intimacy, little is known about how consumers deal with this paradox of smart personalization-privacy, considering the changing status and value such smart devices bring to consumers. This study aimed to delve deeper into the use of smart devices through such lenses. The findings offer insights on how consumers navigate the balancing of personalization-privacy and thus strategic implications for marketers as smart devices become an important conduit to connect with today’s consumers.

In addressing the motivation and experience aspect of smart device use from RQ1, the issue of control emerged as one of the main constructs. Feeling in control at all stages in their consumer journey with smart home devices (from purchase to use, to personalization options, and privacy protection) was perceived as particularly important for users. In contrast, the absence of control led to frustrations and mistrust, affecting not only their experience with their smart devices but also the outlook regarding future purchases. The issue of control appears to be indirectly related to the degree the users could enjoy and fulfill their ultimate underlying motivations in their use of the device: if, ultimately, smart home devices can help users attain a
sense of comfort at home, peace of mind, a sense of safety, or even feelings of fulfillment and accomplishment, this cannot be achieved without a prior sense of the user of being in the driver’s seat when it comes to products dwelling in the privacy of their own home. The issue of control, therefore, might be more crucial in this context compared to other devices like smartphones and computers because of the inherent privacy expectations in a home setting. The concern for the loss of control, in various forms such as how personal data is used, how the environment is programmed, or what content is presented, might contribute to perceived risks (see Figure 2). In sum, improving the affordance of control would be especially important in the context of smart devices for developers, device makers, and marketers as smart devices continue to grow in functionalities and capabilities.

Regarding personalization, while relevance might be the generally perceived benefit, there appear to be extreme attitudes among the study participants: either they understood and desired the possibilities brought about by smart home devices’ personalization technologies, or they did not think of them as relevant and applicable to their current lifestyles, or even both. These attitudes seemed to be highly personal and did not reveal patterns across age groups or type of device owned. Again, personalization was one of the territories where users longed for more control over exactly what the devices were able to personalize and how, to avoid privacy concerns and collateral effects like the creation of echo chambers. There also seemed to be different interpretations of the actual meaning of the concept of personalization: some participants interpreted it as features they could actively input in their devices or tell their devices they like, and some participants interpreted it as inferred patterns of machine learning. The variation in attitudes, as well as the confusion surrounding concepts like customization versus personalization, might suggest that better literacy on smart devices’ personalization
capabilities could increase trust and positive sentiment around personalization.

Regarding the central theme of privacy, concerns arose among many of the participants within key categories like advertising, data breaches, discomfort and exposure, and uncertain data practices. Much of this discomfort came from the unknown ways in which data are being used in the consumer experience, and whether information collected could be used to 'harm’ the user. Many participants cited personal anecdotes of seeing advertisements that reflected recent conversations and some pointed to specific instances of data mishandling or breaches that raised concern. One of the most common qualifications of privacy concerns was specific to the data being collected. Participants felt the amount and type of information being collected by the device was most important in determining the level of concern. They pointed to personal information such as social security numbers, addresses or medical history, as well as financial information as being areas of discomfort in data collection. However, the risk assessment over the magnitude of the information collected and the propensity for that information to cause harm to the user if mishandled seem to be mitigated by the participants’ perceived values derived from the smart device usage experience and the transparency of “purposes.” There are significant strategic implications regarding these findings. For instance, transparency in the functions served by the specific user data collected might highlight the value of the data to appropriate user segments and thus ease their personalization-privacy predicament.

Concerning RQ2, besides the factor of control, the aspect of active involvement seems to also play a role in the privacy calculus and trust level. In general, there was a lower level of trust and more hesitations with device usage among those gifted a smart device. This finding supports Lee and Rha’s (2016) suggestion that consumer involvement affects the PPP deliberation. The active involvement in device acquisition indicates a more motivated state of consumption, which
might contribute to the level of trust and valuation of the benefits of smart device personalization. The usability or user-friendly experience seems to also affect the balancing act of personalization vs. privacy (see Figure 2). As it impacts the extent of realized functionality, sense of control/comfort, and frustrations from the “un-smart” moments, a “friendly smart” device might elevate the value of its personalization during the PPP consideration.

This study also implicated distinct differences in consumer perceptions of various smart device brands. Among all brands mentioned within interviews, Amazon appeared to garner the least trust from users. Two lines of reasoning emerged behind this lack of trust: first, Amazon’s focus on commercial goods and perceived likelihood to use data to boost sales, and second, the fact that Amazon is not perceived as a tech company basing their operations around an ecosystem of technologies and smart devices. Participants claimed Amazon would have less to lose from a data breach or data mishandling than other brands because technology is one small aspect of their business models. A few participants also expressed additional hesitations about purchasing unbranded or lesser-known brands from Amazon’s marketplace. Google seemed to foster more trust among users when compared to Amazon. While participants still expressed similar privacy, personalization, and control concerns within interviews about Google devices, the perception of Google was more positive relatively. Participants seemed to believe Google’s focus on data and tech would result in more security and data breach protocols. Finally, users perceived Apple’s security and privacy policies to be robust, albeit still foreign to many participants, and felt a great deal of trust toward the brand in comparison to common smart device brands like Amazon and Google. The fact that a sizeable number of participants pointed out that improved transparency practices and clearer privacy agreements would improve their trust in their smart home device experience also strengthens the notion that the brand that owns
or makes the device and its privacy policies and practices are influential in the privacy-trust relationship, and a factor of consideration in the user’s privacy calculus. The expressed brand preferences suggest the significance of an ecosystem-based service/business model in gaining consumer confidence when they balance between personalization and privacy. The collective experiences in different product settings seem to elevate consumers’ trust on these brands.

This study contributes to extant literature in three aspects. First, it affirms that privacy continues to play a role in how consumers use their smart devices and perceive personalization (Cao & Liu, 2020), and PPP is still an issue in the context of smart device usage (Cloarec, 2020). However, personalization itself conveys no meaning until the users place them in the perspective of value in their daily lives and this is strongly dependent on user types. In addition, privacy concerns are even more contextual for these smart home devices because their values can be learned over time through experiences. Second, previous PPP studies on other technologies have often suggested the instrumental role of consumer and situational characteristics in the deliberation of personalization benefits and risks (Karwatzki, et al., 2017; Lee & Rha, 2016), this study further identified the essential role of technology “friendliness” in the process. These smart devices must be reliably smart and friendly. Technology unfriendliness and/or un-smartness may alienate users and act as triggers of privacy concerns. Finally, privacy calculus in the smart device context might be somewhat different from other technologies from the aspects of motivations in attaining a better quality of life and of the integration of multiple devices. Here the users might evaluate personalization in a more “holistic” approach instead of focusing on specific benefits. The fact that some respondents conveyed a low level of trust for the 10+ devices that they use regularly or used the litmus test of whether certain information existed on their smartphone as an assessment of privacy concern is indicative of this holistic approach.
Future research could expand on a variety of topics identified over the course of the interviews and data analysis. First, the concept of “trust” in smart home devices seemed to be elusive and nuanced, with few participants being able to express a 100% yes or no answer. Studying the determinants of trust in smart home devices can be an interesting research avenue to predict the ways in which users will be confident and comfortable in the use of smart home technologies. Although this was not a key point in this study, additional demographic aspects could also be included as a focus of the research on trust, in order to study whether certain populations (e.g., BIPOC) have different attitudes towards these devices based on systemic issues. Related to the issue of trust, users seemed to agree that there are information types that their smart home devices should not have access to, affecting their degree of privacy concerns in relation to their devices. Understanding exactly what those types of trigger information are can be extremely useful in shaping future privacy attitudes and options in smart home devices.

Secondly, purchase intent was revealed to be a more complex topic than anticipated, which could also reveal interesting research angles to estimate purchase intentions in different categories and study effective persuasive messaging in the marketing practices of these devices. For example, in the context of this study, purchases of smart home devices that were not speakers were more intentional, functionality- or need-based than those of smart speakers, which were more based in novelty, peer influence and, interestingly, gifting. A deeper dive into why users are purchasing different categories of smart home devices, what devices are associated with a stronger purchase intent, and how this translates into use and further adoption of smart home technologies can shed light into the role of different types of devices within the home.

Additionally, future research could uncover further layers and key concepts in the definition and use of personalization of smart home devices. Our study aimed at studying the
balance between personalization and privacy options in these devices, but the clarity the users seem to have in respect to privacy risks is not as developed in the context of personalization. This suggests that participants had a stronger knowledge and attitude towards privacy than they do for personalization, and this can be studied in the future in a variety of ways. For instance, studying the complex relationship between personalization and choice or perception of autonomy and control could expose ways for developers to help users to relieve concerns and make the most of personalization options in their use of these devices. Understanding attitudes towards customization and personalization could also be revealing to interpret current and future attitudes. Furthermore, it would be fruitful to see how “purpose transparency” might play a role in the context of understanding and appreciating smart device personalization.

Several limitations should be noted. This research is a snapshot in time of a dynamic phenomenon. Longitudinal studies would provide additional insights regarding this phenomenon. While the sample of this study is relatively diverse in demographics, there are more female than male users. Future research should recruit a more diverse sample to uncover similarities and differences. In the same vein, studies designed to explore the dynamics and variations among subcultures/subgroups of smart devices users such as power users vs. light users may enrich our understanding. This study also interviewed only current smart device users, a study of potential users and non-users would reveal the factors that contribute to the privacy risks deterring the adoption of such technologies. Moreover, this study only focuses on the U.S. consumers. To broaden the research context into a cross-cultural environment, future research may examine perceptions of smart devices in different countries and cultures. Finally, although online interview is an effective interview technique and appropriate to apply in the current situation, due to the constraint of the technology, interviewers may miss some nonverbal communication signs and possibly misinterpret interviewees’ descriptions.
Reference


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https://doi.org/10.1371/journal.pone.0231615


Table 1. Profile of participants

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Figure 1. Consumers’ perception on smart devices

Figure 2. Consumers’ personalization-privacy balancing act of smart devices